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Electronic filing system, bureaucratic efficiency and public service delivery

Evidence from
Bangladesh



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Report on

Electronic filing System, Bureaucratic Efficiency and Public Service Delivery: Evidence from Bangladesh

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I. Introduction

Bureaucratic efficiency is an important prerequisite for state effectiveness and economic growth. An aspect in that regard is the various services that the government provides to the citizens which are then added to the engine of growth of the economy. Recognizing this importance of bureaucratic efficiency and public service delivery, governments around the world introduce all kinds of reforms and initiatives to enhance bureaucratic efficiency and public service delivery. In this era of digitization, one such initiative is electronic governance, or e-governance, a simple low cost approach that is intended to increase access to public services, improve transparency and accountability, reduce transaction cost and ensure good governance. To what extent e-Governance initiatives are being successful remains to be an open research question.

In this paper, we look into the effect of an e-Governance initiative in Bangladesh on efficiency in the public sector. The electronic Filing (e-Filing) system was introduced to all the Deputy Commissioners' (DC) Offices in 2013. The e-filing system is an electronic file management system where a file in a soft form (or if it is received in hard form, it is transformed to a soft version) is processed and disposed of electronically. The major advantage of the system is that it provides a dashboard which allows the administrator (or whoever has access to) to track every file in the system. Since the head of the office, the DC and the Cabinet Division (the agency comprising of all the ministers and headed by the Prime Minister who also monitors the workings of the whole government including the DC office) has access to the dashboard, the increased monitoring can be expected to improve bureaucratic efficiency and public service delivery.

The DC office, where the electronic system was introduced, is the administrative hub at the district level. As the district administrator, the DC coordinates various projects being implemented, provides emergency support to all the public offices at the district, conduct cases that appear in the District Magistrate's Court as well as all the mobile (special) courts, provides a wide variety of services to the citizens and business community, looks after the government properties, conduct eviction drives and looks all sorts of other activities where government is a party but does not fall under any line ministry (For example, administering election at the district level on behalf of the election commission). For that matter, the introduction of e-filing at these offices, if successfully implemented, can be expected to have a significant impact on the district economy and hence, the national economic growth.

We use two sets of data. First, we collect administrative records from the DC offices on service delivery. We selected about seven services three of which are different licenses provided from three sections, one is various leasing services, two land acquisition services and record room collection. A second set of activities involve various cases where the government is a party and also the number of cases resolved

in District Magistrate's office. Second, we collect electronic file processing data from the Access to Information Dhaka office.

We utilize the implementation variation across districts in order to identify the effect of the e-filing system. In particular, even though it is introduced to all the offices at the same time (except Jessore where it was piloted), the DC offices adopted the system at different points in time. Also, the switch to the electronic system was not abrupt: the offices, even after deciding to adopt it, did so gradually and this adoption rate was different across the districts and over different points in time. This provides us a quasi-experimental setting and allows us to use difference-in-difference method. However, there is still a possibility of selection bias: the DCs that are efficient may better see the benefits of e-filing and therefore may adopt the system earlier and at a better rate and may also utilize this better. In order to counter this, we are planning to apply an instrumental variable approach. We intend to use the transfers of various officials on the adoption of the e-filing to identify the effect. We have also planned to use electricity transmission failures in order to instrument for the e-filing adoption rate.

The file processing data is a rich dataset of more than one million files processed electronically and can be used to test additional research questions on bureaucratic efficiency. More specifically, the data contains the date it has been created and disposed of and hence, number of days required to process the file. We can therefore test the factors affecting file processing in a bureaucratic environment. Our first interest is to test the hypothesis posed by the seminal work of James Wilson (1991) which states that the speed of file processing depends on the number of officials involved in processing the file. We further look into the complicacy factor that files that are complicated takes greater time to process. In order to capture complicacy, we consider two variables: the number of actions taken on a file controlling for the number of users and the number of paragraphs the file consists of. We hypothesize that complicated files, measured by higher number of actions required to process and greater number of paragraphs, takes longer to process. The high volume of data allows us to control for district and sub-section fixed effects as well as monthly trends.

We get a number of important results. First, we find that more granular monitoring through e-filing has a positive impact on delivery of public services, in the sense when the system allows to identify the subsection where file is processed. For example, the number of licenses processed is higher in districts where the system also records that it is processed by licensing section in comparison to districts where name of the processing section (licensing here) is absent. Second, we find the opposite result for the number of cases dissolved by the DC office, possibly because the more granular monitoring makes the magistrates more careful on processing the cases and leading to taking more time in dissolving. Third, the electronic file data reveals that files that require more users (i.e., that involve greater number of officials) takes longer time to process. Fourth, the files that are more complicated using both the variables takes longer time to process.

We do not find any effect of number of files electronically processed on either number of citizens served for a service or number cases dissolved. There could be several reasons for this. First, many public officials many find this system uncomfortable to work on and hence took a long time to get used it resulting into slower process and little effect on efficiency. Second, anecdotal evidences suggest that the

technical prerequisite for a smooth running of e-filing is not fully available in most districts. In particular, the electronic filing depends on frequency of server breakdown, availability of internet and stable electricity supply. All of these were not available at most of the district offices in at least early months of e-filing implementation and hampered both adoption of e-filing and reaping of the full benefit of using e-filing.

