Measuring Parliamentarian Efficiency of Selected Countries in Asia: A Stochastic Frontier Model Approach

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Abstract: The aim of this study is to investigate the technical efficiency of the parliamentarians of randomly selected eight Asian Countries using stochastic frontier model suggested by Battese and Coelli (1993) and applying it to unbalanced panel data sets for the period 2002-2010. A Cobb-Douglas stochastic frontier production function with both time-variant and time-invariant technical inefficiency effects were estimated with two alternative distributions. The half normal distribution was found preferable to the truncated for the technical inefficiency effects. Year wise mean technical efficiency of the parliamentarians of eight Asian countries was found to be 44 and 55% in both distributions and the mean efficiencies of parliamentarians during the reference period was observed to be decreased. Among the selected Asian countries, China was experienced highest, Philippine and Pakistan obtained lowest parliament efficiencies. Time-variant inefficiency effect model was found to be an adequate representation than time-invariant model.

Keywords: A stochastic frontier model, Asian countries, Cobb-Douglas production function, parliamentarians technical efficiency

INTRODUCTION

In Asia, like many other parts of the world the parliamentarians plays very important role to good governance. They contribute though legislation, oversight and representation. Legislation is a process of formatting laws and bye laws that makes up a country’s legal framework. Oversight is the process of keeping an eye on the activities of the executive and holding the executive to account on behalf of the country’s citizens trough question-answer session as well as through parliamentary committees like public accounts committee. And representation is about collecting, aggregating and expressing the concerns, opinions and preferences of the country’s citizens, through the political process (TesKpo and Alen, 2009). However, despite such theoretical assertions, in practice, the role of parliamentarians especially in many developing countries are weak and ineffective and contribute little to good governance and poverty reduction. Reasons attributed to ineffectiveness of parliaments includes limited supremacy of the parliament, institutional incapacity, financial dependence on executive, lack of knowledge, experience, skill and resources of the members of parliament and over expectation of voters about their developmental works (individual and collective) than legislation (Hudson and Wren, 2007).

Several studies have evaluated the role of parliament in Asia but not of the parliamentarians and mostly of descriptive nature. A study conducted by Muni evaluated the role of parliament in Asian countries and concluded that despite important role prescribed by the constitution, the parliament of Asian countries has been seen largely ineffective mainly due to its weak capacity and lack of clear business process, whereas the parliaments of South Asian countries have poor parliamentary institutions with no sovereignty (Muni, 2004). In India, the Lok Sabha is considered mere talking-house without any effective role in the governance (Kapur and Pratap, 2006). Due to poor performance Bangladeshi parliament is considered mere a house of controversy and irrelevant speeches (Ahmad and Aftab, 1996). Even in stable democracy like Sri Lanka healthy political culture has not been reflected in the functioning of parliaments and its associated institutions (Muni, 2004). Most recently Quibria (2006) measured the performance of parliament in Asia using Kaufman, Kraay and Zoido-Loboton (KKZ) composite index and concluded that the state of governance in Asia is far behind of the international standards.

Although several works have been available on the role of parliament but to the best of our knowledge none of the study has been measured the productive or technical inefficiency of Asian parliamentarians using stochastic frontier approach. The pioneer work of Farrell’s...
(1957) provided the definition and conceptual framework for both technical and allocative efficiency. Technical efficiency “refers to failure to operate on the production frontier whereas allocative efficiency refers to the failure to meet marginal condition for profit maximization” (Chakraborty et al., 2002). There are two widely used approaches for measuring technical efficiency in both public and private sectors. These are Data Envelopment Analysis (DEA) which is non-parametric in the context of mathematical programming and Stochastic Frontier Analysis which is parametric method. Both have advantage and disadvantage; however the latter one is widely used for measuring technical efficiency since in general, the nonparametric methods like DEA is less suitable because it assume away noise in the data and luck. It does not impose any assumptions about production functional form and does not take into account random error in measuring technical efficiency hence the efficiency estimates may be bias if the production process is largely characterized by stochastic elements. While parametric frontiers require the specification of a particular functional form and can be classified as deterministic and stochastic. The deterministic model assumes that any deviation from the frontier is due to inefficiency, while the stochastic incorporates statistical noise. In this respect, in the case of deterministic frontiers, any measurement error and any other source of stochastic variation in the dependent variable is attributed to inefficiency, making the estimations of Technical Efficiency sensitive to extreme values (Greene, 1993). On the other hand, the stochastic production frontier resolves the problem of extreme values incorporating a compound error with a two-sided symmetrical term and a one-sided component. The latter reflects inefficiency, while the two-sided error captures random effects outside the control of the production unit.

