The business value of e-government for small firms

Debora Viana Thompson and Roland T. Rust
Robert H. Smith School of Business, University of Maryland, College Park, Maryland, USA, and

Jeffrey Rhoda
IBM, Bethesda, Maryland, USA

Abstract

Purpose – To propose and test a model about the business value of government electronic services (e-government) to small firms. Two dimensions of e-government use (search-oriented and transaction-oriented) are measured and the effects of three types of e-government benefits on small firms' profitability are tested.

Design/methodology/approach – Survey of 100 small firms in three states of the USA (Maryland, New York, and Washington).

Findings – Small firms' information technology capabilities are positively associated with the use of e-government services. Search-oriented use of e-government is positively related to enhanced intelligence generation, new business development, and time savings. The relationship between use of e-government and profitability is mediated by firms' intelligence generation.

Research limitations/implications – The study uses self-reported data and was based on a sample of firms from three states of the USA. Thus results are limited by the specificity of this geographic context.

Practical implications – Small firms should use e-government as an information source to enhance their market intelligence and build revenues. IT suppliers should emphasize e-government services that link small firms to customers and collaborators, and facilitate access to key information resources. Government agencies should enhance their e-government information services to improve small business performance and increase tax receipts.

Originality/value – The paper provides empirical evidence about the positive effect of use of e-government services on the financial performance of small firms.

Keywords Small enterprises, Government, Government agencies, Information services, United States of America

Paper type Research paper

Introduction

Governments' use of internet capabilities has increased significantly over the past ten years. Among all the constituencies that are affected by the development of electronic government, businesses represent one constituency that may experience significant benefits. An example of the potential impact of government electronic services on

businesses is Singapore's eCitizen portal, which allows citizens and businesses to access all government services from a single worldwide web site. A few years ago, obtaining an import or export license in Singapore required applicants to fill out 21 different forms and took 15-20 days for 23 agencies to process the request. Today, applicants can submit one online form and receive a license about 15 seconds later (Al-Kibsi *et al.*, 2001).

To comply with government regulations, firms handle a variety of transactions, such as permits, licenses, registrations, taxes, etc. Additionally, companies and governmental agencies exchange information on many different issues, from employment to financial to trade data. Many of these business-to-government interactions involve searching for information across agencies on regulations, procedures and deadlines, obtaining and filling out forms, submitting required information, etc. With the development of electronic government, firms can conduct several, if not all, stages of these interactions online. Some of the potential advantages of such online interactions are time savings and, consequently, reduced opportunity costs for firms complying with government. How are firms affected by the development of electronic government? What is the strategic impact of e-government services on businesses? The goal of our research is to empirically address these issues.

Governments have been recognized as important lateral partners of organizations (Comer *et al.*, 1980), but the strategic impact of e-government on business has been relatively unexplored. Our goal is to shed some light on how firms may gain from using electronic government in the United States (US). Recent statistics show that US spending on government-related internet ventures is expected to increase in the years ahead, increasing from $2.9 billion in fiscal year 2002 to more than $5 billion in fiscal year 2007 (Input, 2002). However, like the worldwide pattern, the stage of development of electronic government varies across US states. Some states are moving strongly ahead in transferring information and services online, while others lack financial, technical and/or personnel resources to invest in electronic government. Because e-government is still relatively underdeveloped in many states, we explore the impact of electronic government on three US states that currently offer a wide array of governmental e-services to the business public: Maryland (MD), New York (NY) and Washington state (WA).

We are particularly interested in the effects of electronic government on small firms. Assessing the effects of electronic government on businesses requires an examination of its impacts on small firms, considering the substantial impact of this segment on the economy in the United States. Small firms represent more than 99 percent of all employers in the US and provide 51 percent of the private sector output (US Department of Commerce, 2001). Moreover, American small businesses have been investing in internet infrastructure in large numbers. According to a study by the Office of Advocacy in the Small Business Administration (SBA) in June of 2000, small businesses spent an estimated $156 billion on information technology (IT) products in 1999 (Small Business Administration, 2000).

Throughout this paper, we refer to government electronic services as e-government services. The term e-government refers to government's use of IT applications to enhance the access and delivery of government information and service to citizens, business partners, employees, other agencies and government entities (McClure, 2000). It encompasses intranet applications that allow data to be gathered, processed and shared in more efficient ways, extranets that link government to business suppliers, and public web sites that give citizens and businesses a self-service channel for

transactions and information (Symonds, 2000). In this study, we specifically examine web-based e-government services designed to interface with the business public.

The paper is organized as follows: first, we present the conceptual framework of our model about the business value of e-government. Next, we discuss our research method and empirical results. We conclude with a discussion of our results, limitations and implications of our research.

Conceptual framework
Owing to the advent of the internet and developments in e-commerce, public administration is experiencing a change from the bureaucratic, inward-looking approach to a citizen-centric, outward-looking approach that prioritizes the concerns and needs of users (Ho, 2002; Scavo and Shi, 1999). Public managers are now emphasizing user satisfaction and control, flexibility in service delivery, and network management with internal and external partners, rather than solely cost-efficiency issues (Ho, 2002). As mentioned by Layne and Lee (2001), government processes will be organized for citizens' convenience instead of the convenience of the government. Federal, state and local governmental agencies in the United States have started the move toward this new approach (see Ho (2002) and Moon (2002) for data on city web sites and West (2004) for data on state web sites).

Citizens and businesses can use e-government for three main purposes:

(1) to access information;

(2) to transact with government electronically; and

(3) to participate in government's decision making (Marchionini *et al.*, 2003).

