

## Local Government Performance, Cost-Effectiveness, and Use of the Web: An Empirical Analysis

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*This article empirically assesses the relationship between government use of the web, service performance, and cost-effectiveness. It tests and challenges the assumption, prevalent in government thinking and in the Digital Era Governance (DEG) quasi-paradigm, that the delivery of web-based public services is associated with better outcomes. English local government is used as a test case, for which (uniquely) good-quality full-population time-series data for council performance, cost, and web quality are available. A new panel data set is constructed covering 2002–2008, allowing the actual relationship between web performance and council cost and quality to be estimated using dynamic regression models which control for both general changes over time and the time-invariant differences between councils. Consistent growth is shown in the scope and quality of local government web provision. Despite this, and governmental enthusiasm for bringing services online, no association is found between web development and performance, or cost-effectiveness. The article concludes that governments' enthusiasm for citizen-facing digital government is not supported by this empirical data, and that a skeptical view is warranted of DEG's advocacy of digitalization as a core focus for service improvement.*

**KEY WORDS:** Digital government, performance, cost-effectiveness, local government, Digital Era Governance, e-government

本文从实证上评估了政府对网络的使用、网络服务表现和成本效果三者之间的关系。本文检验并挑战了一种假设，这种假设正流行于政府思考和数字时代治理准范式，即基于网络的公共服务交付与更好的结果有关。本文将英国地方政府作为一项测试案例。针对地方政府，有关其地方议会表现、成本和网络质量的优质数据（此数据为覆盖总体的时间序列数据）是可获取的。本文建构了一项新的小组数据集，此数据集涵盖2002-2008年间的的数据；并通过使用动态回归模型，进而允许预测网络表现、议会成本和质量之间的真正关系。此动态回归模型对地方委员会之间随时间演变而产生的一般变化和与时间作为恒量所产生的差异进行了控制。地方政府网络所覆盖的范围和质量都出现持续增长。除去这点，和政府在提供网络服务一事上的热情，本文并未找到网络开发和表现、或成本效果之间存在任何联系。本文结论认为，政府对公民面对数字政府一事展现的热情并不受到文中实证数据的支持；结论同时认为，有必要对“数字时代治理倡导数字化作为提高服务的主要焦点”提出质疑。

**关键词：** 数字政府, 表现, 成本效果, 地方政府, 数字时代治理, 电子政务

*Este artículo evalúa empíricamente la relación entre el uso de la web por parte del gobierno, el rendimiento del servicio y la rentabilidad. Se prueba y desafía el supuesto, que es prevaleciente en el pensamiento del gobierno y en el casi paradigma de gobernanza de la era digital, de que la prestación de servicios públicos basados en la web se asocia con mejores resultados. El gobierno local inglés es utilizado como caso de prueba, para el cual están disponibles (de forma única) datos de series de tiempo completos de buena calidad para el desempeño, el costo y la calidad de la web del concejo. Se construye un nuevo conjunto de datos de panel que abarca el período 2002–2008, lo que permite estimar la relación real entre el rendimiento web y el costo y la calidad del consejo utilizando modelos de regresión dinámica que controlan tanto los cambios generales a lo largo del tiempo como las diferencias invariantes en el tiempo entre los consejos. Se muestra un crecimiento constante en el alcance y la calidad de la oferta web del gobierno local. A pesar de esto, y del entusiasmo del gobierno por poner los servicios en línea, no se encuentra ninguna asociación entre el desarrollo web y el rendimiento, ni la rentabilidad. El artículo concluye que el entusiasmo de los gobiernos por el gobierno digital que enfrenta a los ciudadanos no está respaldado por estos datos empíricos, y que se garantiza una visión escéptica de la defensa de DEG de la digitalización como un foco central para la mejora del servicio.*

**PALABRAS CLAVE:** gobierno digital, rendimiento, rentabilidad, gobierno local, gobierno de la era digital, gobierno electrónico

## Introduction

Since the beginning of the web, there has been a great deal of enthusiasm about the possibilities for digital government,<sup>1</sup> using the Internet as a tool for improving public service performance. From the late 1990s onwards, governments have extensively touted the benefits of, and encouraged spending on, government on the web programs at local and national level. Such enthusiasms are reflected worldwide, with digital hubs such as the United States Digital Service, 18F, the Australian Digital Transformation Agency, and Britain's Government Digital Service seen as a key driver of cheaper and better twenty-first century government. One prominent recent quasi-paradigm advocating these approaches has been Digital Era Governance (DEG) (Dunleavy, Margetts, Bastow, & Tinkler, 2006) and its follow ups, which propose a digital-centric model of twenty-first century public administration.

It is, however, much easier to spend money on ICTs than it is to demonstrate that money was well-spent and returned the benefits expected. There has been an assumption amongst policymakers that use of the Internet to deliver public services will make an impact.<sup>2</sup> This assumption underpins a burgeoning industry of companies delivering online service systems to government, and policy discussions not about whether investment in the web is desirable, but about the fastest and most powerful ways of doing it.

Academic views are more nuanced. There is a large volume of work studying the informatization of public administration, from the early days of computing to strands of work looking at web-based digital government. The general picture is mixed, with evidence that some information technology can be effective at reducing costs and improving services some of the time and in some settings, but with the

wilder enthusiasms for using the web as an agent of service transformation finding fairly limited support.<sup>3</sup>

This article shows that, despite a clear improvement in the quality of online provision, associated gains in quality and cost-effectiveness cannot, in fact, be demonstrated in a full-population panel data series of English local authorities. The English local government case is valuable both theoretically, as a way of testing the benefits of digitalization in a policy context which was hugely enthusiastic about the benefits of e-government (the Blair government) but also because of the ongoing policy claims about digitalization directly leading to improved spending and service improvement outcomes in a large and important sector, responsible for £93.6bn per year in revenue spending in 2016/17 (DCLG, 2017).

This article develops as follows. The next section explores the theoretical background of local digital government and argues for more robust analyses of the performance impact of e-government approaches. It then outlines English local government as a case study, and discusses sources of data for carrying out such an analysis on a whole-of-sector basis. Next, the analysis methods are set out, followed by the study's results, showing no association between government web provision and quality and cost-effectiveness. The final section discusses the findings and concludes that the results are both robust and substantively important.

These findings challenge both governments' present enthusiasm for web-based approaches to e-government as a central tool for service improvement and digital-centric models of public administration such as DEG.

### *Theoretical Background and Research Question*

Two competing positions can be identified within the literature that represent opposite ends of a spectrum of enthusiasm for the benefits of web-based digital government for service improvement. One, exemplified by the DEG work of Dunleavy et al. (2006) (and, in some ways, in the enthusiasm of government itself) sees digitalization as a potentially transformative mechanism for improving government and use of the web as an intrinsic part of twenty-first century public administration. The other, represented by Kraemer and King (2003), sees the benefits actually delivered using technology to be much lower than expected, the costs substantially higher, and the associated changes more incremental in scope. In a more recent chapter, King and Kraemer (2012) state that there has been a "surprising lack of impact of ICT on public administration," while noting that this does not mean that there has been no impact (or, perforce, that no impact is possible in the future).