Stochastic frontier approach has been widely used in both developed and developing countries to measure technical efficiency of different disciplines for example, Rawlins (1993) and Amor and Christophe (2010) in agriculture economics; Ondrich and Ruggiero (2001) and Baten et al. (2009) in industrial settings; Sheehan (1997), Farsi and Filippine (2006), Tran and Tsionas (2009), Baten et al. (2009) and Rozilee (2010) in manufacturing industries; Baten et al. (2009), Samad (2009) and Vu and Sean (2010) in banking sector and Barros (2005) in other financial institutions. A time variant inefficiency effects literature were also available in works of Cornwell et al. (1990), Kumbhakar (1990) and Coelli et al. (1998).

This study will fill this gap in the literature by measuring technical efficiency of randomly selected eight Asian countries using stochastic frontier approach. The stochastic frontier begins with Farrell’s (1957) who study on efficiency measurement and this approach with different distributional assumptions was independent proposed by Aigner et al. (1997) for a normal distribution truncated at zero; Meeusen and Julien Van (1977) for an exponential distribution; Battese and Corra (1977) and Jondrow et al. (1982) for a half-normal distribution truncated at zero and Greene (1993) for a two-parameter Gamma or Normal distribution. The way Bauer (1990) made distributional assumptions by which efficiency effects can be separated from stochastic element in the model. However, there are no priori reasons for choosing one distributional form over the other and all have advantages and disadvantages (Coelli et al., 1998).

In order to measure the (in) efficiency of Parliamentarians in Asian countries, in this paper we propose a stochastic frontier production function for unbalanced panel data (Battese and Coelli, 1992) assumed to be distributed as a half normal random variables. Furthermore this paper not only intended to identify the determinants of technical efficiencies for improving the existing performance of Asian countries but also to know that whether their efficiencies are time-varying or time-invariant.

**METHODOLOGY**

A theoretical stochastic frontier model: This paper considers stochastic frontier model for the inefficiency effects of Asian countries in stochastic frontier production function, proposed by Battese and Coelli (1992). This model was proposed for the analysis of panel data, namely Cobb-Douglas production frontier used in empirical studies for production including frontier analysis. The model is discussed in this study assuming that the data are available for a sample of NAsian countries over $T$ time periods.

The general stochastic frontier production function for panel data, considered here, is defined as:

$$Y_{it} = \exp (X_{it} \beta + V_{it} - U_{it}) i = 1, 2, \ldots, N; \quad t = 1, 2, \ldots, T$$

where $Y_{it}$ denotes the output for the i-th country in the t-th time period; $X_{it}$ denotes the vector whose values are functions of inputs for the i-th country in the t-th time period; $\beta$ is a vector of unknown parameters to be estimated; $V_{it}$ s are assumed to be independent and identically distributed random errors which have normal distribution with mean zero and variance $\sigma^2$ and independent from $U_{it}$; $U_{it}$ s are non-negative random variables associated with the technical inefficiency of production.

The model used here incorporates a simple specification of the time-varying inefficiencies following Battese and Coelli (1992) as:
where \( \eta \) is an unknown scalar parameter to be estimated, which determines whether inefficiencies are time varying or time-invariant. The \( U_o \) term can have different specifications and the most popular are the independent and identically distributed non-negative random variables of a truncated normal with an average \( \mu \) and a constant variance \( \left( U_i \sim iid | N(\mu, \sigma_u^2) \right) \) and the half-normal distribution \( \left( U_i \sim iid | N(\mu, \sigma_u^2) \right) \). Coelli et al. (1998) suggests that the choice of a more general distribution, such as the truncated normal, is generally preferable. However, this is an empirical question and consequently, in this paper, the truncated normal distribution was tested against the half-normal.