The public can search for information across several governmental databases such as FedStats (statistical information), Library of Congress, SBA research and stats department, Internal Revenue Service, Social Security Administration, etc. The second type of e-government use is transactional in nature and includes submission and receipt of information online to apply and obtain licenses, permits, patents, reports, loans, etc. The third type of e-government use involves citizens' participation in rule making such as using e-mails or chat rooms to comment and discuss regulations, e-voting, and e-mailing government officials. Our focus in this paper is on search-oriented and transaction-oriented uses of e-government – the two most meaningful applications of e-government to businesses. Using e-government to participate in government's actions is likely to be more relevant at the individual level than at the firm level (e.g. how and why individuals decide to participate and the impact of such e-participation on individuals' attitudes toward government), and e-participation is the least developed application of IT to government (Marchionini *et al.*, 2003). Thus, the expression e-government use, henceforth, comprises search and transaction-oriented uses of e-government services by small firms.

IT capability and e-government use
We propose that use of e-government is related to firms' ability to interact with government online. Ability has been extensively used to understand organizational and individual behavior in fields such as psychology (Ajzen and Fishbein, 1980), consumer behavior (MacInnis *et al.*, 1991), persuasion (the Elaboration Likelihood Model, Petty and Cacioppo, 1981) and organizational behavior (O'Reilly and Chatman, 1994).

IT capability relates to firms' ability to acquire, deploy and leverage their IT resources to shape and support their business strategies and value chain activities (Bharadwaj *et al.*, 2003, p. 4). The role of IT is expanding within small firms (Riemenschneider and Mykytyn, 2000) due to factors such as lower hardware and software costs, their ease of use, increased general IT knowledge by many individuals within the firm, and most importantly, due to the need to increase or maintain customer satisfaction (Hussin *et al.*, 2002; Riemenschneider and Mykytyn, 2000). Previous research has shown that computer experience, company-supported training, and management knowledge improve the effectiveness of computer use and IT applications in small firms (Cragg and King, 1993; DeLone, 1988). Moreover, small firms' technological readiness (i.e. the level of sophistication of IT use and IT management) has been used to predict electronic data interchange (EDI) adoption (Iacovou *et al.*, 1995), and owners' knowledge of IT in micro firms (less than five employees) has been positively related to the extent of use of e-services (Pollard, 2003).

Furthermore, IT capability is an important antecedent of organizational participation in business-to-business electronic markets and a significant factor on firms' substantive and procedural knowledge of how to do business online (Grewal *et al.*, 2001). We extend this view by saying that IT capability is also an important foundation for e-government use to search for information and conduct electronic transactions, providing small firms with know-how to redesign their relationship with government and to envision benefits from this change. Thus, we expect that:

H1. There is a positive relationship between the IT capability of the firm and the firm's use of e-government services.

Business value of e-government services

Investigating the benefits of e-government services to the business public seems particularly relevant given the significant (and usually overlooked) impact of government on firms' cost structure. According to the Office of Advocacy at the SBA agency, firms employing fewer than 20 employees face an annual regulatory burden of $6,975 per employee to comply with federal government (about 60 percent more per employee than larger firms). The use of new technologies to interact with citizens and businesses does not change the laws and regulations *per se*, but it has the potential to lessen the burden of handling paperwork, acquiring information and submitting documentation.

We propose that the business value of e-government services is linked to intelligence generation, new business development and reduction in firms' compliance and opportunity costs. These categories of benefits are consistent with the search-oriented use (e.g. access to valuable information) and transaction-oriented use (e.g. complying with government online) of e-government. Table I describes ten US government services that are currently available online to businesses.

The use of e-government services may improve business profitability through two different paths: revenue expansion and cost reduction.

Revenue expansion effect

Electronic environments can help firms expand and develop new markets through intelligence generation (Fraser *et al.*, 2000). The internet makes it easier to collect and disseminate critical information to create superior customer value and obtain

Agency	Service	Description	Web address	Type of application
SBA	Starting your business	Provides start-up basics, planning, finance, marketing, employment, and legal topics	www.sba.gov/starting/	Informative (e-mail interactivity for information request)
SBA	Financing your business	Provides information, forms and applications for loans, links to financial organizations and workshops	www.sba.gov/financing/	Informative (e-mail interactivity for information request and downloadable forms)
SBA	Statistical information	Provides statistics from over 100 US federal agencies	www.fedstats.gov	Informative (e-mail interactivity for information request)
SBA	Business opportunities – database of firms	Central contractor registration (CCR) is a database with companies wanting to do business with government. Agencies and firms can search the database by firms' abilities, size, location, experience, etc.	www.ccr.gov	Interactive (firms can register, update and renew registrations online as well as search for other firms)
SBA	Business opportunities	Database with current contracting and subcontracting opportunities (SUB-NET). Business can identify opportunities and bid on them	www.sba.gov/businessop/	Interactive (firms can post and search contracting opportunities using different criteria and contact other firms through e-mail)
Department of commerce	Trade service	Database (search engine) that connect firms with international buyers, distributors and agents. Offers reports by industry and country, international business broadcast discussing international trade possibilities	www.buyusa.com	Interactive (firms can post profiles for matchmaking, search for international partners, receive e-mail notices of trade lead opportunities, submit and respond to offers)
New York State	Online permitting and application system	Service delivery platform that allows businesses to search for permits, registrations and licenses and submit applications online. This system allows application for over 1,100 permits administered by 36 agencies	www.nys-permits.org	Interactive (firms can search for which permits are necessary, submit applications and track their status online)
US patent and trade mark office	Patents and trade marks	Allows businesses to search and apply for patents and trade marks, pay patent maintenance fees	www.uspto.gov/ebc/indexebc.html	Interactive

(continued)

Table I.
Examples of government services available online in the USA

Agency	Service	Description	Web address	Type of application
Maryland State	Business operations	Web page of the department of labor, licensing and regulation that allows businesses to post job openings, search for résumés, file unemployment insurance contributions and claims, obtain registrations, etc.	www.dllr.state.md. us/	Interactive
Washington State	Portal for the business public	Web page provide information on starting and expanding businesses, doing business with government, obtaining licenses and permits, submitting employment information, etc.	http://access.wa.gov/ business/index.aspx	Interactive (apply for and renew licenses, obtain criminal history information, etc.)