We contribute to the growing empirical literature on electronic governance. Lewis-Faupel et al. (2015) and Abdallah (2015) show that electronic procurement system improves the performance of the contractors in infrastructure development project. Jin & Lee (2014) find that use of PDA/Tab during inspection leads to increased detection of hygiene violation in restaurants and hence, greater compliance. Di Tella & Schargrotsky (2013) show that fitting an electronic device to criminals reduces criminal recidivism. Lee et al. (2013) present that Health IT has modest impact on Health care value addition. Huyesentruyt & Lefevere (2010) shows that complexity and Informational cost impose significant barriers to adoption of electronic family benefit payment system. Finkelstein (2009) illustrates Electronic Toll Collection system increases toll revenue because of relative low tax salience. Card & Moretti (2007) finally finds that electronic Voting is correlated with George W. Bush's vote share in 2004 election and this is higher in counties with higher share of Hispanic population and uncorrelated to swing states.

The rest of the paper organized as follows. Section II provides the institutional background, section III informs the data, section IV discusses the measurement issues and econometric framework, section V depicts the descriptive statistics, section VI describes the effect of e-filing on various bureaucratic activities whereas section VII investigates the effect of officials and complicity on processing time and finally, section VIII concludes.

II. Institutional Background

Deputy Commissioner's (DC) Office

Bangladesh is divided into eight divisions and sixty four districts for administrative purposes. The head administrator located at the divisions are called Commissioners whereas the head administrator at the district level are called the Deputy Commissioners (DCs). Even though the Commissioners are heads of the DCs, it is the DCs who run the government at the district level whereas the Commissioners play more of a monitoring and some coordinating roles. All the Commissioners and the DCs are part of the administration cadre and accountable to the Cabinet Division.

The DC office, being the administrative hub of the government at the district level, is engaged in all sorts of activities for and related to the government. This includes activities related to delivery of all kinds of licenses (ranging from restaurants, shops, businesses, brick kilns to guns for private persons), leasing of government properties (Lands, water bodies like rivers and lakes, sand estates etc.) as well as land records. The government acquires a large amount of land every year to construct various roads, bridges, culverts, offices and other public buildings and establishments from citizens and the DC office takes care of the bureaucratic processes of handling of these land acquisition cases. A large number of activities also include various legal activities related to reclamation of government properties and related illegal

land-holding eviction drives, handling various kinds of legal cases in district magistrate courts, conducting mobile courts (A special court in the form of legal compliance drive run by a magistrate with a team of a member from prosecuting agency and law enforcement agency), arrangement of all the cases where the government is a party, educational programs, ICT related activities etc. An important activity performed by the DC office is the coordination of all the projects that are being implemented in the district where a member of the office, usually the DC or a the representative of the DC.

There is also a wide range of miscellaneous activities performed by the DC office. One example is, the DC or his deputies often need to create, head or participate in various committees, for example, relief work committee, District Task force Committee, Anti-drugs awareness campaign committee, Tobacco Control Act Implementation Committee. Disaster management in fact is one of the major activity of a DC office, particularly in disaster-prone districts. The DC office is responsible for managing urgent or special issues of national importance, for example, management of elections at the district level. The DC office also provides support services to other agencies, for example, district jails, especially in the time of urgencies like emergency food shortages or corruption issues.

These activities are managed through four major sections. These are general, revenue, judiciary and education & IT. Each of these sections are managed by Assistant Deputy Commissioners (ADCs). Usually, the ADC-General is also the in-charge of ADC-Education & IT. Since the inception of the Local government Strengthening Project II (LGSP II), a public official of the rank Deputy Secretary and his staffs also sit in the DC office compound and run the project at the district level in coordination with the DC office.

Within each section, there are sub-sections that focus on a particular service or an activity. The General section usually includes trade and business section, Nezarat section (responsible for leasing and a few other licenses), District e-service center/Help Desk/Information Desk, Disaster Management section and Establishment section. The Revenue section has sections that generate revenue and also related to other revenue related issues, for example, Record Room section, General Certificate Office (GCO), Revenue Munshikhana (RM) section, Land Acquisition (LA) section and Vested Properties (VP) section. The Judiciary includes the Judiciary Munshikhana section, the Treasury section and the Executive Magistrate Court. It is however important to note that there could be more specialized sections or one sub-section could be divided into further subsection, depending on the degree of activities or transactions. For example, the DC office at Dhaka consists of three LA sections due to the huge amount of land acquisition resulting from great volume of public works related activities.

Electronic Filing system

The Access to Information (a2i) programme of the Prime Minsiter's Office in collaboration with the Cabinet division has introduced a digital filing system known as electronic filing (e-filing) system at the DC office. The initiative started as a pilot project in January 2013 in Jessore District and it was introduced to all other districts in June 2013. As it will be revealed in the descriptive statistics section, it took quite a while for most of the districts to fully assume the electronic filing system.

The e-filing system is a simple electronic system designed to process files and letters electronically. The process starts with digitization of the file at its inception: when a file is created or an application or letter is received at the DC office, the soft version of the file is used for file processing. If the application is made in hard copy, it is first scanned and digitized and then the processing starts. For example, a file, if addressed towards the DC as in most cases, the digital version is first received by the DC who then delegates the file to a designated ADC to complete the file processing. The ADC after seeing the file then delegates to a subordinate in his office to further process it and the process goes on until the file is disposed.

