Determinants of E-Government Use in the European Union

Subjects: Economics

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Efficient governments, defined as those that provide digital public services and effectively support their citizens through modern tools and channels, can be the result of a variety of factors, including education, urbanization, infrastructure, and economic growth as measured by GDP per capita.

e-government   government efficiency   education   internet use

1. Introduction

Efficient digital public services, or e-government, can increase the transparency of administration, increase savings for businesses and governments alike, and facilitate more active participation in democratic practices [1]. While there are many studies aimed at deconstructing the relationship between a government and its citizens, it is still unclear which factors lead to the adoption of e-government services or the relationship between costs and benefits. From declining cash use and documenting economic transactions and interactions, to better collection of taxes and saving costs, and opportunity costs in terms of compliance, the e-government paradigm can accelerate economic growth [2].

A significant increase in the use of information technologies in government functions and procedures has become a relevant factor in society and economic activities but it is, of course, subject to the availability of the relevant infrastructure [3].

The COVID-19 pandemic has accelerated governments' digital transformation, but different countries find themselves at very different stages in their digital journeys. In general, European countries have been early adopters of e-government, prompting the EU to commit to provide all key public services online by 2030 [4]. However, significant differences remain, in part due to disparities in funding and digital infrastructure, as well as political will more broadly. Some countries offer comprehensive e-government portals that cover healthcare access, taxation, or digital ID, while others only offer basic services such as online forms [5]. The European Commission [4] scores Estonia and Malta as the most mature, but some Eastern European countries score nearly half on the same scale. Estonia is often considered a world leader in e-government, not just because of its innovative solutions such as digital ID, but also because of its comprehensive online services for citizens and businesses alike [6].

2. Determinants of E-Government Use in the European Union

The relationship between a government and its citizens has already been empirically examined in many studies, but evidence is mixed, and it remains unclear how an efficient government can contribute to economic growth. Empirical analysis varies in terms of scope, considering the regional contexts, the models used and the examined periods, but government efficiency is generally found to positively impact the economy and the functioning of society, with beneficial implications for countries' economic growth and competitiveness. The most important and relevant findings of previous studies are discussed, which are also summarized in **Table 1**.

Table 1. Summary of extant literature on government actions and government efficiency.

Authors	Period and Region/Countries/Entities Studied	Empirical Model	Main Input Variable(s)	Output(s)
Hauner and Kyobe [7]	1980–2004; 114 countries	Panel model	Education and health spending Years of schooling Income per capita	Government efficiency
Voghouei and Jamali [8]	2003–2010; 51 countries	Dynamic panel model—system-GMM	Information technology expenditure by government Total information technology expenditure in economy Consumer price index Transparency Corruption Ethnic fractionalization	Government efficiency (government spending as share of GDP)
Lizińska et al. [9]	2015–2016 1220 municipalities in Poland	Survey	Number of tasks actually implemented by local governments Number of tasks which could be implemented	Institutional efficiency of local governments
Balaguer-Coll et al. [10]	2009–2015; The Valencian Region	Robust order methodology	Population density Unemployed job seekers Disposable income Accommodation vacancies Political ideology of the incumbent party Herfindahl	Index of (in)efficiency

Authors	Period and Region/Countries/Entities Studied	Empirical Model	Main Input Variable(s)	Output(s)
			index Voter turnout in local elections Tax revenues Transfer revenues Indebtedness Number of mistakes in the budgetary statements	
Halaskova et al. [11]	2012–2015 and 2015–2018; 27 EU countries	Data envelopment analysis (DEA)	Local government expenditure by function	Government effectiveness Corruption perceptions Index
Wen et al. [12]	1996–2018; 166 countries	Panel data	Government efficiency Bureaucracy quality	Patents and trademarks
Ding et al. [13]	2002–2018; 156 countries	Panel data	Government efficiency	Health outcomes (disability-adjusted life years (DALYs))
Reinecke and Schmerer [14]	2001–2006; Chinese firms	Panel data regression	Government efficiency Firm age Sales State-owned enterprises Employment and capital stock Total factor productivity (TFP)	Export share on total output
Chen and Yoon [15]	2010–2016; A-share listed firms from 27 Chinese provincial government	2SLS regression	Administrative efficiency of local governments	R&D expenditure over total assets Number of patent applications
Amir and Gokmenoglu [16]	2002–2015; 31 OECD countries	Panel data model	Government efficiency Corruption Employment Population Urbanization	Financial development

Authors	Period and Region/Countries/Entities Studied	Empirical Model	Main Input Variable(s)	Output(s)
Gupta and Verhoeven [17]	1984–1995; 37 countries in Africa	Free disposal hull (FDH) analysis	Education and health spending by the government	Life expectancy Infant mortality Immunizations against diseases School enrolment Adult illiteracy
Geys [18]	2000; Flemish region in Belgium	Stochastic parametric reference technology	Current expenditures in the municipality	Number of subsistence grants beneficiaries Number of students in local primary schools Public recreational facilities Length of municipal roads.
Liu et al. [19]	2007; 22 Local governments in Taiwan	Data envelopment analysis (DEA) model; Sharpe ratio.	Employment Accumulation of fixed assets	Real disposable income per capita Unemployment rate Volume of waste clearance Air pollution
Asatryan and De Witte [20]	2003–2011; German State of Bavaria	Fully non-parametric approach	Per capita expenditure	Pupil population Child population Elderly patient population Green and recreational areasEmployees paying social security
Chang et al. [21]	1990–2014; 31 OECD countries	Group-mean dynamic common correlated estimator (DCCE) panel regression Panel cointegration Vector-error-correction model (VECM)	Corruption, political ideology Real per capita GDP FDI Oil prices Electricity regulation Gas regulation	Energy intensity