Table I.

competitive advantage. Slater and Narver (2000) tested the direct effect of firms' intelligence generation on several measures of business performance such as sales growth, customer satisfaction, product quality and new product success. They examined four dimensions of business intelligence (market-focused intelligence, intelligence obtained through inter-organizational collaboration, intelligence from experimentation and intelligence from repetitive experience) and reported a positive effect of these dimensions on the performance measures. Further, Tippins and Sohi (2003) showed that organizational learning improves firms' ability to deal with customers and competitors and is positively related to superior profitability.

One important potential benefit of e-government services is access to information and new business opportunities. The United States Government is the world's largest producer of information (Susman, 2001). US governmental web sites have been making available an extensive array of public sector information, socioeconomic, technological, scientific, labor and marketing information as well as industry-specific data (e.g. www.firtgov.gov, www.sba.gov/advo, www.fedstats.gov). Firms can get marketing training, financial advice, search for technological partners, etc. (see www.sba.gov, for a list of resources available to small firms). Additionally, governmental web sites have created networks of sellers and buyers, which represent a window to potential news customers and business development. For example, as described in Table I, the Department of Commerce offers an e-service that connects firms with international buyers, distributors and agents (www.buyusa.com). Firms can submit and respond to offers online. Moreover, the Central for Contractor Registration (www.ccr.gov) is a search engine with firms wanting to do business with government. Agencies and firms can search for information and contact each other using e-mail.

In summary, use of e-government services should enhance the firm's intelligence generation, which is a crucial component of organizational learning and market orientation. Considerable empirical evidence has shown the influence of intelligence generation on organizational performance through several paths: relative product quality, new product success, sales growth, enhanced customer value, improvements in strategy consistency and workability, and ultimately, on superior profitability (Jaworski and Kohli, 1993; Pelham and Wilson, 1996; Slater and Narver, 1994). Therefore, we expect that:

H2. There is a positive relationship between the firm's use of e-government services and the firm's business intelligence generation.

H3. There is a positive relationship between the firm's business intelligence generation and the firm's profitability.

E-government may function as an extension of the market when government web sites provide information on sales opportunities, such as posting of business leads, subcontracting listings, networks of suppliers and buyers, etc. Firms can search for these sales opportunities, improving the generation of new businesses. Searching for new business leads on governmental web sites may also lead to time savings because e-government web sites collapse information from many different sources (e.g. different agencies and contractors) into one site, facilitating sales generation. The development of new businesses from use of e-government services is expected to have a direct positive impact on the firm's profitability. We hypothesize that:

H4. There is a positive relationship between the firm's use of e-government-services and the amount of new businesses generated due to information in governmental web sites.

H5. There is a positive relationship between the amount of new businesses generated due to e-government services and the firm's profitability.

H6. There is a positive relationship between the amount of new business generated due to information in governmental web sites and the firm's time savings.

Cost reduction effect

In addition to revenue expansion, the electronic commerce, operations, management, and economics literatures have discussed empirical evidence that electronic commerce decreases intermediation costs (Fraser *et al.*, 2000), procurement costs (Litan and Rivlin, 2001), search costs (Bakos, 1997), labor and overhead costs (Strader and Shaw, 2000). We hypothesize that electronic business-to-government interactions will also decrease firms' costs. Several studies have proposed that the main benefit of e-government use, for both governmental agencies and the public in general is cost efficiency (Edmiston, 2003; Ho, 2002; Jaeger, 2003). Firms' transaction-oriented use of electronic government services should reduce the total cost (direct and opportunity cost) of interacting with government by decreasing the amount of time, effort and money involved in understanding regulations and procedures, contacting agencies, locating forms, gathering and submitting information (including bids for procurement processes) and receiving feedback. A study by Deloitte Research (2003) showed, empirically, that the construction industry could save between $15 and $20 billion per year if governments at all levels in the US were to streamline their compliance processes through the use of IT. Search-oriented use of e-government also may decrease search costs (such as effort, time and money) to acquire market, technological, legal and other types of intelligence.

We focus on the amount of time savings that accrue due to use of e-government services as an indicator of the decrease in firms' costs. Time is an especially valuable resource for small firms due to their reduced personnel and financial resources. Time savings from use of e-government are likely to reduce the capital cost of time and the opportunity costs associated with interactions with government, and are expected to have a positive effect on firms' profitability. We hypothesize that:

H7. There is a positive relationship between the firm's use of e-government services and the amount of time savings in the firm's interactions with government.

H8. There is a positive relationship between the amount of time savings in the firm's interactions with government and the firm's profitability.

Method

Sampling and data collection procedures

We acquired a business list from a commercial database (compiled from a variety of sources and directories) that contains over 12 million business establishments with representation across industry classifications and across states of the US. We

randomly selected 667 firms from each of the three states, Maryland, New York and Washington, yielding a total sample of 2001 firms. All firms met the SBA size criterion for small business (fewer than 500 employees). We screened the addresses of the 2001 firms of our sample list and a total of 142 addresses contained errors and/or incomplete address information[1], leading to a total sample of 1,859 companies. We sent to these companies questionnaires personally addressed to the top executive. The questionnaire asked respondents to focus on their firms' interactions with government in the last 12 months.

Prior to sending the final questionnaire, we conducted a pretest with ten executives of small firms using a convenience sample of firms from different industries (i.e. consulting firm, restaurant, insurance company, picture shop, medical clinic, cabling and computer network firm). The pilot study confirmed that top executives were appropriate informants for the study.

One hundred and seventy questionnaires could not be delivered due to wrong addresses, leaving us with a valid sample of 1,689 firms. We received 57 complete questionnaires (3 percent initial response rate). To further increase our sample size and boost our response rate, we developed a phone follow-up study, contacting the non-respondents from the mail survey. In this second phase of the data collection, we offered a $25 dollar cash incentive but we conducted the interview with firms' top executives entirely over the phone. From the 160 top executives contacted over the phone, 42 accepted to participate and were interviewed (26 percent response rate). Our final sample size was 100 firms.