There is one major advantage of such a filing system. The users of the system needs a unique id to log in and use the system. When a file moves from one person to the other, it is as if the file is moving from one table to the other. Now, there is a system dashboard where one can identify where a particular file is located, or in other words, with whom the file is. since there is a signature of every user and the days when a file moves from one user to the other is automatically recorded, the system dashboard also contains information on number of days the file is with a particular official. Since the DC has access to this Dashboard and the Cabinet Division has access to all the Dashboards, the e-filing system hands in an excellent monitoring tool to the DCs and the Cabinet Division in the form of the Dashboards.

Performance Measurement

This information can also be used to measure performance of a DC office, a section or even a single official by simply looking at the number of files processed by the particular office, section or individual. However, in order to do so, the DC offices need to start using the e-filing system at the first place. Since the take-up of the new system was low, the Cabinet division in order to encourage use of e-filing has introduced a performance measurement system of the DC offices based on the number of files processed through the e-filing system by a DC office and the number of files disposed in September 2013. In November 2013, it was decided to create a ranking of the DC offices and publish it internally. The high performing DCs were publicly praised and the low-ranked DCs are advised to improve their performance. The system was scrapped in April 2014.

There were however a few problems in implementing the such an electronic system of file management. First, a large proportion of officials working at the DC offices were lacking technical expertise to use e-filing or sometimes, averse to technology and as a result, the adoption rate was slow. Second, there were technical hick-ups as well. The server was often slow, sometimes at the level of creating frustration among the public officials and there were server breakdowns as well. Second, the internet and the related support system has been inadequate. Third, the electricity generation and hence supply was not enough resulting into load shedding and subsequently, affecting a file management system where electricity is a vital input.

The intermittent technological breakdowns of the server, internet and electricity has forced different DC offices to adopt to various strategies. One approach is to wait for the system to run again. Another one is switching to manual system and dispose the matter manually and keeping a record that it has been disposed of. A more common one was to maintain a dual file management system where a file is

processed electronically and manually concurrently. Nevertheless, because of the apparent technical difficulties and low capacity to adopt the system for a large proportion of officials, the incentive to process files through e-filing system was withdrawn on April 2014. Most of the DC offices however have embraced the electronic system by then, but also have maintained the manual system side-by-side.

III. Data

Two sets of data has been used in order to understand bureaucratic efficiency and public service delivery. First, we have attempted to collect administrative records on public service delivery and other bureaucratic procedures from forty seven DC offices. The list of the services and procedures is listed in table 1. As table 1 depicts, we have collected administrative records on fifteen services and procedures. The services are delivery of various kinds of licenses to citizens and other procedures include the various legal cases conducted by or run by different sections of the DC office. Even though forty seven districts have been approached, data on all the services and all the procedures were not available for all the districts. Hence, for most of the services, the data we got are less than for forty districts.

The second set of data is the electronic data of all the files processed electronically and generated by the system available at the a2i office. The system data contains 6,374 users from 89 public offices. These offices include 64 DC offices, 7 Commissioners Offices, 15 ministries offices and three public agencies. These offices has received 1,666,129 letters/applications (all the citizens requests for services are considered as letters) received and 1,657,704 letters/application processed till date. Since a new system is running from June 2016, this is the final dataset. Most of these files are processed in the DC offices since the rate of usage in the ministries and agencies were very limited. We use data of the 59 districts until December 2015. The total number of files amounts to 1,012,986 file level observations. For each of these files, we have information on the district where it is created and disposed of, the date of creation and disposition, the number of days taken to dispose it, the number of users involved in processing the file, the number of actions taken on the particular file, the number of paragraphs in the file, the section where the file was processed and the name of the file.

Given that the DC office data will be at the district level, we aggregate the system data at the DC office level for every month for each section at every district. The system data includes the location of the office (e.g., Jhenaidah), section/sub-section (e.g., and the date is processed/disposed of (for example, April 23, 2015). Hence, we reduce this data to a database of number of files processed electronically by each section of DC office per month for all the months since January 2013 until December 2015. We then match this data with the DC office data to conduct our analysis.

IV. Measurement Issues and Econometric Framework

There are a number of ways of measuring bureaucratic efficiency. One simple way is simply to look at number of files processed by the public officials. However, such a measure may not be appropriate to measure a DC office's efficiency, particularly at the initial stage of adoption of the e-filing system. The problem lies in the way the number of files recorded at the DC office. In particular, a file, if arrives at the DC's section, is recorded at the DC's personal assistant's office ("Goponiyo Shakha") and similarly, is recorded at other sections (General, Revenue, Judiciary, Education and IT). When e-filing is introduced,

it is not clear whether the files processed electronically were recorded in the personal assistants' offices (of DC and ADCs). Whereas it is a possibility, there is no way to identify which files or what percentage of files, in each month, are recorded in the personal assistants' offices. This is more of a problem in the first year of e-filing implementation and less so in later years since anecdotal evidences indicate that all the files processed electronically are also processed manually and hence are recorded at the personal assistants' offices. Hence, in some occasions, the electronic files replaces the manual files whereas in some cases, this is not.

