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The Economic Impact of Digital Technologies

Measuring Inclusion and Diffusion in Europe

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Preface

This Final Report originates from a study, 'Analysis of e-Inclusion impact resulting from advanced R&D based on economic modelling in relation to innovation capacity, capital formation, productivity, and empowerment', conducted for the European Commission (Contract no 30-CE-0220618/00-21) by the College of Europe, Bruges. An Intermediate Report has been prepared. This volume presents the main findings of the study and provides an in-depth overview of the methodology, policy simulations, the underlying theoretical framework, and literature references.

The study was conducted between December 2008 and September 2010 by a project team including Paolo Guerrieri (Director), Sara Bentivegna (Chapters 1–4), Giovanni Di Franco (Appendix), Rinaldo Evangelista (Chapter 5), Valentina Meliciani (Chapter 6), Marco Bee, Roberto Gabriele and Giuseppe Espa (Chapter 7), and Jacques Pelkmans (Chapter 8).

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However, any errors or omissions are solely the responsibility of the authors.

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Introduction

Differences in economic performance between industrialized countries are largely explained by the level of investment and research in, and use of, information and communication technologies (ICT), and by the competitiveness of the information society and media industries. ICT services, skills, media and content are a growing part of the economy and society. Indeed, the implementation of the Europe 2020 strategy, intended to modernize the European economy and to build a knowledge-based economy, is strictly linked to an 'information society for all', in other words a widespread use of ICT in public services, SMEs and households.

Progress in e-inclusion, however, is still slow. Social differences in ICT use persist and in some cases are even widening. Most of the Riga targets will be difficult to achieve if current trends continue. Therefore much more should be done to achieve e-inclusion, and EU intervention is justified to guarantee equal access and effective participation in the information society, internal market coherence and e-inclusion co-ordination actions.

At the end of the 1990s, when the European Council began to deliberate upon and formulate plans of action with regard to the role of ICT within the European economy, the theme of ICT diffusion slowly began to attract the attention of policy makers and researchers. To achieve this main goal, over the years many intervention plans have been prepared and implemented. In this perspective a path articulated on two tracks has been followed: the first devoted to finding and describing the modalities and the pace of ICT diffusion – early defined in the much quoted and well known expression 'digital divide' – the other one focusing on policies and interventions able to reduce the digital gap and favour a more balanced technological diffusion. In the initial phase, attention and efforts were all concentrated towards reinforcement and expansion of networks and electronic services; that is, on the enlargement of the size of the user population. Faced with such needs – preliminary and essential to the construction of an 'information society for all' – the issue of social impact of digital inclusion/exclusion inevitably remained in the background.

It came to the fore in the subsequent plan, 'eEurope 2005: An information society for all' (CEC, 2002), presented at the European Council in Seville in June 2002. In the light of the progress made within the ambit

of *e*Europe 2002, the new plan concentrated on two categories of action: 'on the one hand, it was intended to stimulate services, applications and content both for public online services and e-business; on the other, it refers to the basic broadband infrastructure and issues linked to security' (p. 3). The new attention given to the spread and availability of broadband and multi-platform access implies a different approach to the services offered and the role of the user. Two years after the formulation of the *e*Europe 2005 plan, the Commission set forth the '*e*Europe 2005 Action Plan: an update' (CEC, 2004), which dedicated greater attention to the issue of e-inclusion and the need 'to understand in more detail the various facets of this complex issue' (p. 3).

The new strategic plan 'i2010 – A European information society for growth and employment' (CEC, 2005), presented in 2005, follows this route even more clearly. The issue of the inclusion of citizens in the information society thus becomes one of the Commission's priorities. The aim of a European society based upon the inclusion of its members is linked to the spread of broadband access and, more generally, to the achievement of digital convergence, the improvement of the services on offer in terms of both accessibility and costs, the spread of basic digital awareness and the improvement of citizens' health made possible by the new e-health services. Attention is extremely clearly directed towards the social impact of ICT and the need to guarantee the advantages of their use to an ever-greater number of citizens. Reference to various dimensions of access (both material and skill access), as well as the implementation of public services, indicates a distinctly richer and more structured interpretation of the themes of e-inclusion than in the past.