Common method and non-response bias assessment
To minimize concerns about common method bias, we employed several procedural and remedial methods (Podsakoff and Organ, 1986). First, our questionnaire did not provide any information about the actual goal of the research. The Likert scales for our key constructs were interspersed with general questions requesting managers' opinions (e.g. in the near future what percent of total transactions with government do you foresee your firm conducting online?). Second, in a *post hoc* approach, we attempted to isolate the potential covariance due to artifactual reasons using Harman's one-factor test (Podsakoff and Organ, 1986). Results from a factor analysis did not indicate the presence of one single factor explaining the majority the variance in our measures, so common method bias does not seem to be a major concern.

To minimize non-response bias, we follow several steps. First, we implemented a two-stage data collection, whereby data were collected from non-respondent firms from the first stage. Firms in our final sample that did not return the mail survey represent 42 percent of our sample, and thus provide the basis of a robust test for non-response bias. Second, we compared the responses from executives that returned the mail survey with the responses from executives who were later interviewed over the phone on key firms' characteristics and latent constructs. We ran 15 independent t-tests and found significant differences ($p < 0.05$) in two pairwise comparisons. A non-parametric sign test shows that a null hypothesis that 5 percent of the tests will be significant (the percentage expected at the 0.05 level if there is not bias) cannot be rejected at the 0.05 level ($p = 0.34$). Therefore, we cannot reject the null hypothesis that mail survey respondents are the same as the phone interview respondents, indicating no evidence of non-response bias. Third, we assessed whether our sample is representative of small

firms in the United States by comparing the firms' sizes and economic sectors in the sample with those in the population. We found that our sample closely represents the universe of small firms in the US (details are given in the next section).

Sample characteristics
Approximately half of them (48 percent) were located in the state of Washington, 31 percent were in Maryland and 21 percent were in New York. Thus, our sample has a geographical bias towards Washington state. Most of the firms (62 percent) reported a gross profit in the last 12 months of less than $100,000 dollars.

Table II compares the sample characteristics with the universe of small firms in the US, according to the US Census Bureau (2001). The proportions of firms across firms' sizes and sectors in our sample are not significantly different than those in the universe of small firms in the United States (all $ps < 0.05$), with the exception of the proportion of service firms. Our sample slightly under-represents the service sector ($p = 0.02$). Overall, the composition of our sample is very similar to that of the population of small firms in the US, indicating that our sample is representative of the population, with respect to the most salient descriptive variables.

Measures
Measures for IT capability and intelligence generation were borrowed from previous research (see Appendix – Table AI for list of all measures). Owing to the absence of any direct measure of e-government use in the literature, we developed a scale tapping two underlying dimensions of the firm's electronic interactions with government. To develop the scale items, we conducted an extensive search in 46 governmental web sites of federal and state agencies and conducted interviews with developers of e-government services applications at a leading IT company. We obtained nine categories of transaction-oriented use, in which firms interact with government to comply with regulations, submit requested information, or apply for specific governmental services. We also obtained nine categories of search-oriented use, in which firms use governmental web sites to search for information. Use of

	Sample (percent)	USA (percent)
Firms' size (number of employees)		
<0-10	81.6	78.4
10-19	7.1	11
20-99	8.2	9.1
100-499	3.1	1.5
Firms' sector		
Services	51[*]	62
Retail trade	15	13
Construction	12	12
Manufacturing	11	5
Farming	4	0.4
Other	7	8
Number of firms	100	5,640,407

Table II.
Comparison of sample and universe of small firms in the USA

Note: [*]Test of differences between two proportions is significant at $p < 0.05$

e-government services in these 18 categories were measured with a five-point Likert scale, ranging from never to very often, anchors previously used to assess frequency of use (Ailawadi *et al.*, 2001).

New business development from use of e-government was measured using a four-item Likert scale (five points, strongly disagree/strongly agree). Time savings from use of e-government was measured by asking respondents to rate the extent to which their firms have saved time by using e-government services in five dimensions of interactions with government (five points, strongly disagree/strongly agree).

Firms' profitability was measured as the average of three items relative to firms' stated objectives (seven-point scale, ranging from worse/better): return on investments (ROI), return on assets (ROA) and cash flow from operations (Moorman and Rust, 1999; Pelham and Wilson, 1996). Robinson and Pearce (1988) showed significant positive correlations between subjective assessments of sales, ROA and return on sales and their respective objective values. Furthermore, Harris (2001) reported positive significant correlations between subjective assessments of sales and ROI and their respective objective indicators gathered from secondary sources. We also correlated our three profitability indicators with the actual dollar amount of firms' profits in the most recent year informed by a subset of our sample ($n = 77$). ROA was not significantly correlated with the dollar amount of profits, and therefore was dropped. Our final composite profitability measure formed by ROI and cash flow was significantly correlated with the dollar amount of profits ($r = 0.238$, $p = 0.03$).

Additionally, we measured several control variables related to firms' characteristics (e.g. size, age, relative selling prices and operating costs) and market-level factors (e.g. industry, buyer and supplier power, market dynamism and competitive intensity).

Data analysis

We tested the hypothesized relationships among the constructs using path analysis with composite variables in EQS/Windows (Bentler and Wu, 1993). Forming composites for each construct reduces the total number of parameters to be estimated, yielding correct small-sample standard errors (McDonald, 1996) and capturing the essence of the underlying meaning of each construct (Bagozzi and Heatherton, 1994). We incorporated measurement error into the model by fixing the error variances of the single-index measure of each construct equal to the construct unreliability measure multiplied by the construct variance (Bollen, 1989; Jöreskog and Sörbom, 1989)[2].