Instead, we chose to look into another measure of bureaucratic efficiency, the number of citizens served for a particular service. we hypothesize that adoption of electronic filing system would increase number of citizens served in a month for a particular service. In order to test this hypothesis, we estimate the following model:

$$\ln(y_{ijkt}) = \alpha + \beta \ln(X_{ijkt}) + \gamma_j + \delta_k + \theta_t + \epsilon_{ijkt} \quad (1)$$

where y_{ijkt} is the number of citizens/firms served for service i in section j at district k in year t , X_{ijkt} is the number of files processed in section j at district k in year t , γ_j represents the section fixed effects, δ_k represents district fixed effects and θ_t represents the time fixed effects and ϵ_{ijkt} is the error term clustered at district-section level. We expect that the coefficient β is positive.

We delved deeper into the files that are processed electronically using the rich dataset generated by the system to test a few hypotheses on bureaucratic efficiency. We estimate the following model:

$$\ln(y_{ijkt} + 1) = \alpha + \beta_1 \ln(X_{1ijkt} + 1) + \beta_2 \ln(X_{2ijkt} + 1) + \beta_3 \ln(X_{3ijkt} + 1) + \gamma_j + \delta_k + \theta_t + \epsilon_{ijkt}$$

where y_{ijkt} is the number of days taken to process file i in section/subsection j at district k in month t , X_{1ijkt} is the number of officials involved in processing file i in section/subsection j at district k in month t , X_{2ijkt} is the number of actions taken on file i in section/subsection j at district k in month t , X_{3ijkt} is number of paragraphs the file i in section/subsection j at district k in month t contains, γ_j represents the section fixed effects, δ_k represents district fixed effects and θ_t represents the time fixed effects and ϵ_{ijkt} is the error term clustered at district-section/sub-section level. We expect that the coefficients β_1, β_2 and β_3 are all positive.

V. Descriptive Statistics

Table 1 provides the descriptive statistics of service delivery and other procedures. It shows that every year, government is faced by a large number of various types of legal cases where the largest number of these cases are handled by the Revenue Munshikhana under Revenue Section. The government also runs mobile courts, a special court delegated to run speedy trials on anti-crime drives conducted by the executive magistrates in each district, is averaged to be 921 in each district each year in the sample.

Table 1: Various Legal Cases faced by the government and Services provided at the DC offices

Services	Mean	SD	N
Legal Cases			
General Certificates	422.39	843.87	175
Revenue Munshikhana	2,621.42	6,662.85	175
Judicial Munshikhana	663.43	629.04	168
Mobile Court	921.92	826.37	182
Citizen Services			
Land Record Room	42,529.50	87,774.18	134
Juidicial licenses	57.39	159.59	142
Nezarat	784.82	7,804.16	141
Business and Trade Licesenses	194.36	259.53	149
Sairat Mahal (Leasing)	138.51	263.64	167

Figure 1 indicates the number of districts adopting the electronic filing over time. It is evident that for the first five months of 2013, there is only one district (Jessore) that has adopted the electronic filing. Since June 2013, the e-filing adoption has been started. There is however a sharp increase in September 2013 in number of districts adopting e-filing system, possibly due to the introduction of the performance measurement system. By late 2013, there is another larger-than-trend increase in the adoption again due possibly to the announcement and sharing of the ranking and recognition of the top ranked DC offices.