In 2006 this approach and the objectives for an EU e-inclusion policy were agreed in the Riga 'Ministerial Declaration on an Inclusive Information Society' (June 2006) which set concrete targets for Internet usage and availability, digital literacy, and accessibility of ICT by 2010. It also identified a number of priority areas for action: namely ICT and ageing, geographical digital divides, e-accessibility (that is, the usability of ICT for people with disabilities), digital literacy and competences, ICT for cultural diversity, and inclusive e-government. As a follow-up, in November 2007 the Commission adopted a 'Communication on a European e-inclusion initiative' (CEC, 2007a) which considers failure to access or use ICT to be a major form of social and economic exclusion, affecting cohesion and prosperity in Europe.

Furthermore in the final part of the 'e-Inclusion' Ministerial Conference held in Wien (2 December 2008), the Presidency of the European Union emphasizes that: (i) measures to improve digital inclusion constitute an investment in the future and have to be at the centre of public policies

addressing the information society; (ii) a strong political commitment, targeted at vulnerable social groups, is necessary in order to improve digital inclusion; and (iii) broadband is becoming an 'essential commodity' like water and electricity. it is today an indispensable service for the effective participation in global trade, economy, education, culture, politics and society.

Therefore, the key issue becomes the 'difference' made by ICT in the everyday life of people and in the whole society. This contribution is not restricted to the economic dimension alone. It involves the social dimension as well. Thus the issue of e-inclusion becomes something that is worth achieving (CEC, 2007b) if we want to build 'a growing and sustainable well being for all society' (p. 8). In order to build one Europe, including digitally, it is necessary to create an 'Internet ecosystem' which has its foundations in a social system that promotes the economic development and social welfare of its citizens by reducing inequality in all its various aspects. This appears to be the objective of 'Europe 2020' (CEC, 2010a), the new strategy for Europe, as it poses as its priority the 'development of an economy based on knowledge and innovation' and places among the seven flagship initiatives 'a digital agenda for Europe'.

Despite all these valuable initiatives, as the CEC's 'impact assessment' (2007b) recognizes, much more must be done to achieve e-inclusion and EU intervention is justified to guarantee equal access to and effective participation in the information society, internal market coherence and e-inclusion co-ordination actions. In this regard, the 'European e-inclusion initiative' (CEC, 2007a) clearly recognized that e-inclusion should not be seen as a problem only but also as an economic opportunity. On economic grounds an inclusive information society brings large market opportunities for the ICT sector, contributes to productivity growth and reduces the cost of social and economic exclusion. In other words, bridging broadband and accessibility gaps, or improving digital competences, translates into new jobs and services.

These economic benefits, however, are difficult to estimate. On the macroeconomic quantification of the inclusive potentials of ICT and its impact on economic performance (productivity, consumer welfare, employability and economic growth) there are very few contributions in the current socioeconomic literature.

The purpose of this study is to start to fill this gap and strengthen the evidence on the economic benefits (and costs) deriving from investment in inclusive information society technology and services. The study will gather data, propose indicators and composite indexes of digital development and e-inclusion (and its flip-side, e-exclusion), and use econometric models to assess the relationship between inclusive ICT and wider economic and social performance.

Despite a growing literature on digital inequality and e-inclusion, the quantitative and qualitative understanding of ICT and e-services usage remains extremely poor and uncoordinated: it is not yet possible to find fully consolidated and reliable datasets and indicators to provide a broad quantitative perspective and facilitate benchmarking for monitoring the process of e-inclusion. Facing these difficulties, and in order to define and measure e-inclusion, we moved beyond the distinction between 'haves' and 'have-nots' in terms of access only, and instead propose a multi-focal approach to this complex concept in continual evolution (see Chapter 1).

More specifically, in Chapters 2–4 we adopt a multi-perspective and multi-dimensional approach (infrastructure, usage, impact on quality of life) so as to to provide a quantitative evaluation, indicators and a dataset to monitor e-inclusion for all 27 EU Member States and explain their main determinants.

On the operational front our goal is to produce the European Digital Development Index (EDDI), in order to monitor and capture the level of advancement of digital inclusion in the EU27 and in all member countries and compare progress made between 2004 and 2009. The composite and longitudinal nature of the EDDI – based on the indexes measuring the subdimensions of infrastructure, usage and impact from 2004 to 2009 – will contribute to individuate the main obstacles to ending the digital exclusion and to monitor progress that has been made in terms of the Riga targets. Its main objective is to provide policy makers with a useful tool to benchmark and assess the e-inclusion processes.