Two rival path models were tested: first, a more restrictive model, where the two dimensions of e-government use (transaction and search oriented use) were predicted to be full mediators of the effects IT capability on firms' profitability. We refer to this model as the full mediation model. We compared the goodness-of-fit of the full mediation model with that of a less restrictive, partial mediation model, where IT capability was allowed to have a direct relationship with intelligence generation and firms' profitability. Previous research supports these paths (Bharadwaj, 2000; Tippins and Sohi, 2003; Bharadwaj *et al.*, 1999).

Both the full and partial mediation models were estimated using the maximum likelihood (ML) method. A linear regression of firms' profitability on a set of control variables[3] was performed to provide a preliminary indication of variables outside our structural model that might affect firms' profitability. Service orientation ($\beta = 0.398$, $t = 3.67$, $p = 0.001$) and competitive intensity ($\beta = -0.326$, $t = -2.72$, $p = 0.009$)

had a significant relationship with profitability. Number of employees ($\beta = 0.188$, $t = 1.73$, $p = 0.08$) and market dynamism ($\beta = -0.228$, $t = -1.81$, $p = 0.07$) had a marginally significant relationship with profitability. The effects of these four variables were statistically partialled from the data to remove their influence from the entire system of variables.

Confirmatory factor analysis
We employed confirmatory factor analysis (CFA) to assess the factor structure of each of our latent constructs. The analysis was conducted using EQS/Windows (Bentler and Wu, 1993).

The results indicated adequate levels of fit for IT capability, new business development and time savings (goodness-of-fit indices are shown in the Appendix Table AI). The initial CFA fit indices for intelligence generation were below the usual cutoff criteria. Based on loadings, residuals and modification indices we modified each of these scale models. For intelligence generation, we dropped two items and the obtained goodness of fit also improved substantially. Deleting these items does not appear to reduce domain coverage. For firms' profitability, the factor model with three items is just identified; therefore we could not estimate CFA indices. A principal component analysis indicated that all the variable loadings were high (> 0.85).

The convergent validity of the two dimensions of e-government use was assessed through the overall goodness-of-fit and variable loadings of a two-factor model, where transaction-oriented use and search-oriented use were allowed to covary. The initial indices were below the acceptable criteria. We purified the e-government transaction scale through a four-step CFA, where we dropped items with low variance explained and high residuals and re-estimated the model. Five items were dropped due to low variance explained (< 0.33) and high standardized residuals. The loadings of the remaining items were high; ranging from 0.66 to 0.89, therefore the scale seems to capture the latent factor well. The final results from the CFA for the two-factor e-government use model indicated adequate goodness-of-fit.

The reliability estimates of all measures were in an acceptable range (> 0.70), according to cutoff suggested by Nunnally and Bernstein (1994) and the correlations among the constructs (Table II) did not suggest problems of discriminant validity.

Results
The estimation of the full mediation model yielded a relatively poor fit ($\chi^2 = 27(8)$, $p = 0.001$, CFI = 0.85, SRMR = 0.07, RMSEA = 0.15). The explanatory power of the partial mediation model was substantially better ($\chi^2 = 11.14(6)$, $p = 0.08$, CFI = 0.96, SRMR = 0.04, RMSEA = 0.09). The chi-square difference is significant at $p < 0.001$ ($\chi^2(2) = 15.86$), meeting the recent joint cut off criteria suggested by Hu and Bentler (1999)[4]. Thus, we retained the partial mediation model as a more precise representation of the effects of e-government use. Figure 1 shows graphically the partial mediation model.

The correlation matrix (partialling out the control variables) is provided in Table III. The significant parameters in the model are shown in Figure 2.
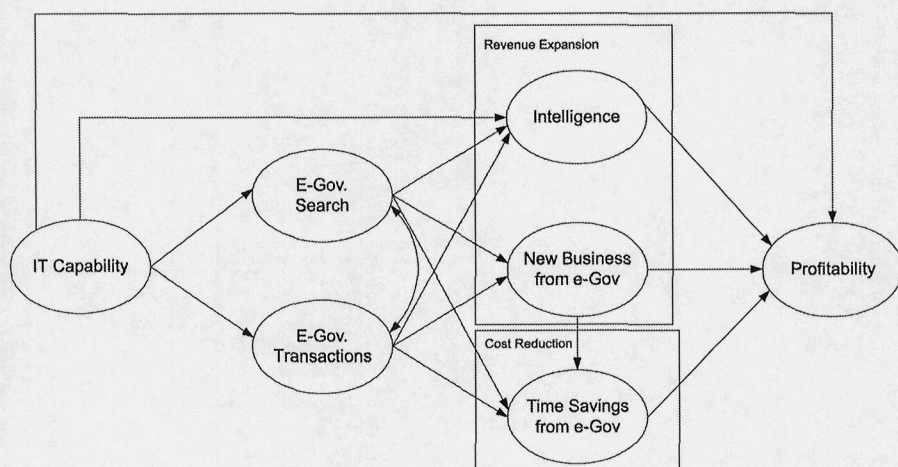
Figure 1.
Partial mediation model of
e-government

	1	2	3	4	5	6	7
1 IT capability	1.000						
2 E-gov search	0.283*	1.000					
3 E-gov transaction	−0.089	0.285*	1.000				
4 Intelligence	0.437*	0.442*	0.010	1.000			
5 New business	0.034	0.344*	−0.048	0.282*	1.000		
6 Time savings	0.196	0.669*	0.243*	0.241*	0.475*	1.000	
7 Profitability	−0.163	−0.046	0.137	0.110	0.035	−0.003	1.000

Notes: Partial correlation matrix controlling for service orientation, competitive intensity, market dynamism, and number of employees; *p-values < 0.05

Table III.
Correlations between
constructs

IT capability and e-government use
Firms' IT capability has a positive and significant association with the search-oriented use of e-government, as predicted by *H1* ($\beta = 0.311, p = 0.004$). We found no evidence that IT capability has a significant relationship with the transaction-oriented use of e-government ($p = 0.40$). Thus, *H1* is partially supported.