Figure 1: Number of DC offices adopting e-filing system over time

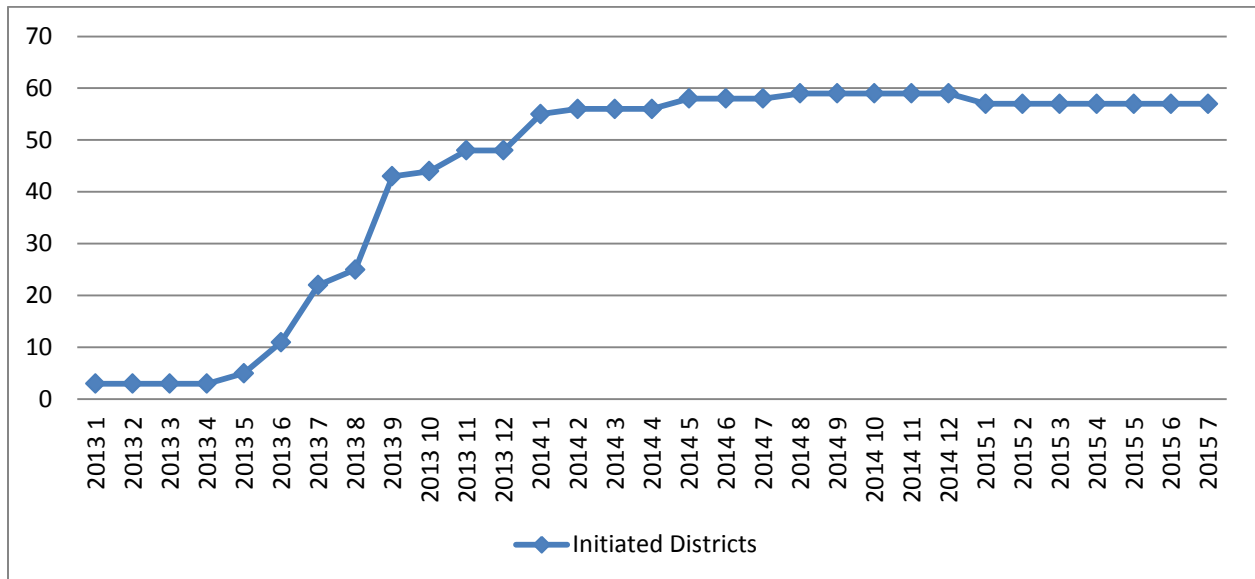


Figure 2 presents the mean number of files processed through e-filing system in a month in all the districts over time. According to figure 2, there is a sharp increase in number of files processed electronically in September 2013 and again a slight bit in November 2013 as well, possibly due to the performance measurement system. There is however a drop in the number of files processed through the system in May 2014, possibly due to withdrawal of the performance system. Interestingly, there is a sharp increase again in August 2014 and again in September 2014. since then, the average number of electronically processed files hovered between 40,000 to 45,000 files.

How long does it take to process these files? Figure 3 represents mean number of days in a month to process a file in each district over time. Focusing on the first five months when Jessore was the only district implementing the system, figure 3 indicates that the mean number of days taken to process a file has gone down over time, indicating a learning phase for the public officials while adopting the new system. For that matter, this part can be thought as the learning curve of for the public officials at the Jessore DC office: the officials learn as they work use the e-filing system more over time and become more efficient user of the system, reducing the . There is a rise from May 2013 since other districts have started to use the new system slowly and as they step into their first month of using the system and hence ride into their own learning curve, the number of days required to process the file increases. It reached a peak on the . Since then, there is a gradual decrease in the number of days required to process a file, possibly due to the "learning by doing" effect of using the e-filing system. Like Jessore, hence, this part can be thought of as the learning curve of all the other DC offices, aggregated.

Figure 2: Mean (monthly) number of Files processed through e-filing system in all the districts over time

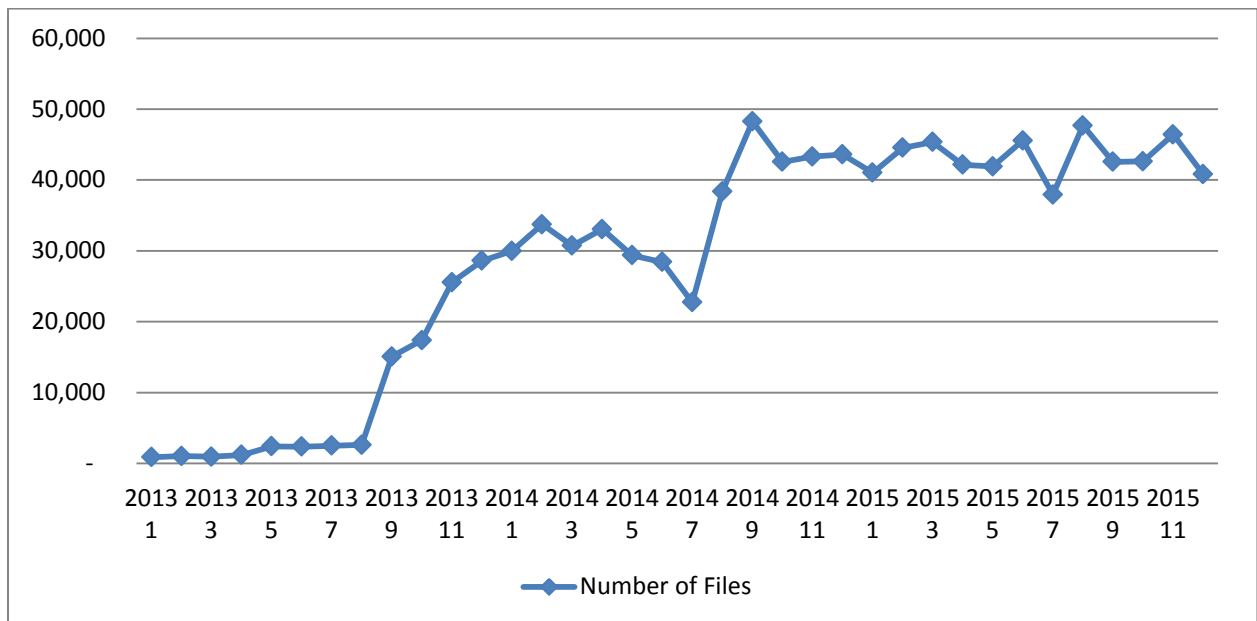


Figure 3: Mean number of Days taken to process a file in a month for all the DC offices