Authors	Period and Region/Countries/Entities Studied	Empirical Model	Main Input Variable(s)	Output(s)
Seo et al. [22]	2015–2016; 42 central administrative agencies in the Republic of Korea	Data envelopment analysis (DEA)	IT budget Number of employees	Number of policies for the adoption of Government 3.0 Number of open public data (API) Number of public services that can be applied for online
Alonso and Andrews [23]	2002–2008; local governments in the United Kingdom	Dynamic panel data model	Total per capita service expenditure, excluding expenditure on central administration.	Fiscal decentralization Fiscal deprivation Number of pupils attending the General Certificate of Secondary Education examination Older people being helped to live at home Waste management
Chen and Paudel [24]	2004–2017; 30 provinces in China	Malmquist–Luenberger index Dynamic panel model	Number of people employed by government Provincial-owned economic capital stock Annual financial expenditure.	GDP per capita Unemployment rate Consumer price index Ratio of middle school teachers to students Density of transportation infrastructure Number of hospital beds per capita Number of cases of corruption per 10,000 people Rate of labor dispute settlement
Pacheco et al. [25]	2008–2018; 324 Chilean municipalities	Parametric models and [16] panel data	Expenditure on personnel Consumer goods and services Expenditure on education	Rural and urban municipal education establishments; Enrolment in municipal

seeking opportunities, reducing bureaucracy, and improving the overall technological abilities of government staff [12][15]. Seo et al. [22] examined e-government efficiency in Korea and found citizen-centric IT service integration and IT investment to be key driving factors. Furthermore, Voghouei and Jamali [8] argue that government efficiency

Authors	Period and Region/Countries/Entities Studied	Empirical Model	Main Input Variable(s)	Output(s)
[27]			Expenditure on health Transfers to health services and centres Transfers to public education schools Municipality population [19] Distance to the regional capital	education establishments Health facilities Maintained green areas; Cleaning services, waste collection and [7] landfill services Drinking water coverage Social organizations
	[17]	[13]		

Government efficiency is not the only aspect that could be enhanced by e-government; education is another important factor [28]. Indeed, Horobet et al. [29] find that in the EU, education plays a key role both in digitalization and financial development, with no significant differences between Western and Eastern European economies. Cerna et al. [30] show that education has quickly adapted to the accelerated digitalization instilled by the COVID-19 pandemic, making it even more relevant when discussing its impact on digitalization.

Digitalization, measured by either internet use or number of mobile subscriptions, is key when discussing e-government [1]. DESA [31] finds that most UN countries have a national digital government strategy in place, and that in nearly all countries, people's as well as authorities' digital engagement has increased. In the long run, digitalization could lead to a paradigm shift towards a digital-first society, with new forms of digital money, enabling novel and more efficient ways of interacting with services [32][33]. However, the road ahead remains long. Spacek et al. [34] have shown that the level of digitalization in Central and Eastern European countries remains modest.

Dobrolyubova et al. [35] found no direct cause and effect relationship between the digitalization of government and other governance indicators such as effectiveness. Further, Ahmad et al. [36] show that many public services remain manual because their digital equivalent is inadequate, featuring blank web pages, invalid forms, or out of date information. This suggests that e-government involves more than just the tools that allow citizens to interact with their governments in digital form; it also involves rethinking processes so that they can become digital-first and making interaction with government easier, cheaper, and quicker [1]. Indeed, Mensah et al. [37] and Chen et al. [38] conclude that the use of e-government services is not predicted by the performance, effort, or social influence but instead by the perceived service quality and trust in government.

Several studies that associate local authorities' efficiency with state government efficiency as a whole, because of its positive influence on the competitiveness of a country. In this regard, Liu et al. [19] find that the operating performance of local governments has a strong influence on a country's competitiveness. Additionally, the paper of Reinecke and Schmerer [14] highlights a positive correlation between firm size and export shares, as stimulated by high governmental efficiency. In fact, it stands out that larger firms in provinces with more efficient provincial

governments have higher export rates. When it comes to the population, Chen et al. [24] demonstrated that an improvement in government efficiency in the urban area can increase the urban population. When considering other perspectives, EU countries' efficiency appears to be more strongly linked to their effectiveness than the overall perception of corruption [11].

Some studies have revealed that many local governments do not fully apply the available tools to streamline the provision of administrative services [9]. When it comes to fiscal decentralization, it is positively related to productive efficiency, but there is a negative relationship between socioeconomic deprivation and efficiency [23].

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