In stochastic frontier model (1), using the composed error terms we utilize the parameterization of Battese and Corra (1977) who replace \( \sigma_v \) and \( \sigma_u \) with \( \sigma = \sigma_v + \sigma_u \) and \( \gamma = \frac{\sigma_u^2}{\sigma_v^2 + \sigma_u^2} \). In a truncated and a half-normal distribution, the ratio of country specific variability to total variability, \( \chi \), is positive and significant, implying that country specific technical efficiency is important in explaining the total variability of output produced.

**Functional form and variables:** This paper devotes the stochastic frontier production function technique to assess the parliamentarian technical efficiency in Asian countries, in particular, the Cobb-Douglas stochastic frontier production with the distributional assumption due to advantages over the other functional forms (Kalirajan and Flinn, 1983; Dawson and Lingard, 1989; Coelli and George, 1996). Since the panel data is used in this study and the sample number is not very high, the Translog specification could not be tried.

The empirical version of stochastic frontier model (1) can be expressed with the decomposed errors:

\[
Y_i = \beta_0 + \sum_{j=1}^{k} \beta_j X_{ij} + \left( V_o - U_o \right) i = 1,2, \ldots, N; \\
t = 1,2, \ldots, T;
\]

where, \( Y_i \) denotes (the logarithm of) the total membership of lower house of the parliament of the \( i \)-th country in the \( t \)-th time period; \( X_k \) represents the \( k \)-th input quantities (the logarithm of) percentage of women in the lower house of the Parliament, election system type, status of government; \( \beta_k (k = 1, 2, 3) \) stands for the output elasticity with respect to the \( k \)-th input; \( V_o - U_o \) are the random variables defined above. However, distinguishing between a half-normal and a truncated normal distribution as the most appropriate assumption for the inefficiency distribution is undertaken the model.

Given the specifications of the stochastic frontier production function, defined by Eq. (1), the technical efficiency of \( i \)-th country in the \( t \)-th year is defined by (Taymaz and Saatci, 1997; Kumbhakar, 1990):

\[
TE_i = \exp (-U_o)
\]

where \( U_o \) denotes the specifications of the inefficiency model in Eq. (1) and (2). The technical efficiency of a country is between zero and one and is inversely related to the level of the technical inefficiency effect. The technical efficiency can be predicted using the computer program FRONTIER Version 4.1 (Coelli, 1996) which calculates the maximum-likelihood estimators of the predictor for Eq. (4) that is based on its conditional expectation (Battese and Coelli, 1993).

**Data:** Measuring accurate productivity of public sector is not an easy task because of the complication of identifying accurate volume of output to volume of input used in the production process. In other cases it is very hard to measure output particularly with regards to collective services like parliamentary affairs. Further the non availability or non accessibility of the facts and figure is another major constraint in the measurement of public sector performance. However, despite all these complications and limitations we measured the technical efficiency of the parliamentarians using stochastic frontier production approach. The detail of the used variables is as follows.

**Dependent variable:**

**Total membership of lower house of the parliament \( Y \):** Data for the dependent variable (Total membership of lower house of the parliament) was obtained from Inter Parliamentary Union (2010). Inter-Parliament Union’s PARLINE data base was used to get figures of membership of the lower house of the Parliament of eight Asian countries for nine years from 2002 to 2010.

**Independent variables:**

**Percentage of women in lower house of the parliament \( X_k \):** First input variable used in this study is the percentage of women in the lower house of the Parliament. This input variable helped the researcher to see the impacts of substantive representation of women in the parliament as well as their role in improving the efficiency of parliamentarians through evolving the spirit of competition. Data for this variable was also obtained from Inter Parliamentary Union (2010) PARLINE data base.
Election system type \((X_2)\): Election system type is a second important input variable used in this study. It is important input variable which has a role in determining the efficiency level of the parliamentarians. Through identifying the background, knowledge, skill and party support of the candidate at the time of parliamentary election, one can perceive the role and responsibilities of the candidate in fourth coming parliamentary proceedings. Furthermore it plays an important role in the reduction of prevailing gender inequalities in the political arena of the World. For this variable we used three categories exists in Europe such as (proportional, semi proportional and plurality-system) and coded 1, 2 and 3 respectively. Data was obtained from the data base of Electoral System Design provided by the International Institute for Democracy and Electoral Assistance IDEA (2010) and Inter Parliamentary Union (2010) PARLINE data base on National Parliament.