Revenue expansion and e-government use
The search-oriented use dimension of e-government use has a positive significant relationship with intelligence generation ($\beta = 0.403, p < 0.001$) and new business development ($\beta = 0.458, p < 0.001$), as predicted by *H2* and *H4*. These effects were not significant for the transaction-oriented use of e-government; therefore, *H2* and *H4* are partially supported.

We found that the association between e-government use and firms' profitability occurs through intelligence generation, as predicted by *H3*. Consistent with *H6*, new business development from use of e-government services has a positive and significant relationship with firms' time savings ($\beta = 0.330, p < 0.001$), however, the
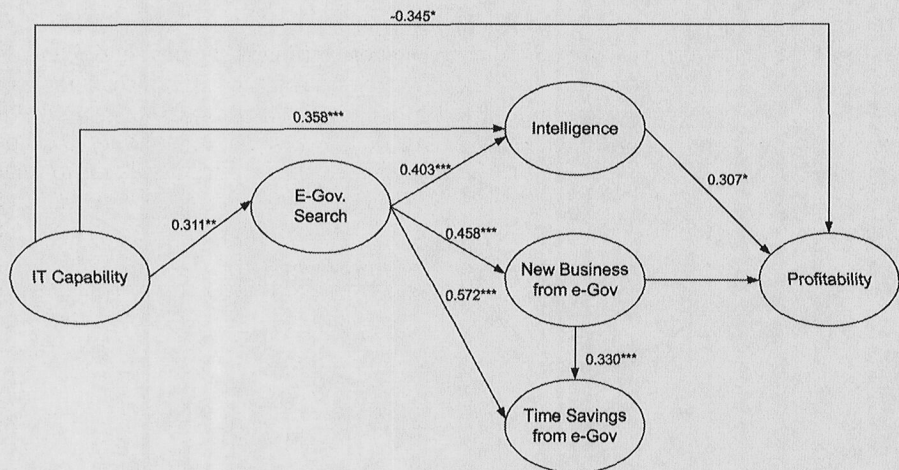
Figure 2.
Significant relationships
in the model

Note: Parameters are standardized regression coefficients
* p <0.05
** p <0.01
*** p <0.001

relationship between new business development and firms' profitability (*H5*) did not approach significance ($p = 0.84$).

Cost reduction effect of e-government use
H7 predicted that e-government use is associated with time savings, an important resource to small firms. We found that e-government search-oriented use is positively associated with time savings that accrue from interacting with government online ($\beta = 0.572$, $p < 0.001$), but e-government transaction-oriented use is not $p = 0.2$. Thus, *H7* is partially supported. The relationship between time savings and firms' profitability was not significant ($p = 0.96$) and *H8* was not supported.

Direct effects of IT capability
There is a positive direct link between IT capability and firms' intelligence generation ($\beta = 0.358$, $p < 0.001$). Moreover, we found a negative direct link between IT and firms' profitability ($\beta = -0.345$, $p < 0.05$). These findings seem to support Tippins and Sohi's (2003) study, which showed that organizational learning (i.e. the ability to acquire, disseminate and interpret information) is a missing link in the relationship between IT capability and organizational performance. According to these authors, the positive impact on IT on firms' performance cannot be measured directly; firms use their IT capabilities to leverage organizational learning, which, in turn, leads to superior performance.

Sensitivity analysis
To validate the results obtained using subjective indicators of profitability, we tested our model using the dollar firms' gross profit in the most recent year (controlling for number of employees) as the indicator of profitability ($n = 77$). This model produced a

good overall fit ($\chi^2 = 12.12(6)$, $p = 0.06$, CFI $= 0.954$, SRMR $= 0.04$, RMSEA $= 0.11$) and the path estimates and significance values were largely similar to the ones shown in Figure 2. Consistent with our previous results, this model indicates that, in our sample, the relationship of e-government use and dollar firms' gross profit occurs through the revenue expansion effect of search-oriented e-government use, and not through cost reductions. The effect of search-oriented is significant related to new business development ($\beta = 0.541$, $p < 0.001$). The direct link between IT and profitability became non-significant ($p > 0.22$). Thus, it appears that this direct link between IT capability and firms' profitability is unstable in our sample, supporting Tippins and Sohi's (2003) view that IT impacts on firms' performance is mediated by organizational learning and should not be estimated as a direct linear relationship.

Discussion

Based on our findings, firms' IT capability is an ability factor that influences the extent to which firms use e-government services to search for information. In terms of the strategic benefits that result from using e-government services, our results indicate that search-oriented use of government e-services is positively associated with intelligence generation, new business development and time savings. The positive link between search-oriented use of e-government and profitability occurs through improvements in the firm's ability to generate market-focused intelligence (information about customers, competitors and industry) and collaboration-based intelligence (information about potential business partners, external leveraging and inter-organizational learning). The lack of significant effects related to the transaction-oriented use of e-government may be due to the fact that e-government in the United States is still in its infancy. The average level of use of e-government in our sample was still low. As federal, state and local governments advance in their strategies to offer online transactions, firms may conduct more electronic business to government interactions and obtain significant improvements in performance through both revenue expansion and cost reduction. The absence of significant effects of time savings on firms' profitability adds support to recent findings in the strategy literature (Rust et al., 2002), which demonstrate that revenue expansion has a stronger effect on financial performance than cost reductions.

Our results confirm previous findings in the information system literature about the importance of the firm's IT capability to the adoption of new technologies to support business activities and indirect positive effect on financial performance. Firms with higher IT capability have a higher usage of e-government services, possibly because they are more knowledgeable about using internet resources, more equipped to interact online with government and are more likely to envision benefits from use of e-government. Our study extended Tippins and Sohi's (2003) results to small firms: IT positive effects on profitability are indirect, depending on how IT is utilized to leverage organizational learning.