These two views of the potential benefits of web use are, in principle, empirically tractable. Governments have been implementing Internet-focused digital improvements on a wide scale since the 1990s, and the benefits of at least the early reforms should now be manifest. It is easy to point to specific technological interventions that have the potential to save money and transform public services, and the practitioner literature in particular is full of successful single-service case studies (see, e.g., Local Government Association, 2014). In the

context of web-based services, a key expectation is that the delivery of interactions via the Internet would allow for more convenient and much cheaper interactions than those delivered face-to-face or by phone, improving both service quality and cost-effectiveness.

Accompanying this, the rhetoric surrounding the opportunities for service improvement from government use of the Internet has been fulsomely positive. Repeated government reports in Britain have outlined the necessity of bringing services online, and of adopting the kind of Internet-enabled dynamism exemplified by the .com entrepreneurs of the late 1990s (Cabinet Office, 1999b, 2005). Local government practitioner literature, though generally less utopian, saw the Internet and e-government as a substantial opportunity, as well as a challenge (Socitm & Improvement and Development Agency, 2002). This enthusiasm has continued well into the 2010s, with digitally delivered savings seen as one way of handling the austerity reductions in local government budgets. Digital offices such as the United States Digital Service, 18F, and the U.K.'s Government Digital Service have been enthusiastically set up worldwide.

Dunleavy et al. (2006) highlight both the challenges of digitalization and the opportunities presented by Internet technologies to improve public administration. In doing so, they introduce DEG as a new quasi-paradigm for public administration and take a firm position on the positive service benefits to be had from digitalization. The DEG case is that governments are, and should be, moving away from New Public Management (NPM) approaches toward three new themes:

1. Reintegration, where the disaggregation tendencies of NPM are reversed in order to exploit digital-era technology opportunities.
2. Needs-based holism, in which the relationships between agencies and citizens are simplified and processes are "re-engineered" on an end-to-end basis.
3. Digitalization, with electronic delivery channels becoming the transformative central approach, rather than being supplementary—agencies "becoming their websites" (Dunleavy et al. 2006, p. 227).

The extent to which DEG is a viable model in practice therefore depends on empirical evidence of the effectiveness of digitalization as a means of improving government, as well as a normative discussion as to whether the end state of a largely digital approach to public administration is desirable.

The amount of empirical work directly justifying enthusiastically pro-web positions is not large. As Norris and Reddick (2013) explain: "We do not cite empirical works that validate claims made in cyber-optimist writings because, after an extensive review of the e-government literature, we have not been able to find any" (Norris & Reddick, 2013, p. 167). This is particularly problematic in light of research going back decades (e.g., Kraemer, Dutton, & Northrop, 1981) showing that the relationship between informatization and performance in public authorities is complex and the results highly variable. The notion of service transformation, central to DEG, has been particularly difficult to demonstrate.

Although Information Technology (IT) has a long pedigree in government, it is only with the availability of the Internet that e-government has been seen as having

major applications external to the government body itself (Moon & Norris, 2005, p. 44). Nevertheless, there is little evidence that use of the Internet has done much to fundamentally change the underlying dynamics of government. The disputes within the literature between theorists of weak or strong technological determinism, and those arguing that organizations are complex socio-technical systems for which technology is only one variable, have generally been resolved in favor of complexity and against a reductionist view of technology as the sole driver (Nograšek & Vintar, 2014).

Work comparatively analyzing the effect of Internet use on service outcomes, or on cost-effectiveness, across the government in general is notably scarce save for some U.S. studies founded only on surveys of government staff (e.g., Oliveira & Welch, 2013). This focus on surveys of senior managers as a proxy for solid performance measures is unfortunately common across the public administration field (see, e.g., Wynen & Verhoest, 2013), despite the obvious disconnect between the actual measurement (reported belief) and the underlying variable of interest (performance).

The extent to which service changes have actually been made is also not straightforward to measure. For example, in one early study packed with enthusiasm for the benefits of the Internet as a way of improving local administrative performance and cost-effectiveness, a survey of city managers was paired with a manual analysis of the structure of U.S. local government websites, each simply hand-sorted into “portal,” “information-oriented,” and “user-oriented” categories (Tat-Kei Ho, 2002). Studies assigning particular website features as binary variables and regressing output variables on these have also been common. Even where models of government IT use emerge, they are often focused on micro-interactions within particular agencies (see, e.g., Cordella & Iannacci, 2010 in which the underlying case is the U.K. criminal prosecution system and the model aims to explore the values embedded in information systems, not their take up, use, or effectiveness).

This reflects in large part the difficulties in conducting effective studies of technological interventions in complex environments, which has generated an extensive literature on Information Systems evaluation approaches over multiple decades in both the public and private sectors. Where effort has been spent on the *ex ante* evaluation of investment decisions, a focus is possible on stakeholder involvement and both metric-based and qualitative analysis of the particular problem for which information systems are being proposed to solve (see Frisk, Bannister, & Lindgren, 2015). The goals and metrics established can then be used after implementation to understand if the investment has achieved its goals. By contrast, most academic evaluations of IT investments are done after the event and limited to available data (rather than what might ideally have been collected). This has limitations, especially if it requires the repurposing of outcome data which are not ideally specified for measuring the effects of the IT intervention made.

As many of the decisions to proceed with DEG-type approaches have been politically driven and sector-wide, internal evaluation data is likely to be limited and insufficient, if available at all. Assessing such policy consequences on a comparative basis, though, requires effective data on both the extent to which the proposed changes have actually been made (which will vary by organizational

unit), and also the effects that they have had (separated from effects consequent on other political, economic, and management changes that likely co-vary). One example of this in a private sector Information Systems (IS) context is the comparative econometric literature on the effects of firms' technology investments, perhaps exemplified by contributions to the "productivity paradox" debate (e.g., Brynjolfsson & Hitt, 1996, 2003) assessing the productivity gains from information systems investments using firm-level metrics. This is, naturally, much harder to apply effectively to governmental technology use, where there is no single measure of productive output such as revenue.

There is also a strong sense that effective evaluation is aided by access to process measures as well as outcome ones. DeLone and McLean (2003), summarizing some of this literature, highlight the particular importance of system use as a critical dimension of IS success measurement. Process measures have the undesirable property for comparative work that they often vary between organizations, being collected for the purposes of management and not public reporting. IT service use statistics, for example, are not routinely collated except as part of internal benchmarking clubs, and are neither complete nor publicly available. Despite this potential empirical tractability of digital government to comparative analysis, therefore, it remains unclear whether developments in e-government are, in fact, causally related to increased performance (Heeks & Bailur, 2007).

Perhaps there are, in fact, no benefits? There is an extensive literature studying informatization in both the public and private sectors which finds no measurable return on investment for major IT projects (Brynjolfsson & Hitt, 1996; Strassmann, 1997). If benefits are debatable for major back-office processing systems, should they be considered obvious for more nebulous Internet-based customer applications? Kraemer and King (2003) analyze the effectiveness of IT as a catalyst for reform and report their findings that it in fact has a tendency to reinforce existing trends in organization and its effects are highly contingent—a long way away from the techno-optimists' claims that IT results in changes to more effective, focused, and cheaper organizations. It is difficult to square this (empirically driven) skeptical analysis with the positive analysis of the benefits of technology inherent in digital models of public administration like DEG. Indeed, this is at the "other end" of the spectrum of Internet enthusiasm from DEG (Andersen et al., 2010, p. 564).