Status of government \((X_3)\): Status of Government is also used as input variable in this study. For measuring technical efficiency of the Parliament the knowledge of country’s freedom level and the sovereignty of the Parliament is imperative. Freedom in the World is the standard-setting comparative assessment of global political rights, civil liberties and status of the government, published annually since 1972 (Freedom House, 2010). The survey ratings and narrative reports are widely used by policymakers, media analysts, civic activists and human rights defenders to monitor trends in democracy and track improvements and setbacks in freedom worldwide.

Hypothesis test: In this study the hypothesis tests are conducted to determine the distribution of the random variables associated with the existence of technical inefficiency and the residual error term. If the null hypothesis involves \( \gamma = 0 \) expressing that the technical inefficiency effects are not present in the model. If the null hypothesis, that \( \gamma = 0 \) is accepted, this would indicate that \( \sigma'_u \) is zero and hence that the \( U_u \) term should be removed from the model, leaving a specification with parameters that can be consistently estimated using ordinary least squares. Setting the null hypothesis that \( H_0 : \eta = 0 \) provides the technical efficiency is time-invariant. If parameter \( \eta \) is positive, the technical efficiency of the sample country increases over time and vice versa. However, if parameter \( \eta \) is zero, then the country effect will be constant over time. The half-normal distribution is a special case of the truncated normal distribution and implicitly involves the restriction \( H_0 : \mu = 0 \) if parameter \( \mu \) is zero, then country effect would have a half normal distribution instead of a truncated normal distribution. Test of hypothesis for the parameters of the frontier model is conducted using the generalized likelihood-ratio statistics, \( \lambda \), defined by:

\[
\lambda = -2 \ln \left[ \frac{L(H_0)}{L(H_1)} \right]
\]

where \( L(H_0) \) is the value of the likelihood function for the frontier model, in which parameter restrictions specified by the null hypothesis, \( H_0 \), is imposed; and \( L(H_1) \) is the value of the likelihood function for the general frontier model. If the null hypothesis is true, then \( \lambda \) has approximately a chi-square (or mixed square) distribution with degrees of freedom equal to the difference between the parameters estimated under \( H_0 \) and \( H_1 \), respectively.

RESULTS AND DISCUSSION

The parameters of Ordinary Least Square (OLS) estimates and Maximum Likelihood Estimates (MLE) were computed using Cobb-Douglas stochastic production frontier model to measure the technical efficiency of Parliamentarians for a randomly selected eight Asian countries. A two step process was used to find out the technical efficiency using maximum likelihood method. In the first step using frontier 4.1 by grid search, the ordinary least square estimates of parameters were obtained and at the second step ordinary least square estimates were used to compute the maximum likelihood estimates of the parameters using Cobb-Douglas frontier production function.

Estimation of Cobb-Douglas stochastic frontier model:
The maximum likelihood estimates for the parameters for time-varying inefficiencies effects through Cobb-Douglas stochastic frontier production function with truncated normal and half normal distributional assumptions were obtained and presented in Table 1. The results indicated that the coefficients of input variable percentage of women parliamentarians were 0.1880 and 0.0679 and found statistically significant at 1% level in both the truncated and half normal distribution respectively. The estimated coefficient of input variable election system type was found to be 0.4868 and 1.5692 for both distributions respectively and the election system type variable was statistically significant observed in case of half-normal distribution. Similarly, the coefficient of Status of Government was found -0.0751 and -0.7795 in both distributions respectively but it was significantly occurred with negative values in case of half normal distribution. The results also indicated that the parliamentarian’s inefficiency variability to total variability ‘\( \gamma \)’ was observed at 0.9810 and 0.9978 which showed significant at 1% level for both distributions, respectively, indicating the importance of parliamentarian’s technical efficiency in explaining the total variability in the production process. Thus we can say that 98 and 99% of the variation in the response variable is due to technical inefficiency of the input variables of the model for both the truncated normal and half-normal distribution respectively. In case of both
The parameter percentage of total membership of the parliament in the country produced. The parameter is important in explaining the total variability of the level, implying that country specific technical efficiency values 1.0415 and 0.1581 and highly significant for both variables (election system type) were obtained positive 0.1562 and 0.0605 for the truncated and half normal distributions. The coefficients of input variable (status of government) were found to be -0.0285 and -0.1186 for truncated normal and half normal distribution respectively. Here the status of government was significantly occurred for half-normal distribution but not for truncated normal distribution. Since the coefficient was estimated negative for truncated normal so it has impacts on output variable due to its technical inefficiency.