Two issues regarding the effects of IT on the firms' profitability are important avenues for future research. First, previous academic research has focused on the impact of IT on large organizations (IT leaders). We believe that future research should explore the differences between small and large organizations in terms of how IT shapes business performance. Second, as our results suggest, the strategic value of IT is related to how companies use their IT capabilities (e.g. how to use IT to generate

knowledge). New empirical evidence suggesting other indirect effects of IT on economic returns is a necessary step to determine its overall strategic importance to the firm. IT impacts on intermediate variable such as customer service, quality and prices can be important sources of competitive advantage. Finally, it is important to mention that measures of actual use of IT, rather than investments in IT, may be a crucial missing link in the relationship between individual technologies and firms' profitability.

Our study has several limitations that should be acknowledged. We used self-reported data to test our hypotheses. Future research that focuses on larger firms should assess the impact of e-government on objective performance indicators over time. Moreover, it is important to note that as e-government develops over time, its impact on businesses is also likely to evolve. Future tests and refinements of the proposed framework will be extremely helpful to advance knowledge on the business impact of e-government initiatives. Finally, we highlight that our study was based on a sample of firms from three states of the United States; therefore, our results are limited by the specificity of this geographic context. Future research should consider the value of e-government in different settings.

Implications

Our results suggest that governments can be a source of organizational learning, having an active role on making small firms well educated in their ability to continuously sense and act on events and trends in their markets (Day, 1994). Government e-services can induce organizational learning at a relatively low cost. They can facilitate information acquisition, compiling and organizing a vast amount of information, providing guidance in making sense of this information and in making managerial decisions.

Our research also relates to the issue of the impact of revenue expansion and cost reduction strategies on firms' profitability. Experts in information technology, CIO's of governmental agencies and analysts of the public sector have emphasized the impact of electronic government on cost reductions for governmental agencies, businesses and citizens. Our study suggests that such approach may be overlooking the revenue expansion effect of e-government. In our sample, e-government services were linked to better profitability primarily through revenue gains, via intelligence generation. Thus, it seems that for small firms, the benefits from e-government may result more from its ability to expand business, rather than its ability to increase efficiency. One important boundary condition for this result may be the fact that e-government is still in its early stages in the United States. As the availability of e-government services increase, researchers should investigate the robustness of these findings.

Some important implications arise for both business users and suppliers of e-government services as well as governmental agencies. Business users should consider e-government services as a revenue expansion tool and not just a cost reduction opportunity. Government web sites may work as a doorway to marketing, financial, technological, labor and other resources that can help managers to position and develop products, strengthen relationships with current customers, and prospect new customers and business partners. Additionally, e-government services can assist the marketplace by facilitating the development of networks of buyers and suppliers.

For IT firms that create online government applications, important managerial questions are how to position their services to governments and which types of e-services create the most benefits. Our study provides preliminary answers to these questions. E-government services that link small firms to potential customers and collaborators and provide information on industry trends, legal issues, technology, etc. seem to be more effective in improving small firms' profitability than applications that focus solely on speeding transactions and increasing efficiency.

Enhancing the economic performance of the private sector may not be a priority for several governments worldwide. Thus, our finding that e-government services may be an indirect mechanism to improve small firms' performance is more useful for governmental agencies directly concerned with the economic environment. These agencies should extend the range of electronic government-to-business services that provide access to information and other business resources, communicate to the private sector, effectively, the array of resources and programs available, and educate firms about the benefits of interacting electronically with government. In this context, developing e-government services may function as an indirect way to improve business performance and increase tax receipts.

Overall, our study contributes to service research by proposing and testing a model of government-to-business relationships. Advances in IT have transformed not only the interactions between firms and customers but also the interactions between government and its constituencies. In spite of service playing a large role in the public sector, little is known about how governments can manage their services in order to become more citizen-centric. Our findings contribute to the management of governmental services by differentiating two wide categories of e-government services (informational vs transactional) and measuring their strategic benefits to small firms. Additionally, our study represents an attempt to quantify the financial impact of government-to-business relationships to small firms.

We conclude with two important notes regarding the public sector's investments in e-government. First, governmental agencies face several challenges in the transition towards e-government services. Some of the difficulties linked to the implementation of e-government involve lack of financial, technical and personnel resources. Other problematic issues involve security (e.g. ensuring integrity of electronic records), accessibility, limited cross-agency collaboration and internal politics, and citizen awareness and confidence (e.g. educating citizens about e-government and raising their confidence about the quality of these services) (West, 2004). The pace in which government will move from early to more advanced stages of e-government will depend on how effectively agencies handle these challenges.

Finally, our finding that superior profitability may result from use of e-government services relates to the phenomenon of the digital divide, and can increase the polarization between firms that have access to online government and those that do not. Governmental agencies may consider some actions to avoid or decrease this gap, such as developing multiple channels to reach small firms (e.g. call centers) and investing in network infrastructure. A good example is Westchester County, NY (US), which has developed a new fiber optic network throughout the county (www. westchestergov.com/westchestertelecom), offering local companies faster internet access and higher bandwidth at lower prices.

Notes

1. Of these 142 pre-screened addresses that were eliminated of our sample, 47 were in MD, 46 in NY and 49 in WA.

2. Error variances were fixed to: $\mathrm{Var}(\varepsilon_i) = (1 - \alpha)\,\mathrm{Var}(Y_i)$.

3. We regressed firms' financial performance on competitive intensity, market dynamism, number of employees, firms' costs and prices (in percentage, relative to competition), buyer and supplier power, age (in years), service orientation (one item, seven-point scale), product line differentiation (three items, seven-point scale) and entry of competitors with more than 5 percent of market share in the last five years (dummy variable).

4. Hu and Bentler (1999) in a study that used simulation to assess the performance of different indexes suggested the adoption of the following joint criteria: CFI equal or greater than 0.96 and SRMR ≤ 0.10 or RMSEA ≤ 0.06 and SRMR ≤ 0.10.