Even if there are gains to be had from greater use of digital technology, it is still by no means clear that service advantages can be had simply from constructing a website in the absence of care and attention given to the services that sit behind it. Indeed, at least one article (Gulati, Williams, & Yates, 2014) treats good (national) public sector performance as a precursor to the delivery of online services and uses the latter as a dependent variable. Dunleavy and Carrera (2013) provide some empirical support for digitalization. Their National Health Service analysis uses a cross-sectional analysis of various input factors. The regression models built to estimate labor productivity of health trusts feature an "ICT use" independent variable, together with others tracking management practices and the nature and

location of the hospital. The conclusion is that the ICT use variable is statistically significant, though the effect size is small<sup>4</sup> (Dunleavy & Carrera, 2013, p. 255).

There are reasons to be skeptical of this finding. The quality of the data available to the researchers to measure ICT use is unfortunately fairly limited: the index they develop largely looks for the presence or absence of individual features on the trust's website as a proxy for ICT use (e.g., "site map is provided," "pop-up web survey is provided," and "online donations to hospital charity are possible"). These are potentially outputs of web development projects, but not in themselves outcomes of the kind that would justify investment: Business cases for such activities would likely be based on customer satisfaction, better quality management information, or increased hospital charity donations. Such data are not available to researchers, particularly in high-quality comparable form. The relatively difficult methodology therefore makes these findings suggestive rather than conclusive. As there is no plausible mechanism of action for a customer-focused online site map actually delivering greater efficiency in the staff-intensive business of medical care, the index is really measuring the extent to which the trust cares about (or, possibly, is skilled in) the use of ICTs. This may, or may not, translate to better information systems and decision-making processes within the hospital.

The key questions from the literature turn around whether there are benefits from e-government, especially from Internet-focused e-government, or not. That there is only limited evidence for the impact of Internet-focused e-government is troubling, given the continued importance of it in practitioner circles, and its centrality to modern theories of public administration such as DEG. This disconnect between the practitioners' and scholars' expectations of benefits exemplified by DEG, and the continuation of theoretical skepticism (Kraemer & King, 2003) and shortage of empirical evidence for this expectation, motivate the research question:

RQ1: Are web-focused digital government efforts associated with improvements in the quality or cost-effectiveness of government services?

The assumption we are testing from the existing literature is that government web use will be positively associated with service quality, and positively associated with cost-effectiveness. At first glance, efficiency gains generated by digital government activities are more likely to be found associated with higher performance than with overall budget reductions; efficiency gains are generally difficult to remove as cash savings rather than increased output (Willcocks, 1992, p. 248). It would be reasonable, therefore, to expect any savings to be re-invested in service delivery. However, it is important to test an alternative hypothesis: that improvements made are reflected by a reduction in costs rather than an improvement in quality.

The following section highlights the choice of English local government as a suitable test case, sets out the available data sources to allow the question to be operationalized, and establishes concrete hypotheses based on those data to address the research question.

*Case Selection and Data*

A unique combination of circumstances prevailed in England between 2002 and 2008 that allow the assumption of Internet-based service improvement to be empirically tested using English local authorities as the test case. The Blair government collected standardized full-population measures of local government performance, allowing a panel of reasonable quality and cost metrics to be constructed for every top-tier<sup>5</sup> English council (Revelli, 2010). At the same time, the local government IT officers' professional association, Socitm, was producing expert assessments of every authority's web service provision.<sup>6</sup>

Although all councils' websites (and most councils' service scores) got better over these seven years, that they did so from different baselines and at different rates provides a foundation for empirically testing the association between government on the web and the delivery of high-quality, cost-effective, and satisfactory services. The full-population nature of the data and the sensitivity of panel analyses allows the detection of even small effects.

*Case Selection: The English Context*

Although DEG is in the nature of an ideal type, or as the authors state a "quasi-paradigm" (Margetts & Dunleavy, 2013), the United Kingdom has clearly been aspiring to thoroughgoing digitalization: "The United Kingdom is currently witnessing a coalition government exhibiting a rhetoric and aspiration that is clearly strongly rooted in DEG, but the evidence on its ability to drive effective implementation remains deeply mixed" (Fishenden & Thompson, 2013, p. 997).

The context of local government's approach to the Internet is inextricably linked with the election of the Labor government in 1997. Tony Blair's focus on public sector reform and service delivery is attested in the 1999 White Paper *Modernising Government* (Cabinet Office, 1999b). Local government was targeted alongside central departments (Cabinet Office, 1999a). A whole chapter of *Modernising Government* was dedicated to "information age government," explicitly drawing inspiration from the private sector and espousing utopian themes: "We have seen a revolution over the past decade in the way leading companies across the world do business" (Cabinet Office, 1999b, p. 45) and "The pace of technological change is fast and exhilarating" (Cabinet Office, 1999b, p. 52). The e-government sections were long on ambition and rhetoric, and especially short on any evidence that the digitalization efforts would actually result in the improvements desired: "Is it being unfair to summarise this, and everything else that has so far been said about this White Paper, into saying that what government is for is better government, and better government is government that is more efficient and effective because it is government in the age of information technology?" (Chapman, 1999, p. 12)

A core part of the government's ambition was to make services both more accessible to the citizen and cheaper for the government by encouraging a shift of citizen and customer interaction toward web-based channels. This vision of



customer-facing technology replacing existing bureaucratic processes provided possibly the most concrete example of how savings might be made, as well as fitting into a broader critique of existing services being provided at the convenience of provider interests, not 24/7 and on-demand like the idealized digital service. Goals set out ranged from the ambitious but ill-defined, such as “A new target of all dealings with government being deliverable electronically by 2008” (later brought forward to 2005: Cabinet Office, 1999b, p. 6) to the more concrete “cross-government co-ordination machinery and frameworks on such issues as use of digital signatures and smart cards, websites and call centres” (Cabinet Office, 1999b, p. 7).

Local government practitioner enthusiasm for these developments varied, but most of the published practitioner literature is cautiously optimistic, while noting the scale of the management and service changes required to make the transition to online delivery work (e.g., Socitm & Improvement and Development Agency, 2002). The Local Government Online project was given £670 m by central government between 2000 and 2005, to help councils to make service improvements and cost improvements (Local Government Association, 2014, p. 13). Central government’s enthusiasm for digitalization did not subside over that period. By 2005, the Cabinet Office was confidently claiming that “Twenty First Century Government is enabled by technology—policy is inspired by it, business change is delivered by it, customer and corporate services are dependent on it, and democratic engagement is exploring it” (Cabinet Office, 2005, p. 3). This implicitly placed technology not just at the heart of the public sector reform process, but as a pervasive part of all government activities.