It was also evident from both the Table 1 and 2 that the variance associated with the estimate of the technical inefficiency effects is relatively small and significantly different from Zero for truncated and half-normal distribution that indicated a good fit and correctness for the assumptions of truncated and half-normal distribution.

Using Likelihood Ratio (L-R) statistics, formal test of various hypotheses were obtained and presented in Table 3. From the results we can see that since our first null hypothesis $H_0: \gamma = 0$ is rejected so we can say that there are technical inefficiency effects in the model. We also tested technical inefficiency effects for half-normal

Table 1: MLE likelihood estimates of Cobb-Douglas stochastic production frontier model with time-variant inefficiency effects

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter</th>
<th>Coefficient</th>
<th>S.E</th>
<th>t-statistics</th>
<th>Coefficient</th>
<th>S.E</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>$\beta_0$</td>
<td>3.1595*</td>
<td>0.3650</td>
<td>8.662</td>
<td>2.7039*</td>
<td>0.0775</td>
<td>35.7957</td>
</tr>
<tr>
<td>Percentage of women in lower house of parliament</td>
<td>$\beta_1$</td>
<td>0.1880*</td>
<td>0.0529</td>
<td>3.552</td>
<td>0.0679**</td>
<td>0.0282</td>
<td>2.4041</td>
</tr>
<tr>
<td>Status of government</td>
<td>$\beta_2$</td>
<td>0.4868 @</td>
<td>0.6538</td>
<td>0.7445</td>
<td>1.5692*</td>
<td>0.1586</td>
<td>9.8896</td>
</tr>
<tr>
<td>Election system type</td>
<td>$\beta_3$</td>
<td>-0.0751 @</td>
<td>0.0963</td>
<td>-0.7795</td>
<td>-1.101*</td>
<td>0.0425</td>
<td>-2.5911</td>
</tr>
<tr>
<td>Variance parameters</td>
<td>$\sigma^2$</td>
<td>0.0742*</td>
<td>0.0246</td>
<td>3.0050</td>
<td>0.6126**</td>
<td>0.3089</td>
<td>1.9830</td>
</tr>
<tr>
<td>Status of government</td>
<td>$\eta$</td>
<td>0.5396***</td>
<td>0.3052</td>
<td>1.7677</td>
<td>0.0605**</td>
<td>0.0283</td>
<td>2.4460</td>
</tr>
</tbody>
</table>

Log likelihood function

<table>
<thead>
<tr>
<th></th>
<th>Truncated Normal</th>
<th>Half Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>80.615</td>
<td>8108.445</td>
</tr>
</tbody>
</table>

In Table 3. From the results we can see that since our first null hypothesis $H_0: \gamma = 0$ is rejected so we can say that there are technical inefficiency effects in the model. We also tested technical inefficiency effects for half-normal distributions. The coefficients of input variable (status of government) were found to be -0.0285 and -0.1186 for truncated normal and half normal distribution respectively. Here the status of government was significantly occurred for half-normal distribution but not for truncated normal distribution. Since the coefficient was estimated negative for truncated normal so it has impacts on output variable due to its technical inefficiency.