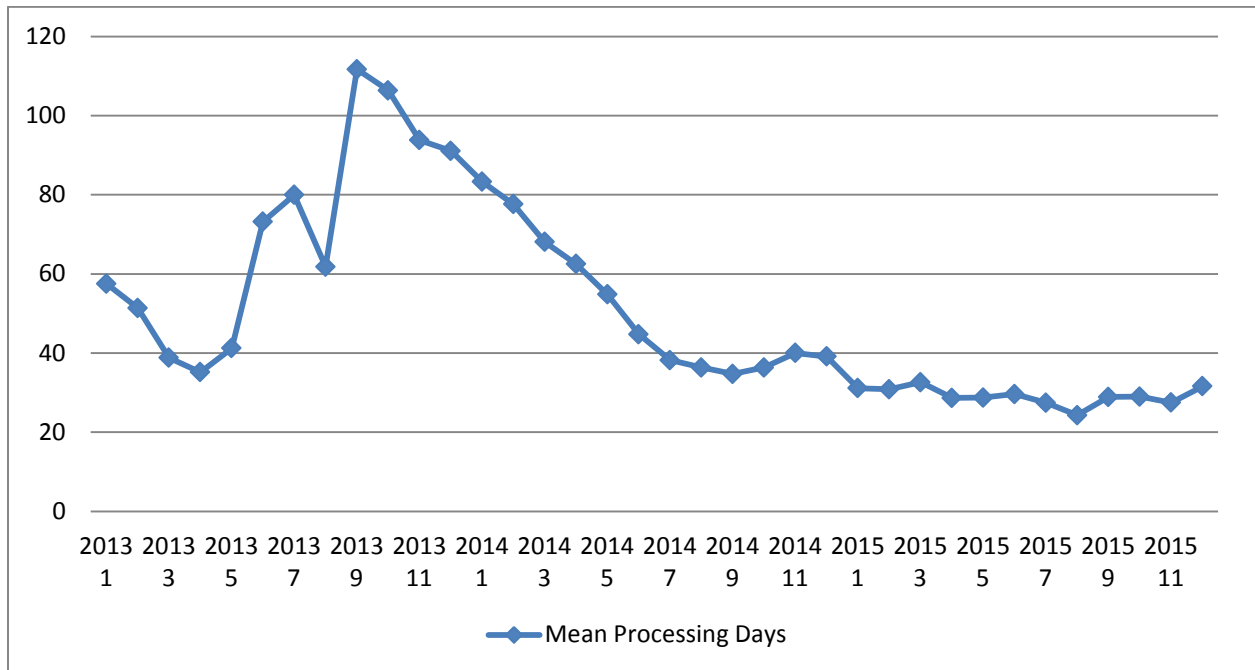


Table 2 presents the descriptive statistics of the files processed electronically. It turns out on an average, a file takes about 43 days to process, processed by an average of 5.3 users who takes 10 actions and each files contain 2.5 paragraphs.

Table 2: Descriptive Statistics of files processed electronically

Variables	Mean	SD	N
All Files			
Days required to process a file	42.6	69.0	1,085,698
Users processed a file	5.3	1.3	1,105,309
Actions taken on file	9.9	9.7	1,105,315
Paragraphs on the file	2.5	3.9	1,105,319
Files in 2015			
Days required to process a file	28.6	42.3	534,577
Users processed a file	5.4	1.3	546,161
Actions taken on file	10.6	12.1	546,163
Paragraphs on the file	2.8	3.6	546,165

There is a significant improvement in file processing in the year 2015. the average number of days has fallen to 29 days. The other characteristics however have somewhat remained the same: the number of officials processing the file is 5.4, with number of actions taken is 10.6 and number of paragraphs on the file is 2.8.

VI. Empirical Results I: Effect of e-Filing on Public Service Delivery

We first consider provision of various licenses and leasing of public properties. Table 3 exhibits effect of number of electronic files processed in a section in a district on number of citizens served for licenses and leasing of state properties. Column 1 estimates a random effect model. We find that number of files processed electronically does not affect number of citizens served, but in districts where more granular monitoring is possible through subsection identification, the number of citizens served is significantly higher those districts where it is not possible. In column 2, we consider district fixed effects. We still do not observe any effect of electronic file processing, but the effect of possibility of granular monitoring has a positive effect. The result remains the same when the year fixed effect is added, as presented in column 3. Since there are possibility that there are some section specific factors that may be causing this, we therefore control for section fixed effects in addition to district fixed effect. Column 4 presents the result without year fixed effect whereas column 5 additionally control for year fixed effect. We do not find any significant changes in the results.

Table 3: Panel Data Regression of Number of citizens obtained a license or a lease

Dep Var: Ln(no. of citizens Served)	(1)	(2)	(3)	(4)	(5)
VARIABLES	RE	FE	FE	FE	FE
ln(Number of Files processed electronically by the respective section)	-0.002 (0.016)	-0.006 (0.017)	-0.062 (0.041)	-0.008 (0.017)	-0.023 (0.033)
Whether the subsection can be identified by the system, $y=1, n=0$)	0.423** (0.201)	0.414* (0.207)	0.429** (0.208)	0.489** (0.241)	0.491** (0.243)
Constant	3.370*** (0.144)	3.468*** (0.058)	3.455*** (0.063)	3.456*** (0.051)	3.446*** (0.053)
Observations	414	414	414	414	414
R-squared	0.0139	0.014	0.021	0.025	0.029
Number of dis2	52	52	52	52	52
District FE	NO	YES	YES	YES	YES
Section FE	NO	NO	NO	YES	YES
Year FE	NO	NO	YES	NO	YES

The clustered robust standard errors are in the parenthesis. The errors are clustered at the district level for first three columns and at district and section level in last two columns. The degree significance follow the standard presentation of *** $p < 0.01$, ** $p < 0.05$ and * $p < 0.1$.