The specific local government aspects of English local government as a test case are also interesting. Unlike many government agencies, English local councils are complex multi-purpose authorities providing a highly diverse range of services—the unifying feature is one of place and not of function. Furthermore, many of the largest and most expensive local government services are delivered face-to-face and locally rather than being routinised and amenable to online solutions. Education spending, for example, is dominated by teachers’ and teaching assistants’ salaries and the need to maintain pupil:teacher ratios. Although there are clearly potential gains to be had from improving online access to information in the education services, it’s unlikely to have the same proportional benefits as, for example, introducing effective online processing of Council Tax Benefit applications. For that reason, an analysis of English local government is a challenging test of the general applicability of DEG and other digital-centric models of service improvement. Coupled with the availability of good-quality data, and the sector’s historic enthusiasm for online service delivery, it is an excellent test case.

### *Online Public Services: Better Connected*

For assessing Internet government efforts, the ideal data set would be comparative, full-population, and well-grounded. Direct assessments by researchers are possible, but the lack of a comprehensive archive of local government websites prevents this from being done on a historical basis. Furthermore,

automated measures, such as page count and connectivity, are limited, while expert judgments are very time-consuming across a large number of units.

A data set nevertheless exists which meets the criteria: the Better Connected data series created by the local e-government professional association Socitm. The data are an expert assessment of the quality of each website, collected from 1998 to present. The methodology has developed over the years that the data has been collected, as have the reporting categories, but scores are awarded based upon the ease of completing particular scenarios and tasks which vary by year, conformance with a set of usability criteria and also on an overall reviewer rating (Socitm, 2013). The critical strength of the Better Connected data is that the scores represent an assessment of the quality of web provision against a contemporary model of importance: the collective judgment of Socitm as to the most productive focus for work.

Data are available annually, including for the period 2002–2008 which aligns with the Comprehensive Performance Assessment (CPA) service quality data discussed below (Socitm, 2002, 2003, 2004, 2005, 2006, 2007, 2008). In this period, sites were graded “Promotional,” “Content,” “Content+,” or “Transactional.” The labels are perhaps slightly misleading: They are applied based on cut-points from an underlying one-dimensional scale and do not directly represent particular strengths at information delivery or transactional services.<sup>7</sup> The number of promotional sites fell year-on-year (Table 1 and Figure 1). In 2007, an additional grade of “Excellent” was added to the rating scale, with the remaining “Content” and “Content+ ” sites being regraded “Standard.”

The data are normally restricted to subscribers to Socitm’s Insight service, but Socitm have kindly made them available for this article. As a result of the restricted availability of the data set, the Better Connected (BC) data has not been previously used in an academic context, despite its obvious utility in studies of local digital government. A few researchers, such as Senyucel (2007), record reading a few of the published reports as part of reviews of the practitioner literature, but not making use of the judgments contained therein. Because the BC data are new in academic work, they merit a close examination: Are they a good proxy for the underlying variable of interest (degree of web development) and can the results of any model which includes them be reasonably relied upon?

It remains common for studies of e-government to use relatively simplistic measures of the presence or absence of small numbers of website features (e.g., Feeney & Brown, 2017). Limited researcher time and heterogeneous coverage by government websites make it tricky to do more, but such measures provide

Table 1. BC Grades By Year, 2002–2008

	2002	2003	2004	2005	2006	2007	2008
Promotional	13	3	1	1	0		
Content	65	56	33	23	30		
Standard						80	57
Content+	69	83	96	98	78		
Transactional	4	7	19	27	41	68	88
Excellent						1	4

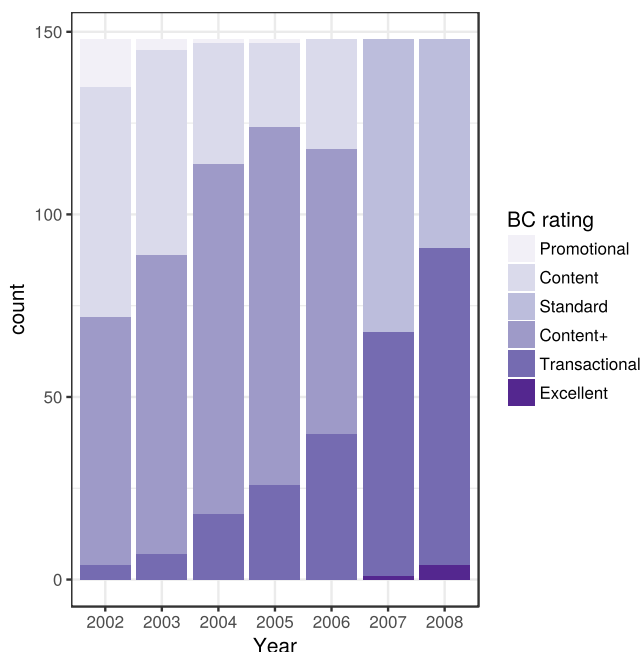


Figure 1. BC Grades By Year, 2002–2008.

relatively limited insight. The Better Connected data are a better measure in almost every way: They are more complete, more authoritative, available on a panel basis over many years, and much more nuanced.

Are the BC data suitable for building into performance models? The clear answer is yes. While there will undoubtedly be a degree of measurement error here against an underlying ideal metric (the collection methodology relies on judgments both by Socitm as to the scope of assessment in each year, and by the experts doing the analysis as to whether particular criteria are met or not),<sup>8</sup> this is true of very many variables in political science. Far from being a repurposing of somewhat off-point official data, however, the BC data series was specifically designed to answer precisely the question we're interested in: the comparative degree of development of government websites. The data were carefully specified and collected, the methodology is defensible, and we can have confidence that they closely reflect the underlying variable of interest.

Overall, BC data are highly suitable for this analysis and deserve to be more broadly used by scholars.

### *Performance: The Comprehensive Performance Assessment*

An attractive high-level council performance measurement is the CPA data set produced by the Audit Commission as part of the oversight process for local authorities. CPA results were calculated between 2002 and 2008. An original motivation for the system was to provide a simple score against which local

residents could hold their councils to account, as well as a mechanism with which government could drive up performance (DTLR, 2001). The underlying approach is to combine ratings from across a number of service areas together with the results of a corporate assessment of capability to improve, into a single score. As Revelli (2010, p. 187) notes, "CPA has the unique feature of combining information on public service level and quality with indices of costs of services, thereby approximating an ideal performance score that promises to be superior both to indices built on gross output only and to crude measures of technical efficiency." Revelli used CPA data, combined as here with CIPFA finance data, to show that increased revenue spending was not a determinant of performance in English local authorities.

These data are, as so often in public administration research, being repurposed for evaluation rather than being planned and specified by academics in advance for this purpose. Nevertheless, this effect should be substantially less distorting than is normally the case. CPA was designed by central government as a means of measuring and driving improvement in local authority performance, the use to which this study puts it. It was uniformly specified nationally and there was substantial oversight of data collection to try to ensure comparability between councils—again, exactly what is needed for a panel model of this kind.