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Table 2: MLE likelihood estimates of Cobb-Douglas stochastic production frontier model with time-invariant inefficiency effects

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter</th>
<th>Coefficient</th>
<th>S.E</th>
<th>t-statistics</th>
<th>Coefficient</th>
<th>S.E</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>$\beta_0$</td>
<td>2.9524*</td>
<td>0.4298</td>
<td>6.8684</td>
<td>0.2711*</td>
<td>0.0755</td>
<td>44.594</td>
</tr>
<tr>
<td>Percentage of women in lower house of parliament</td>
<td>$\beta_1$</td>
<td>0.1562*</td>
<td>0.0397</td>
<td>3.9304</td>
<td>0.0605**</td>
<td>0.0283</td>
<td>2.4460</td>
</tr>
<tr>
<td>Status of government</td>
<td>$\beta_2$</td>
<td>1.0415*</td>
<td>0.8839</td>
<td>11.7827</td>
<td>0.1581*</td>
<td>0.158</td>
<td>612.047</td>
</tr>
<tr>
<td>Election system type</td>
<td>$\beta_3$</td>
<td>-0.0285 @</td>
<td>0.0687</td>
<td>-0.4156</td>
<td>-0.1186*</td>
<td>0.0425</td>
<td>-2.9715</td>
</tr>
<tr>
<td>Variance parameters</td>
<td>$\sigma^2$</td>
<td>0.0523*</td>
<td>0.0234</td>
<td>2.2343</td>
<td>0.6107**</td>
<td>0.3089</td>
<td>2.0371</td>
</tr>
<tr>
<td>Status of government</td>
<td>$\eta$</td>
<td>0.4526**</td>
<td>0.1914</td>
<td>2.3636</td>
<td>0.0011</td>
<td>0.0000</td>
<td>1888.69</td>
</tr>
</tbody>
</table>

Log likelihood function

<table>
<thead>
<tr>
<th></th>
<th>Truncated Normal</th>
<th>Half Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>81.7391</td>
<td>108.3143</td>
</tr>
</tbody>
</table>

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The results indicate that since our null hypothesis is accepted so we can say that the half normal distribution is preferable to the truncated normal (at zero) distribution for the technical inefficiency effect. The hypothesis $H_0: \mu = 0$ is accepted, indicating that the technical inefficiency effect does not vary significantly over time.

**Country-specific parliament technical efficiency:**

**Results from truncated normal and half-normal model:** Country wise parliamentarian’s technical efficiencies in case of truncated and half normal distributional assumptions were displayed in Table 5, Table 6, Fig. 2 and 3 for time-variant and time-invariant situations. The results indicated that time varying mean efficiencies were found to be 0.4983 and 0.5506 for the truncated and half-normal distribution respectively. This means that at average the parliamentarians of Asian countries produced only about 50 and 55% of the potential output in both the distribution respectively indicating rooms for another 50 and 45%. It was clear variation in the technical efficiency of Asian countries which is ranging from 28 to 87% for truncated normal and 38 to 97% for the half normal distribution.

In case of truncated and half normal distribution the highest mean technical efficiency was for China’s 0.8758 and 0.9784 for the time-variant and time-invariant inefficiency model. These results are consistent with the findings of Zhu (2004) that the parliament of China is playing significant role in maintaining political accountability in a country. However it is evident from the results that efficiency of China’s Parliament declined over the period of time in both the models although at a slowest rate as compared to many other Asian countries.

Indonesia is the next leading country with second highest average technical efficiency (0.5374 and 0.9680) in the truncated and half normal distribution respectively. Although Indonesia is at second position however, in comparison with time-invariant inefficiency model its efficiency decreased 14% over the reference period which may be alarming for them. These results are supporting the finding of the Sherlock (2007) that “the Parliament continues to grapple with the effects of having been a
residue of the Governmental incompetence and a rubber-stamp legislature for so long. It is still in the process of developing its institutional strengths and the procedures and practices of a democratic and accountable body”.