Another key goal of this research is to strengthen the quantitative evidence on e-inclusion and the understanding of the relationship between indicators of e-inclusion and wider economic and social performance. In this perspective, in Chapter 5 we review and compare the existing analyses and models, focusing on the relationship between inclusive ICT and European performance in terms of growth, job creation, and social inclusion.

To select the most suitable model and econometric tools we focus on a set of reference parameters related to: (a) methodological approach; (b) structural specification; and (c) performance variables (Chapters 6 and 7). The selected econometric tools and International Futures (IFs) model meet the following requirements: (i) they are internationally used; and (ii) they are able to assess e-inclusion policy initiatives in multiple dimensions (economic and social) and geographically within Europe, across Europe and in a global context. More specifically they incorporate the properties of ICT in a satisfactory way. ICT is general purpose technology (GPT), whose impact on the economy cannot be understood in the framework of the simple production function and must be assessed taking into account,

among other aspects, its interaction with the regulatory framework, the structure of the economy, and the evolution of skills and organization (Guerrieri and Padoan, 2007).

We use and improve the selected IFs model and assess the impact of ICT on inclusion and economic growth generated by digital inclusion in the EU27. We focus also on the most relevant and measurable factors emerging from the literature and the statistical data at micro level. We provide quantified estimates of impacts of various credible forward-looking policy scenarios and run policy simulations using different assumptions with regard to digital inclusion policies.

These policy simulations help us to provide conclusions and identify policy recommendations that are relevant for the post-i2010 strategic framework, keeping in mind the peculiar characteristics of ICT as general purpose technology (which requires that ICT be activated together with other enabling strategies) (Chapter 8). This final part develops an encompassing EU policy framework for pursuing e-inclusion. It attempts to come to grips with what e-inclusion can be understood to comprise (following the EDDI approach) in an EU perspective, and how it relates to traditional and new ICT policies at EU and national levels.

Contents

1. Digital development in Europe: a theoretical framework

1.1 DEFINITIONS OF DIGITAL INCLUSION: BEYOND THE DISTINCTION BETWEEN 'HAVES' AND 'HAVE-NOTS'

In the early phase of study on the diffusion of ICT, the predominant approach was clearly based on the distinction between 'haves' and 'have-nots'. This distinction became widely known as the digital divide, defined as 'the gap between those who have access to the new technologies and those who do not' (US Department of Commerce, 1999, p. xiii). Embedded in a sort of technological determinism, the concept of the digital divide – even if connected to a range of economic, social, cultural and technological differences – maintains a predominant dichotomy in terms of access only, insofar as it utilizes the binary categories of *information haves* and *information have-nots*.

Having mightily entered the everyday vocabulary, the expression 'digital divide' has had a unique destiny: the more it spread, the more it was criticized and revised by scholars. The inflection point of the parabola describing this destiny can be identified soon after 2000, when articles and volumes declining the concept of digital divide in terms of criticism and analytical revision started to circulate. Examples include 'From the "digital divide" to "digital inequality"' (DiMaggio and Hargittai, 2001), 'Second thoughts: toward a critique of the digital divide' (Gunkel, 2003), *Virtual Inequality. Beyond the Digital Divide* (Mossberger et al., 2003), *Technology and Social Inclusion. Rethinking the Digital Divide* (Warschauer, 2003), and 'Reconsidering political and popular understandings of the digital divide' (Selwyn, 2004).

The perception of the presence of this cultural wave represents the first step towards a close critical examination of a central concept of the study of social and communicative transformation in present-day societies. The first cause of surprise when looking back into the 1990s in search of the author of the lucky expression 'digital divide' is the impossibility of establishing certain parentage. Scholars who have dedicated themselves with obstinacy to this task (Gunkel, 2003; van Dijk, 2006) agree

on identifying its official entry into literature with the report 'Falling through the net: defining the digital divide' – the third report published by the Department of Commerce's National Telecommunication and Information Administration (US Department of Commerce, 1999). Although the expression was used in that report, Larry Irving – under whose direction the report was at the time – has always denied that he coined the term. During a public meeting organized by the Benton Foundation he claimed to have 'stolen' the expression, although he could not recollect the source.[1] The difficulty of ascribing the parentage of such a successful term indicates the climate of creative effervescence that accompanied the initial phase of Internet diffusion. Further indicators of such a climate can be found in the multifarious and diversified meanings attributed to it. Throughout much of the 1990s, this term was in fact used to indicate differences in educational opportunities, inequalities regarding Internet access in schools, differences in working opportunities or even technical incompatibilities (Gunkel, 2003).