Advantages of using CPA data as the main measure of council performance include complete coverage across our target population of local authorities, and a degree of credibility that is difficult to achieve with researcher-constructed composite measures. The CPA measures were embedded in local authority work for many years and have been used widely in academic studies which need a council performance measure (e.g., Andrews, Boyne, & Walker, 2006; Boyne, James, John, & Petrovsky, 2010; James & John, 2007; Walker & Boyne, 2006) and as an object of academic study in their own right (e.g., Andrews, 2004; Andrews, George, Jennifer, & Richard, 2005; Game, 2006; Lockwood & Porcelli, 2013). Game (2006) is a particularly good critical introduction to CPA and its methodology.

The original service blocks selected were education, social care, environment, housing, libraries and leisure, benefits, and use of resources<sup>9</sup> (Audit Commission, 2002b). Each service received a rating between zero and four based upon inspectors' judgments and performance indicator results, which were then combined to make a single-service performance score,<sup>10</sup> which was then further combined with the corporate assessment to produce a final CPA score.

Although CPA ratings were expressly targeted by council senior management as performance goals, and therefore have all the usual issues created when measures become targets, the comparator BC scores are targeted in a similar way by council web teams, so some of the upward variability over time should be common to both of the key variables in the analysis (and in any case the time-invariant effects of councils' abilities at gaming metrics are controlled for automatically by the modeling approach).

The complexities of block measurement are the biggest weakness of CPA as a central measure of service quality, in that they depended in practice both on data availability and on government's notions of importance. Nevertheless, the data

have the great merit of expressing the government's own contemporaneous views of what constituted high-quality local government, which is a principled position on which researchers can stand. Further, far more effort was expended on trying to ensure a robust and comparable data collection process than would be possible with even the best-funded academic project, one reason why convincing robust empirical analyses of local government performance are so difficult to find in the academic literature.

The makeup of the indices used to construct scores varied somewhat over the years of data publication as the criteria were adjusted, generally being toughened in response to councils' increasing scores (Audit Commission, 2005a). Full details of the formulae for constructing the scores in different years can be found in the Audit Commission publications which accompanied them (Audit Commission, 2002a, 2003, 2004, 2005b, 2006, 2007, 2008). In general, councils did better as the assessments went on (Table 2 and Figure 2).

For this research, the CPA service performance scores are used as a key dependent variable, rather than the overall CPA grades. This allows a closer focus on service outcomes rather than the Audit Commission's judgments of corporate capacity (which made up an increasingly large component of the scores as time went on). Previous research using the CPA has also taken a similar approach (e.g., Andrews et al., 2005; Walker & Boyne, 2006).

Here, aggregation has been done by a simple weighted average of service scores, with those services identified by the Audit Commission as "Level 1" (more important) being double-weighted. This score has then been normalized across the whole population to produce an easily interpretable measure with a mean of 0 and a standard deviation of 1. A graph of the aggregated measure is provided in Figure 3.

#### *Cost-Effectiveness: Revenue Expenditure, Controlling for Quality*

Measuring the cost-effectiveness of government organizations is difficult; unlike in a commercial organization there is no single measure of success such as profit, and hence the output part of a cost-effectiveness measure is difficult to estimate. This is particularly true in local authorities. Some significant transactional parts of the modern state are structured along functional lines with a small number of commodified products: The Driver and Vehicle Licencing Agency, for example, handles large volumes of driving license applications and vehicle registrations, both of which are readily measurable. Local government is not like this: there are

**Table 2.** CPA Ratings By Year

	2002	2003	2004	2005	2006	2007	2008
Poor/0*	13	10	1	1	0	0	0
Weak/1*	22	18	14	8	5	2	4
Fair/2*	39	39	33	31	23	22	26
Good/3*	53	56	60	70	71	67	57
Excellent/4*	21	25	40	38	49	57	61

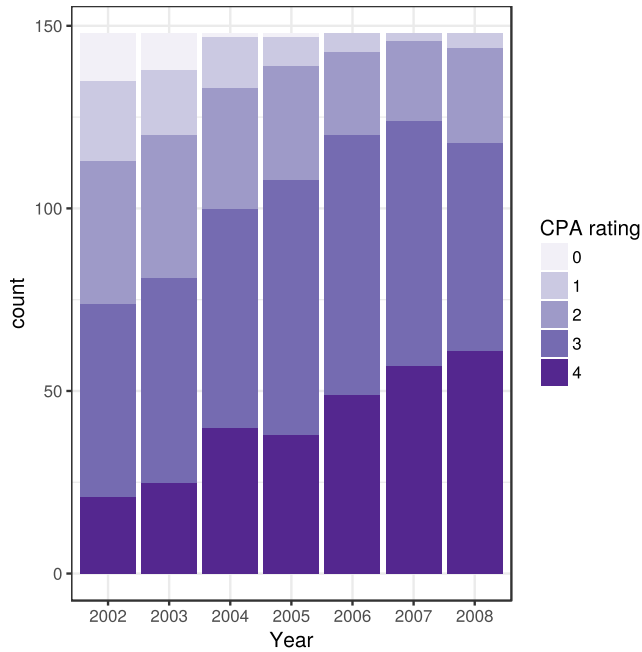


Figure 2. CPA Services Scores By Year.

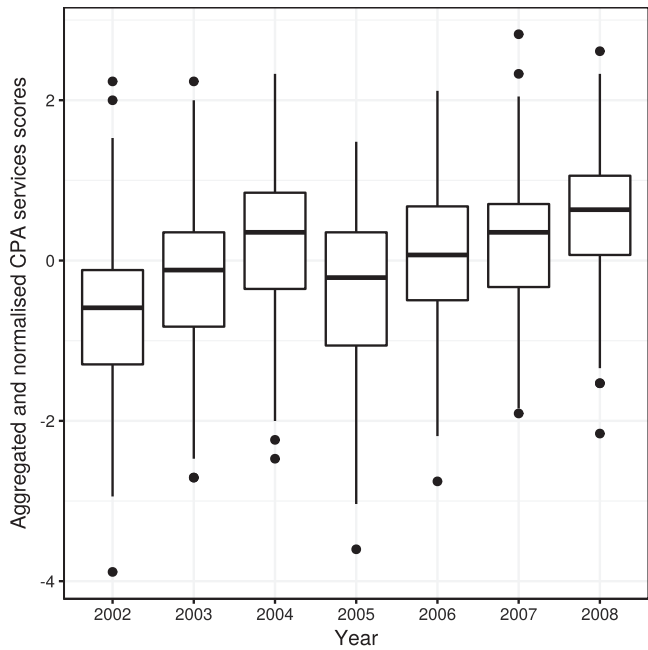


Figure 3. Aggregated and Normalized CPA Services Scores.

several hundred discrete local government services (Wilson & Game, 2011, p. 35) and the relative importance of them (necessary for creating a composite output measure) is politically determined and unclear.

There are some potentially satisfactory approaches to this problem. Total Factor Productivity analyses build an index of outputs weighted by the cost of each service, which are then compared to the cost of inputs to create a measure (Dunleavy & Carrera, 2013, p. 35). This effectively uses the organization's own view about how it chooses to spend its money as a proxy for the importance of the different public services delivered.