We now shift our attention to number of cases resolved in various sections at district offices. Like before, we consider two factors: number of files processed electronically and possibility of more granular monitoring through identification of subsection. We find that electronic file processing has a positive effect on number of cases resolved: a 1% increase in number of files processed electronically results into .04% increase in number of cases solved. When controlling for district fixed effect, this result is still significant at 5% level with coefficient .034. However, when year fixed effect is introduced, the coefficient loses its significance. It is possible that the year fixed effect is correlated with how the sections are coordinated to use e-filing. We therefore additionally control for section in column 4

without year fixed effect and in column 5, with year fixed effects. We find that the coefficient has increased to .1 meaning that a 1 percent increase in electronic filing results into .1 percent increase in number of cases solved.

Table 4: Panel Data Regression of Number of legal cases solved

Dep Var: Ln(no. of cases solved)	(1)	(2)	(3)	(4)	(5)
VARIABLES	RE	FE	FE	FE	FE
Ln(Number of Files processed electronically by the respective section)	0.041** (0.016)	0.034** (0.016)	-0.068 (0.055)	0.126*** (0.016)	0.102*** (0.034)
Whether the subsection can be identified by the system, $y=1, n=0$)	-0.460** (0.192)	-0.466** (0.189)	-0.516*** (0.183)	-1.474*** (0.171)	-1.479*** (0.172)
Constant	5.378*** (0.135)	5.335*** (0.034)	5.319*** (0.039)	5.284*** (0.049)	5.281*** (0.049)
Observations	552	552	552	552	552
R-squared	0.0174	0.018	0.025	0.243	0.244
Number of dis2	51	51	51	51	51
District FE	NO	YES	YES	YES	YES
Section FE	NO	NO	NO	YES	YES
Year FE	NO	NO	YES	NO	YES

The clustered robust standard errors are in the parenthesis. The errors are clustered at the district level for first three columns and at district and section level in last two columns. The degree significance follow the standard presentation of *** $p < 0.01$, ** $p < 0.05$ and * $p < 0.1$.

The effect of more granular monitoring, unlike for services, paradoxically has opposite effect. The coefficient is similar when there is RE and district FE is considered along with year FE in column 3. The coefficient falls even further when section fixed effects are considered. This means that cases in districts where more granular monitoring is possible through subsection identification has lower significantly lower number of cases filed. This is possible since faced with such close potential monitoring, the case handlers and magistrates probably become more careful in disposing a case, taking time to process it, resulting into fewer cases processed per year.

whereas e-filing seem to have mixed effects, it may not have any effect on issues that has complicated bureaucratic process. We consider land acquisitions (purchase of private lands by the government for the purpose of, e.g., roads and bridge construction) to investigate the matter. We find that neither e-filing nor granular monitoring possibility has any impact on solving land acquisition cases.

Table 5: Panel Data Regression of Number of Land Acquisition cases solved

Dep Var: Ln(no. of cases resolved)	(1)	(2)	(3)
VARIABLES	RE	FE	FE
ln(Number of Files processed electronically by the respective section)	0.104 (0.064)	0.070 (0.063)	0.108 (0.074)
Whether the subsection can be identified by the system, $y=1, n=0$)	-0.610 (0.469)	-0.394 (0.471)	-0.438 (0.513)
Constant	2.303*** (0.237)	2.398*** (0.101)	2.397*** (0.101)
Observations	211	211	211
R-squared		0.011	0.015
Number of dis2	53	53	53
District FE	NO	YES	YES
Service FE	NO	NO	NO
Year FE	NO	NO	YES

The clustered robust standard errors are in the parenthesis. The errors are clustered at the district level. Since there is only one section for land acquisition, section fixed effects is ignored. The degree significance follow the standard presentation of *** $p < 0.01$, ** $p < 0.05$ and * $p < 0.1$.

VII. Empirical Results II: Bureaucratic Efficiency Captured in e-Filing System

Once a file is electronically processed, the processing information is automatically stored in the system. As mentioned above, we use this file level data to test two important hypotheses. First, as posed by Wilson (1991), the files that involve greater number of public officials can be expected to take more time to process. Second, the files that are more complicated to process should take longer time to process as well.

We first consider the role of number of officials involved in processing a file. In column 1, we control for district fixed effects only whereas in column 2, we additionally control for monthly trends. We find that a (roughly) 1 percent increase in number of users results (roughly) 1.2 percent increase in number of days required to process whereas this is 1.13 percent if year fixed effect is added. The result is statistically significant at 1% level. In column 3, we additionally control for section fixed effect whereas in column 4, we additionally control for monthly trends. The coefficient of log of number of users remain statistically significant with magnitude slightly above 1. In column 5, we consider subsection fixed effects instead of section whereas in column 6, we add monthly trends to district and subsection fixed effect. The coefficient remains statistically significant and remain close to 1. This provides a robust evidence that more public officials in processing a file results into longer time to process a file.