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Appendix

Construct	Mean	SD	CFA indices
IT capability (Grewal *et al.*, 2001): Consider your firm's information technology (IT) capability. Rate the degree to which you agree with the following statements using the scale below: (five points, strongly disagree/strongly agree). Your firm: Cronbach's α: 0.91, Fornell and Larcker's *RC*: 0.91, Hancock's *H*: 0.92	3.01	1.04	$\chi^2_{(9)} = 2.67$, CFI = 0.96, SRMR = 0.04, RMSEA = 0.12
Has strong IT planning capabilities	2.73	1.27	
Has strong technical support staff	2.78	1.38	
Has an understanding of possible benefits of IT applications	3.39	1.21	
Has adequate knowledge about information technology	3.26	1.16	
Is experienced with IT	2.99	1.26	
Gives high importance to strategic use of IT	2.96	1.29	
E-government transaction-oriented use: Consider the total transactions that your firm conducted with government in each of the categories listed below during the last 12 months. Indicate to what extent these transactions were conducted through governmental web sites using the scale below: (five points, never/very often): Cronbach's α: 0.81, Fornell and Larcker's *RC*: 0.85, Hancock's *H*: 0.87	1.88	1.11	For two-factor model: $\chi^2_{(64)} = 136.3$, CFI = 0.91, SRMR = 0.06, RMSEA = 0.107
Obtain/renew professional licenses	1.91	1.50	
Obtain/renew business licenses	1.88	1.40	
Obtain/renew permits and registrations	1.85	1.29	
Pay fines[a]	1.14	0.41	
File and pay taxes[a]	2.27	1.69	
Pay leases[a]	1.25	0.89	
Bid on contracting opportunities[a]	1.45	0.95	
Submit required government reports	1.89	1.40	
Request a government loan[a]	1.15	0.59	
E-government search-oriented use: Indicate to what extent your firm uses governmental web sites (local, state or federal agencies) to search for information in each of the following categories using the scale below: (five points, never/very often): Cronbach's α: 0.92, Fornell and Larcker's *RC*: 0.93, Hancock's *H*: 0.94	1.77	0.89	For two-factor model: $\chi^2_{(64)} = 136.3$, CFI = 0.91, SRMR = 0.06, RMSEA = 0.107
Trade publications, statistics, taxes, online libraries, laws and regulations, international trade and economic/industry reports	2.46	1.47	
Business location (infrastructure and other resources available in a specific region)	1.95	1.40	
Assistance on complying with local, state and federal regulations (licenses, permits and registrations, international trade, etc.)	2.08	1.22	
Business mentoring/coaching (assistance in starting and expanding the business, training and counseling in business matters)	1.46	0.89	
Financing programs	1.47	1.05	

(continued)

Table AI.
Scale items

Construct	Mean	SD	CFA indices
Technological assistance and training programs (searching for technology/product development partnerships, etc.)	1.71	1.10	
Online classes/courses	1.35	0.76	
Marketing opportunities such as business online networks/contractors lists (networks that bring together buyers, suppliers and service providers) and trade shows	1.89	1.19	
Labor market information (submitting job orders, searching for qualified applicants, obtaining wage data by industry and occupation, current and future employment trends, etc.)	1.59	1.07	
Intelligence generation (Slater and Narver, 2000): How frequently does your firm perform each of the following activities (five points, never/consistently): Cronbach's α: 0.87, Fornell and Larcker's RC: 0.87, Hancock's H: 0.90	2.59	0.96	$\chi^2_{(20)} = 39.14$, CFI = 0.94, SRMR = 0.06, RMSEA = 0.10
Benchmarks key processes for improving customer satisfaction[a]	2.80	1.44	
Tracks and analyzes competitor actions	2.43	1.27	
Allocates resources to identifying and understanding new market opportunities	2.49	1.25	
Attempts to develop new ways of looking at customers and their needs	3.33	1.24	
Systematically collects information about customer needs	2.82	1.38	
Sends employees to seminars or short courses to bring back new ideas to the organization	2.49	1.45	
Benchmarks key operating processes	2.46	1.29	
Arranges seminars and classes to educate employees about important concepts and processes	2.21	1.44	
Enters into joint ventures and alliances[a]	2.19	1.26	
Develops information-sharing relationships	2.56	1.28	
New business development: Rate the degree to which you agree with the following statements (five points, strongly disagree/strongly agree): Cronbach's α: 0.86, Fornell and Larcker's RC: 0.87, Hancock's H: 0.98	1.32	0.64	$\chi^2_{(2)} = 19.83$, CFI = 0.93, SRMR = 0.05, RMSEA = 0.3
We have sold to customers whose contact information was found through buyer-supplier lists posted in governmental web sites	1.39	0.94	
We have closed business contracts whose leads were found searching governmental web sites	1.23	0.60	
We have developed sales that were initiated through information available in governmental web sites	1.35	0.82	
We have identified new business partners through information in government web sites	1.31	0.66	
Time savings: Consider time savings resulting from using government e-services. Indicate the degree to which you agree with the following statements using the scales below: five points, strongly disagree/strongly agree): Your firm saves a significant amount of time by: Cronbach's α: 0.88, Fornell and Larcker's RC: 0.88, Hancock's H: 0.96	2.03	1.14	$\chi^2_{(2)} = 14.2$, CFI = 0.95, SRMR = 0.06, RMSEA = 0.25

Table AI.

(*continued*)

Construct	Mean	SD	CFA indices
Searching for general business information (laws and regulations, financial, market and technology information) on governmental web sites	1.97	1.27	
Locating governmental agencies, forms and applications using governmental web sites	2.38	1.45	
Filling out forms and submitting information online through governmental web sites	2.05	1.34	
Conducting the actual transactions with government online	1.73	1.28	
Profitability (adapted from Moorman and Rust (1999) and Pelham and Wilson (1996)): Rate the following statements when thinking about how your firm is performing, relative to your stated objectives (seven points, worse/on par/better): Cronbach's α: 0.84	3.83	1.28	–
Return on investments	3.87	1.44	
Return on assets[a]	3.78	1.54	
Cash flow from operations	3.86	1.47	

Notes: [a]Represent items that were dropped

Table AI.