Unfortunately, the cost of producing such an analysis for a local government would be prohibitive due to the diversity of the measures used for the outputs and the difficulties of disaggregating the costs of each service from the published council financial reports in order to get an accurate service weighting. Fortunately, alternative approaches are available. By building a model using revenue expenditure as the dependent variable, but adding service performance, such as the CPA services score calculated above, as an independent variable, we can produce an estimate of cost-effectiveness where the output assessment is based upon the expressed service priorities of central government, factored as such into the CPA process, and the input assessment is a high-quality uniform full-population data series which is consistent across multiple years.

The data used here are budgeted revenue expenditures from the authoritative series published by CIPFA, the local government accountants' body. The period 2001/02–2007/08 (CIPFA, 2001, 2002, 2003, 2004, 2005, 2006, 2007) is used to cover the full period of CPA. Figure 4 shows the level of spending by authorities over the same period—one of generally rising public expenditure in the United Kingdom. All expenditure is given in real terms, adjusted to 2008 pounds using the gross domestic product deflator (Office of National Statistics, 2016).

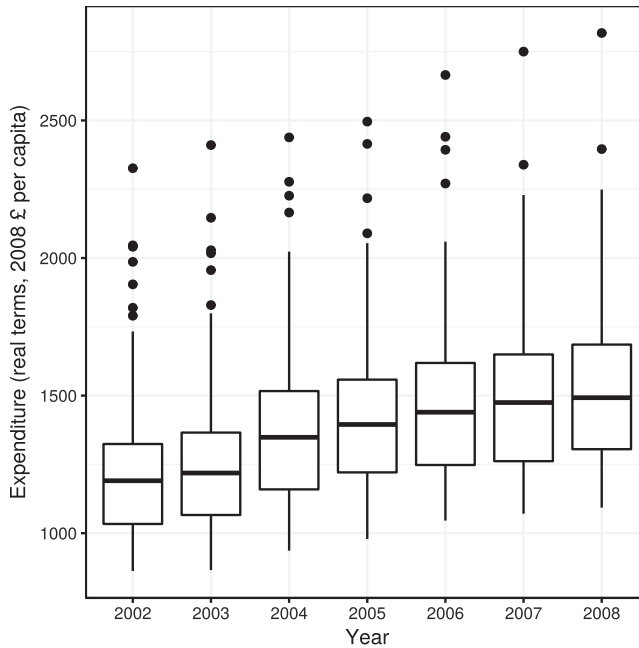
## Methods

The following hypotheses will be tested using this data, to answer the research question outlined above:

*H1: Local authority digital government efforts, as measured by BC results, are positively associated with service performance, as measured by CPA scores.*

*H2: Local authority digital government efforts, as measured by BC results, are negatively associated with the cost of delivering services, as measured by spending in excess of the government-established standard when controlling for service performance.*

This article uses panel models to estimate the association between the variables of interest. As the same councils were repeatedly re-assessed and their scores are trackable over time, more information is available than in a standard repeated cross-sectional design and this can be used to handle omitted variable bias by



**Figure 4.** Expenditure, By Year (Real Terms).

statistically controlling for the heterogeneous nature of the local authorities in the study.

A common approach would be to use a fixed effects model, providing unbiased estimates of the coefficients even in the presence of unobserved time-invariant heterogeneity (Brüderl, 2005, p. 21). The panel approach has previously been successfully used to study the CPA (Boyne et al., 2010). There are also, however, potentially autoregressive effects at play: It is quite feasible, for example, that the level of spending at period  $t$  can be modeled in part as a function of the level of spending at period  $t - 1$ , given that the finances of local government in the period under study were based on cash constraints and limiting maximum percentage increases in property taxation. Finally, this is a relatively short- $T$  panel, with a large number of units but only seven time periods available, which makes fixed effects estimators potentially biased for such autoregressive panel models (Nickell, 1981). There are also potential endogeneity issues with the variables measured, which may co-vary with each other or with unobserved additional variables.

These issues are dealt with here by employing the Arellano–Bond Generalized Method of Moments estimator including lagged terms and the use of previous-period lags as a set of instrumental variables (Arellano & Bond, 1991). This is a standard approach to modeling short- $T$  panels in the econometrics literature, and provides coefficient estimates which are not biased in this case as may be those provided by the standard fixed effects estimator.

Two models have been fitted,<sup>11</sup> to test H1 and H2, and are discussed in the next section below. We analyze data from 2002 to 2008, the full period for which CPA data



are available to combine with the longer BC series. The data set contains all top-tier authorities, excluding the Common Council of the City of London and the Council of the Isles of Scilly.<sup>12</sup> The BC results have been binarized into a single dummy variable: whether the result was “Transactional” or better. Reduction to a binary variable makes interpretation much more straightforward and turns out not to be problematic.<sup>13</sup> Time dummies are included in the models to effectively control for the period-specific effects in the data (Arellano, 2003, p. 61). These particularly include in this case the cross-council effects of governments’ changes to council funding constraints and ongoing developments in CPA and BC scoring methods, which are not directly measurable. The council’s corporate assessment rating<sup>14</sup> has been included in these models. This presumptively has an association with both the BC rating (higher quality management teams are more likely to push service improvement, including via web development) and with service scores (higher quality management teams are more likely to pursue other methods which will lead to improved service outcomes).

An Arellano–Bond panel model (Model 1, Table 3) has been fitted to test H1. We use the normalized CPA services score as the dependent variable and BC as the key independent variable. CPA corporate assessment scores are included as a control variable, together with time dummies, and the lagged value of the CPA services score at period  $t - 1$ . We use lagged values of the dependent variable from  $t - 2$  and earlier as Generalized Method of Moments (GMM) instruments.

Another Arellano–Bond panel model (Model 2, Table 3) has been fitted to test H2. Here, the dependent variable is per capita revenue spending. As the service scores from the CPA data set are included as an independent control variable, variation in the dependent cost variable reflects cost-effectiveness rather than simply changes in performance. Again, the council’s corporate assessment scores, the year term, and the lagged value of the dependent variable at period  $t - 1$  were

**Table 3.** Regression Models

	CPA Services (Model 1)	Spending (Model 2)
CPA services (normalized) $_{t-1}$	0.702*** (0.074)	
Spending (£/capita) $_{t-1}$		0.547*** (0.182)
CPA services (normalized) $_t$		3.178 (4.156)
BC transactional or better $_t$	0.042 (0.096)	−9.966 (8.340)
CPA corporate assessment $_t$	0.031 (0.084)	−10.248 (7.519)
2004	0.027 (0.069)	94.059*** (7.927)
2005	−0.820*** (0.103)	79.416** (27.431)
2006	−0.112 (0.074)	103.705** (35.137)
2007	−0.137 (0.088)	111.792* (44.575)
2008	0.019 (0.100)	124.447* (50.901)
N	148	148

Note: Spending is in real terms, 2008 £ per capita.

\* $p < 0.1$ .

\*\* $p < 0.05$ .

\*\*\* $p < 0.01$ .

also included as control variables, with earlier dependent variable lags used as GMM instruments.