Indonesian parliamentarians achieved their time varying mean efficiency about 43 and 46% in the truncated and half normal distribution respectively whereas time varying mean technical efficiency of Thailand for both the distribution is 41 and 44% respectively. The results reveal that both the countries secured higher mean efficiency for half normal distribution as compared to truncated with efficiency which are negating the view of Coelli et al. (1998) when he argues that the choice of a more general distribution, such as the truncated normal, is generally preferable. Although they performed much better in half normal distribution however, their overtime technical efficiency has been decreased although at slowest rate as compared to Indonesia and Pakistan. These results showed that the parliamentarians of both these countries reacted well to the global concern and tried their level best to improve their efficiency. But the findings are negating the arguments of Rehman (2007) “that Indian parliamentary committees do not perform as successfully as their counterparts in western world in controlling the government and holding it to account”.

The time-variant mean technical efficiency of Bangladesh remains almost 38% in the truncated and half normal distribution. Although technical efficiency of the Parliamentarians of Bangladesh (38%) is less than China, Indian and Thailand however, it is remarkably higher than Pakistan, Philippine and Malaysia which is a good sign. These results do not confirm the findings of Ahmad and Aftab (1996) that “due to poor performance Bangladeshi parliament is considered mere a house of controversy and irrelevant speeches.”

Surprisingly an average efficiency of the Malaysians’s parliamentarians was found about 32 and 42% in the truncated and half-normal distribution respectively which is the fourth lowest in time-varying model. It remained below not only from Indonesia and Thailand but even from Bangladesh in the truncated distribution. These results confirmed the views of Shad Saleem “that judicial process in Malaysia is viewed to involve the executive work rather than the parliamentary process (Yaakob and Nadhrah, 2009)”.

Technical efficiency of the parliamentarians of the remaining two countries namely, Pakistan and Philippine located at the bottom of the tables in both the truncated and half normal distribution. However, Philippine achieved the lowest technical efficiency in truncated distribution while Pakistan in the half normal distribution. The mean technical efficiency of the parliamentarians of Pakistan was found to be 0.34 and 0.38 for the truncated and half-normal distribution respectively in time varying inefficiency model. The lowest technical efficiency of the Pakistani Parliamentarians may be due to terrorist activities in the countries. These findings supported the plea of existing literature “that in parliaments of south Asian states tends to be an arena of rhetorical exchange rather than a vehicle for political consensus building. Parliamentary committees tended to be undermined by the unilateral agenda of the executive (Sobhan, 1999)”.

The mean technical efficiency of the parliament of the Philippines was 29 and 38% for the truncated and half-normal distribution in time varying inefficiency model which may be “due to the destruction of political institutions of governance during Martial law and authoritarianism (Harnandez, 2009)”.

CONCLUSION

In this study, we analyzed the Cobb-Douglas stochastic frontier production model with truncated normal and half-normal distributional assumptions and we estimated country-specific technical efficiency using panel data sets of parliamentarians in the selected Asian countries. The estimated parameters of the time varying inefficiency model indicated that the technical
inefficiency effects increased over time since the parameter $\eta$ was estimated to be negative values for both the truncated normal and half-normal distribution. The mean year-wise parliamentarian technical efficiency also decreased in both the truncated normal and half-normal distribution, which indicated that the mean technical efficiency deteriorated through the years in parliamentarians of each country. The parliamentarian mean efficiency values (49 and 55%) were achieved by Asian selected countries according to truncated and half normal distributions respectively. It indicated that the parliamentarians of selected Asian countries can increase their 51 and 45% output level with the same input variables by both distributions. From the results it was also observed that China attained highest technical efficiency for both distributions whereas Philippine obtained lowest technical efficiency in case of truncated normal and Pakistan in case of half-normal distribution.

The time-variant inefficiency effects model was found to be an adequate representation than time-invariant inefficiency effects model. Research Implications of the study are as follows:

- **Causes of the decline in technical efficiency of the parliament in every country:** Since model shows that the ‘nature and tempo’ of decline in the technical efficiency of different countries differs from country to country therefore it is indicative of a variety of causes operating behind the problems of every state. This needs further exploration.

- **Solutions of the problems for different countries:** Connected with the preceding point, if researchers succeed in unearthing the causes of decline in the perspective of every single state, a domesticated solution model is possible to be sorted out exactly in consonance with the typical conditions of a country.

**REFERENCES**