The report drafted by the Department of Commerce marks the end of loose interpretation for the term and intentionally provides the definition as being 'the divide between those with access to new technologies and those without' (US Department of Commerce, 1999, p.xiii). Ever since, the sphere of application and interpretation has been well defined and limited to mean Internet access on behalf of the population, which translates into a clear binary classification between the 'information haves' and the 'information have-nots'. On the basis of this clear dichotomy, the following gaps have been identified: global (between countries), social (between different segments of the same society), and democratic (between those who have access to the new virtual space and those who do not) (Norris, 2001). Within any context, digital divide has constantly referred to the level of access, with the consequent classification of individuals into those who have access on the one hand and those who do not on the other.

According to DiMaggio et al. (2004), the adoption of this analytical category based on binary classification is the outcome of an interpretative distortion resulting from the extension of the principle of concession of universal service that has been attributed to the telephone in the United States. Indeed, in their opinion 'the view of the digital divide as a gap between people with and without Internet access was natural at the onset of diffusion, because the Internet was viewed through the lens of a decades-old policy commitment to the principle of universal telephone service' (p.363). In line with this formulation, the first reports published by the US Department of Commerce have paid particular attention to the differentiation between urban and rural areas, considering the family, rather than the individual, as a unit of analysis when monitoring Internet diffusion.

In addition to producing an incomplete picture of the phenomenon, the reference – implicit or explicit as it may have been – to such an approach has brought about false expectations regarding the time it will take to reduce the gap between the 'online' and the 'offline'. In fact, delays have been increased by the expectation of the progressive lowering of prices – of hardware, software and connection costs – to shorten the distance between the various groups, marginalizing the role played by other factors in the decision to get connected to the Internet. Some academics believe that such a clear characterization between those who have access and those who do not, known today as the 'early digital divide', has produced more problems than benefits (Gunkel, 2003; van Dijk, 2005, 2006). Others believe that 'the dichotomous view of the digital divide as a distinction between people who do and do not have Internet access was natural and appropriate at the beginning of the diffusion process' (DiMaggio and Hargittai, 2001, p. 2). On the other hand, research experience gained in recent years has produced a number of arguments in favour of a progressive marginalization of the access element, considered a main indicator for subdividing individuals into haves and have-nots. This division has been defined as both too reductive and highly problematic (Bertot, 2003), as well as unclear and confused (Warschauer, 2001). But what exactly are the reductive, problematic or confused elements connoting the concept of digital divide? Furthermore, once these elements have been analysed, will this term still stand or should it be replaced with a more adequate one?

Before proceeding, we should clarify that the evocative capacity of the expression digital divide to describe new forms of social exclusion deriving from the diffusion of new communication technologies is in no way coming under criticism here. From this perspective one can only agree with Selwyn (2004) when he states that, despite the weakness of the concept, it has had the undeniable merit of imposing the question of informative inequality at the centre of the debate in present-day societies. What is being criticized, however, are the limitations of a term that is essentially centred on the element of access, to the disadvantage of other equally important factors, thereby overlooking the fact that access is different from use and that there are a variety of ways in which this technology is actually employed. We are also liable to forget that the adoption of a similar interpretation could generate some serious misunderstandings with regard to the reduction of inequalities between individuals: data concerning the proliferation of the Internet among the population, as well as the reduction of certain inequalities, risks masking those inequalities that persist – or increase progressively – in the way that technology is used and the role it plays in expanding personal opportunities.

Getting to the heart of the concept analysis, the first important objection to be raised concerns the binary structure used to complicate the issue of the relationship between individuals and technologies. Whatever the aspect in question, 'it represents its problematic according to a binary logic, dividing things into one of two types, where the one option is nominally defined as the negative or antithesis of the other' (Gunkel, 2003, p. 505). The result is a classification between the 'information haves' and its opposite term the 'information have-nots'. This dichotomous structure automatically sweeps aside any intermediate positions, denying their existence and cognitive importance. Consequently, all individuals fall into one of two categories, in open contrast with the personal experience of each one of us and with the research data collected over the years. Rather than bringing to light and underlining the differences in behaviour of the individuals within the group of those who use the Internet and among those who do not, this classification gives us a black and white picture that lacks the subtle shading of reality. On the other hand, a consideration of the varied modes of access, use and competence that govern the way individuals interact with the Internet calls for a new definition of digital divide as 'a gradation based on different degrees of access to information technology' (Warschauer, 2001, p. 1).