There are arguments both for and against the inclusion of lagged independent variables, particularly BC scores and corporate assessment scores. We might theoretically expect there to be delayed effects from these variables on performance and cost, but on the other hand these variables are already in some sense measured lagged—in-year changes are not captured until the next annual assessment, so the “current” year’s measurement is already time-displaced. The introduction of additional explanatory variables to estimate also introduces potential difficulties in fitting the models. This article does not, therefore, use lagged independent variables.<sup>15</sup> Standard diagnostic tests have been successfully conducted for all models, including Sargan tests testing the models’ overidentifying restrictions and the second-order autoregression tests recommended by Arellano and Bond (1991).

Great caution should be used in interpreting the standard errors and associated *p*-values. The data are full population, so there is, in principle, no sampling error. Standard errors and *p*-values are best interpreted as treating the data as representative of a hypothetical superpopulation of all possible local authorities.<sup>16</sup> Nevertheless, the data suffer from all the usual non-sampling errors, including variations induced by the particular choice of estimators, and small effects should therefore be treated with caution.

## Results

### *Performance*

In Model 1, the regression coefficient of the BC term, and therefore the detected effect size, is effectively zero. There is a substantial, and significant, positive relationship between service performance at period  $t - 1$  and that at period  $t$ , but no association with the primary variable. This is a surprising result, given the prominence of the e-government effort in local government over this period, and the high sensitivity of panel models for detecting such an effect if it were present. This model thereby provides no evidence that web engagement measured using the BC data series is associated with higher council performance. Despite the lack of sampling error, an effect of this size is very likely to be statistical noise, caused by minor specification error, variations in the measurement process, or other non-sampling error.

Overall, there is insufficient evidence here to support H1, and we must fail to reject the null hypothesis that Internet engagement is not associated with service performance.

### *Cost-effectiveness*

Looking at Model 2, the results of the analysis provide little support for the thesis that improvements in web performance can transform the cost-effectiveness of delivering public services. Again, there is a large and significant positive

relationship between expenditure in period  $t - 1$  and that at period  $t$ , here together with sector-wide variation by year reflecting changes in central government's controls on the rates of taxation.

There is an estimated effect here, in the direction theorized, but it is not statistically significant and the magnitude of it is very small: estimated at £10 per capita per annum, well under one percent of council revenue spending. This is well within the bounds of what would be caused by measurement error or model specification issues. Even if it is a true effect, it puts a low ceiling on the gains realized in practice, far less than the transformational rhetoric of the period, and theories like DEG, suggest.

There is no evidence of substantial cost-savings being made through the use of better web provision in English local government in the period modeled. There is insufficient evidence to accept H2 and we must therefore fail to reject the null hypothesis that Internet engagement is not associated with service cost.

### *Interpretation*

As the CPA and BC scores are both complex proxy measures for the underlying variables of interest (service quality and web development), a step back is needed. Do these results reasonably reflect what was actually going on in the local authorities concerned?

This has not been a full-blown causal analysis. In the event that a relationship with a reasonable effect size had been demonstrated, further work would still have been needed to demonstrate that the association was not due to the influence of a common causal agent: "If we observe change in  $X$  to be related to change in  $Y$ , in most situations we cannot exclude the possibility that the two processes are independent, conditional on an unobserved, time-varying  $Z$ . [...] Thus, although panel data represents a considerable improvement on cross-sectional data for understanding dynamic processes, it is important to note its fundamental limitation in unequivocally identifying causal relationships" (Berrington, Smith, & Sturgis, 2006, p. 6).

Although the census approach to data collection means that the results are untainted by sampling error, there are still causes of bias and uncertainty that exist, and which lead to a more cautious conclusion than would otherwise be drawn. First, the main risk in over-drawing conclusions from the findings above is from specification bias. Although obvious confounding variables have been controlled for, it's always possible that there are other factors at work which have not been considered, which might have adjusted the results in either direction. Because of the nature of the panel modeling, any such confounding variables would have to be time-varying.

Second, full-population panel data models do not make the dependent variable immune from measurement errors and biases. In particular, this research is based largely upon government judgments of service quality; such judgments are not politically neutral and there are significant incentives for authorities to attempt to gain these measurements in pursuit of additional funding or administrative

freedoms. Indeed, the basic interpretation of the significance of the year variables in the regressions is that councils have got better at gaining higher dependent variables as time has gone on. Whether that actually reflects greater performance is, in principle, impossible to prove using this data set alone.

The key question is whether the lack of link found here can be reasonably attributed to the acknowledged weaknesses of the measures, rather than a lack of underlying relationships of the underlying variables of interest. The results support the latter interpretation. Although there is certainly gaming and variability in the measures, any time-invariant biases resulting from this within individual authorities are controlled for by the modeling process. The idea that any time-varying biases would combine to perfectly eliminate an actually existing relationship is less theoretically plausible than the simpler suggestion that no relationship is present. Even if the indicators were very noisy, or an imperfect measure of the underlying construct, we would expect some effect to appear if the theorized performance benefits exist in practice.

Although this is formally a null result, the full-population nature of the sample and the highly sensitive panel design of the model gives us positive evidence that the null hypothesis reflects the underlying truth, above and beyond a simple rejection of the hypotheses. The measures are necessarily imperfect, but they are of sufficient quality that they would be expected to detect an effect if one were present. Although further research with alternative measures would be worthwhile, these results give persuasive evidence of a lack of association.

## Discussion and Conclusions

These findings stand in contrast to the expectations of digital government enthusiasts within English government, and also of the recommendations of DEG for thoroughgoing digitalization and greater government on the web. This latter was undoubtedly in line with the hopeful expectations of government at the time the quasi-paradigm was developed, and the wide international development of digital hubs such as the Government Digital Service shows that “digital” is still in some senses central to governments’ reform agendas.<sup>17</sup> It appears therefore from this study that the wave of Internet-based improvements which inspired the original DEG digitalization thesis did not achieve substantial high-level gains, at least within the English local government context analyzed. This will not come as a surprise to scholars on the less cyber-optimistic side of the digitalization debate.

In aiming to assess the overall effects of developing web services on councils, this research has operated at a high level and has not looked at the specifics of individual services. Rather, it focuses on overall service quality and cost outcomes. Although the data sets used are good quality, full population, and aim to measure fairly directly our underlying variables of interest, this is necessarily an *ex post* study: the motivations for each individual authority’s digitalization decisions are not available (only high-level government and sector-wide practitioner strategy literature) and the evaluation decisions here made by us may not have been the same as would have been selected by the authorities involved.

As already discussed, there are certainly areas of council service that we could intuitively expect to be more responsive to e-government improvements (e.g., handling town planning enquiries and transactional services such as council tax collection) and less responsive (e.g., acute adult social care work), with the latter representing the bulk of both effort and expenditure. Notwithstanding the seemingly-misplaced enthusiasm of the practitioner literature, therefore, this result is quite possible to square with the reality of local public administration. As with other service and management improvement techniques, there is nothing magic about the Internet which will result in automatic service improvement. If Internet-driven automation is applied to an existing disastrous service the outcome is likely to be disastrous. Making the most of the opportunities that are afforded by use of the Internet requires skill and understanding, just as with other ways of improving local public services.

It is important to be clear about what the results in this article show, and what they don't. The data show no associations in the expected directions between Internet engagement and either service performance or cost-effectiveness. Although this does not rule out individually successful digital government projects (which have been attested in many case studies), it does mean that such successes have not been general in the local governments studied.