We turn next to the role of complicity of the file in determining processing days. We first consider the number of actions taken on a file, controlling for number of officials. Number of officials is an important control here since each official would take at least one action. If the file does not have any complicity, each user would have only one action. However, often a file needs to travel back and forth as in the case for more complicated, novel and/or unique issues. This raises the number of actions needed keeping the

number of users same and in such occasions, the number of actions exceeds number of users. Hence, controlling for number of users, number of actions indicates complicity (novelty or uniqueness) of the file. We also control for number of paragraphs since complicated or novel issues often require greater instructions. In column 1, we control for district FE whereas in column 2, we additionally control for monthly trends. We find that number of actions has a positive effect with a greater magnitude when year and it is statistically significant at 1% level. When we additionally control for section fixed effects in column 3 and with monthly trends in column 4, the coefficient remains to be statistically significant. Finally, the result is similar when section fixed effect is replaced by subsection fixed effect.

Table 6: Panel Data Regression of number of days required to process a file

Dep Var: ln(no. of days taken to process file + 1)	(1) FE	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
ln(no. of users + 1)	1.215*** (0.130)	1.138*** (0.108)	1.028*** (0.085)	1.020*** (0.078)	0.934*** (0.065)	0.947*** (0.062)
ln(no. of lactions required + 1)	0.277*** (0.046)	0.387*** (0.049)	0.263*** (0.035)	0.366*** (0.036)	0.245*** (0.030)	0.347*** (0.032)
ln(No. of paragraphs + 1)	0.102*** (0.032)	0.110*** (0.029)	0.121*** (0.023)	0.129*** (0.022)	0.144*** (0.019)	0.154*** (0.018)
Monthly Trend		-0.047*** (0.005)		-0.046*** (0.003)		-0.045*** (0.002)
Constant	0.058 (0.216)	1.062*** (0.202)	0.416*** (0.144)	1.286*** (0.143)	0.613*** (0.110)	1.424*** (0.110)
Observations	1,012,986	1,012,986	1,012,953	1,012,953	1,012,953	1,012,953
R-squared	0.077	0.165	0.065	0.153	0.060	0.152
Number of dis2	57	57	57	57	57	57
District FE	YES	YES	YES	YES	YES	YES
Section FE	NO	NO	YES	YES	NO	NO
Subsection FE	NO	NO	NO	NO	YES	YES
Monthly Trend	NO	YES	NO	YES	NO	YES

The clustered robust standard errors are in the parenthesis. The errors are clustered at the district level for first two columns, at district and section level for columns 3 and 4 and at district and subsection level for columns 5 & 6. The degree significance follow the standard presentation of *** p<0.01, ** p<0.05 and * p<0.1.

We now shift our attention to the second measure of complicity: number of paragraphs in a file. We hypothesize that files that are unique, novel or complicated are expected to require longer description and instructions and therefore will have more paragraphs and will need more time to process. As before, column 1 and 2 has district fixed effects where 2 additionally have monthly time trends. We find that greater number of paragraphs require more time to process: a roughly 1 percent increase in number of paragraphs increases roughly .102 to .11 percent number of days in processing file. In column 3, section FE in addition to district FE is added whereas column 4 has monthly time trends. The coefficient increases and remains to be statistically significant at 1% level. In column 5 and 6, subsection FE replaces section FE. The coefficient increases a bit further between 0.14 and 0.15 and remains to be statistically significant at 1% level.

One final observation is the role of time in processing files. The monthly trend clearly shows that over time, the number of days required to process a file falls significantly and the coefficient is statistically significant at 1% level. This suggests that there is a learning by doing at work: officials, as they use the e-filing system more often, tend to learn and adopt to the new technology better and process the file faster, as evident in figure 3.

VIII. Conclusion

This paper looks into the effect of electronic filing on bureaucratic efficiency via public service delivery and other activities. We find the electronic filing system does not have any effect on license and leasing services but has a positive impact on number of cases dissolved or handled in a month. We have also found that if the subsection of the license or leasing processing unit can be identified, i.e., if the monitoring through e-filing is more granular, the number of licenses processed is higher. However, for legal cases, it is slower, suggesting that due to close monitoring possibility, the case handling officials are more cautious and treat the cases more carefully with greater amount of time, resulting into lower number of cases resolved in a month. For activities involving complicated bureaucratic processes, we do not have any effect of electronic filing or granular monitoring.

The paper also investigates the factors influencing the time required to process a file from two angles. First, it shows that greater number of people involved in the file processing requires more time. Second, more complicated files in terms of greater number of actions taken even when number of officials remain the same needs more time. Finally, files that have more instructions in terms of higher number of paragraphs need more time to process.

We have planned to extend the paper to various directions. First, we have got access to log-in information from which it is possible to find out the number of hours spent by an official in the e-filing system. We can also find out her/his transfer information to other district/section/subsection. This then can be used to instrument the e-filing usage. Second, we are planning to use electricity transmission failures as well as distributional failures/load shedding information to find out power outages at different DC offices and use it as an instrument. Third, as suggested by a participant in the IGC development conference, we want to look into salience factor by focusing into a sample of the districts and test whether files move faster when the particular issue becomes public or media sensation. Fourth, we would like to use the Upazilla election schedule in 2014 to see how the presence of this election affects use of e-filing. Fifth, in the period when the performance measurement was effective, ranking should have played a role. We would like to investigate how this affects usage and processing of files through the electronic system. Finally, Transparency International has conducted two national surveys, one in 2012 and one in 2015. This would help us find out whether services provided by DC offices are subject to greater bribery or not in response to e-filing usage.

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