Increasing delivery of Internet services comes at an implementation cost. One simple interpretation of these results is that Internet engagement is associated with some cost-savings in service delivery (as the cost of provision doesn't rise, despite the implementation costs) but not sufficiently to result in efficiencies overall. This result would be consistent with earlier work on informatization reporting that the benefits of such work were often overestimated and the gains difficult to realize (Strassmann, 1990; Willcocks, 1992).

As the BC data are at whole authority level, it has not been possible to break the results down to the level of individual services. This means that there remains a good deal of uncertainty about the reasons for a lack of overall benefits. Given that the bulk of local services are concrete rather than informational, and rely heavily on face-to-face service delivery, it is completely plausible that the benefits would be limited. For more specific high-volume and transactional areas, however, such as council tax administration and planning information, benefits would clearly be expected.

Consequently, we must take a nuanced view of the scope of the results. They show that, on aggregate, the changes made on the web in the period covered by the data were not associated with improvements. They do not answer the related questions of whether this was because the web is ineffective per se as a means for improving service delivery, whether the problem arises from insufficient realization of potential benefits (perhaps by not pushing channel shift as hard as it has been subsequent to the end of CPA data), whether the local government combination of expensive local face-to-face services and limited scope for online delivery means that we should simply expect small effect sizes, or whether there are other explanations.

The obvious interpretation of the relationships (that greater engagement with the Internet is not associated, with these authorities, at this time, with better services or efficiency) seems fairly robust. There is an extensive literature on the tradition of over-promising and under-delivery in IT work, so it does seem plausible that the straightforward explanation—no effect was found because no effect is present—is the true one. In any case, the analysis was sufficiently sensitive that any strong effect should have been picked up.

The results do not necessarily generalize to other countries or other settings. With the exception of the online information service itself, there are reasons identified above why local government in particular would be less amenable to service and cost benefits through digitalization than other government services. The key issue, however, that the delivery of key local government services is more intrinsically face-to-face and thereby less susceptible to the benefits of digitalization, is not solely a local government issue and will extend to other government agencies. While transactional tax processing may be a paradigm case of the obvious advantages of digitalization<sup>18</sup> there are many other central government services which are expensive, professionalized, and/or place-focused.

There is one missing factor in the analysis, that of the use of services. As highlighted in the review of the literature, it would be desirable to be able to control for which authorities in the model had good levels of citizen use of online services, for which there is a stronger theoretical argument that improvements would be seen. Such data are, sadly, not likely to be available at all for historical analyses like these, and are difficult to obtain in general. But as these results stand, they call into further question the optimistic model of e-government supported service improvement assumed by the British government over the period of this data, and also provide empirical evidence against the value of digitalization as a part of DEG's model of government reform.

By contrast, the results resonate strongly with the skepticism of Kraemer and King (2003) about the delivery of digital government benefits and reinforce the argument that customer-focused online government is a complex proposition with uncertain benefits. Given the high hopes, significant investment, and substantial government support in place over the period of this analysis, together with the unprecedentedly complete scope of the full-population modeling, it is difficult to simply explain these results away by saying "next time it will be different."

Given the increasing size and scope of local government web provision this finding raises significant questions as to the way forward, and whether local government fits neatly into public sector improvement approaches based on increased digitalization, such as the DEG quasi-paradigm.

It was always problematic to justify huge digital government web projects with limited systematic evidence of effectiveness. It is possible that, in different countries, with better management, or adopting different approaches, that next time it might be different. But on the evidence of this data, we should join Kraemer and King (2003) in being skeptical.

## Data Accessibility Statement

Due to the confidential nature of some of the research materials supporting this publication not all of the data can be made accessible to other researchers. Please contact the author (tom.nicholls@bsg.ox.ac.uk) for more information.

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## Notes

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1. This is a term often used for the most recent moves to study and implement customer-focused web-based Information and Communication Technologies (ICTs) within government. Other, overlapping but distinct, terms include e-government, digitalization, and computerization. This article uses “digital government” to reflect that its focus is primarily on the web, and on front-end uses, rather than on the distinctive concerns of these other literatures.
2. This was particularly prevalent in the United Kingdom, and is discussed in the next section.
3. There are multiple approaches to technology-supported service improvement, with a distinction drawn between using technology to merely automate existing malfunctioning processes, potentially leading to “disaster faster” (Margetts & Willcocks, 1993), using technology to support an ongoing incremental improvement process of service improvement, and using technology in a transformational way to radically change methods of delivery and deliver improved outcomes in a single step. This article doesn’t empirically address these differences, partly because the data sets constructed are capable of measuring the scope of changes made but not the means taken to achieve them.
4. The whole model, including management, hospital type, and so forth, only explains 16 percent of the variation between trusts.
5. These are those councils responsible for larger-scale or more strategic services such as education, social services, and transport. In some parts of England there are also district councils providing more local services. District councils are not included in the scope of this article.
6. Indeed, this Better Connected data series began in 1999 and is still ongoing as of 2018.
7. Though the scale is assembled such that “Transactional” is not reachable on the strength of information content alone.
8. Socitm themselves note that “Website assessments are not an exact science, however much we try to be analytical and objective” (Socitm, 2008, p. 24).
9. Not a separate service as such, this block covered financial performance indicators, audit judgments, and corporate planning and was nevertheless included in the service scores.
10. Some services, principally education and social care, were weighted more heavily in this process than the others. The precise method of achieving this weighting evolved over the CPA period from a simple score multiplier in 2002 (Audit Commission, 2002b, p. 8) to a hugely complex rule-based formula in the 2008 edition, which was designed to avoid councils with poor individual service blocks from achieving high scores, irrespective of the quality of the other parts of the authority (Audit Commission, 2008).
11. Using R’s plm package (Croissant & Millo, 2008).
12. *Sui generis* authorities with unusual scopes of responsibility. Excluding them from analysis is commonplace (Revelli, 2010).
13. To ensure that the results were not sensitive to this decision, versions of both models were created with BC treated as a series of categorical dummy variables. Fitting models to this specification using Arellano–Bond estimators is difficult as the number of cases in some of the categories is small and their propensity changes over time as the BC categories were changed, so the results are sensitive to specific modeling choices. Nevertheless, the effects of the category dummies are small and somewhat noisy. We also fitted multiple-category static fixed effects models, with very similar results.

14. This is a measure of management quality created by the government as part of the CPA process and used in generating the councils' final scores.
15. Fitting these models actually produces similar results, with no significant effects from the lagged independent variables but poor Sargan diagnostic test results because of a limitation in the available overidentifying restrictions. Full details are available from the author on request.
16. This is common in econometrics when using, for example, data from all Organisation for Economic Co-operation and Development countries.
17. To be fair to DEG as a quasi-paradigm and the governments implementing it, the other major purpose of government digital hubs is to improve the dysfunctional IT procurement practices that were critiqued very effectively by the DEG authors. This fixing of proven procurement failure appears worthwhile whatever the merits of new digitalization for improving effectiveness.
18. Notwithstanding disasters caused by ineffective contracting by the U.K. tax authorities (Dunleavy et al., 2006).

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