Based on such a reference, van Dijk (2005) for instance develops a spectrum of six positions regarding Internet access (the 'truly un-connected', the 'net evaders', the 'net dropouts', the 'intermittent users', the 'continuous users', and the 'home broadband users'). Bentivegna (2009), on the other hand, develops a well-constructed typology with five positions (the 'unconnecteds', the 'monomorphes', the 'utilitarians', the 'polimorphes', the 'netizers'). The Pew Internet & American Life Project (2009), finally, identifies as many as ten profiles ('digital collaborators', 'ambivalent networkers', 'media movers', 'roving nodes', 'mobile newbies', 'desktop veterans', 'drifting surfers', 'information encumbered', 'tech indifferent', 'off the network'). Even if developed with reference to specific situations, these examples show the complexity of the positions included in the two greater groups of users and non-users. It is also important to stress how they contribute to cleaning up the apodicticity of the binary classification: it is much more frequent and common to pass from one condition to the other than is generally believed. Moreover, the differentiations do not only concern access dimensions but also extend to the digital competences of individuals and how these means are used. Therefore, rather than referring to a binary structure, the relationship between individuals and the Internet refers to a multiple structure that results from the combination of a multiplicity of variables. Metaphorically, this combination has been defined as a 'rainbow' (Clement and Shade, 2000) due to the presence of physical means, software, contents, services, infrastructure and so on.

Moreover, the very concept of digital divide is open to question in that it contains elements that refer to so-called 'technological determinism'. Ignoring the distinctions within the 'soft' or 'hard' approach that can be adopted by technological determinism (Gunkel, 2003), we find the common suggestion that 'access to the technology concerned is able to fix existing social problems, among them problems of social inequality, democracy, freedom, social relationships, and community building' (van Dijk, 2005, p. 5). The main problem is therefore reduced to that of access to digital technologies, marginalizing the importance of other factors that contribute to creating conditions of social inequality. Against this approach, focusing on technologies rather than on social transformations, Warschauer (2003) provides convincing examples of failed experiences aimed at improving the everyday life of citizens through the use of new technologies. From India to Egypt, the negative experiences bring the scholar to the conclusion that 'access to ICT is embedded in a complex array of factors encompassing physical, digital, human, and social resources and relationships' (p. 6). It is thus deceitful, if not counterproductive, to implement plans for technology diffusion without ensuring that individuals use it for activities that are believed to be important in everyday life.

Another criticism of the concept of digital divide refers to its characterization in static rather than dynamic terms. The difficulty of filling a gap in the presence of continuous and new technological updates is also pointed out. In short, those individuals who are already connected are believed to continue enlarging their range of technological opportunities through new applications, skills and uses, thus introducing further differentiations. The reduction of the difference between the 'connected' and the 'unconnected' does not necessarily mean the closure of a gap, with the possibility of even greater distances generated in other areas. With this in mind one can only agree with Compaine (2001) when he states that the digital divide is a 'moving target' that is constantly repositioning itself. With the clear intention of resizing the problem's social relevance, the same author stresses the mobility aspect, recalling that. . .

> in the original iteration of the NTIA surveys. . ., it [digital divide] meant primarily personal computer ownership. More recently it has come to incorporate Internet access. The latest noises is that it further delineates those with high speed (broadband) access from slower dial-up modem access. (p. xiii)

The criticisms and analytical reviews that have accompanied the digital divide in recent years have induced some scholars to make a clear choice for the replacement of the concept. DiMaggio and Hargittai (2001), for instance, have stated very clearly that

the digital divide paradigm served researchers and policy makers during the opening years of Internet diffusion. But the ongoing expansion of Internet access, along with continuing institutional change, require that we move beyond that paradigm if we are to document and explain important dimensions of digital inequality as Internet penetration continues to increase. (DiMaggio and Hargittai, 2001, p. 18)

On the same wavelength we have Warschauer (2003) who, although acknowledging the historical value of the concept of digital divide, prefers to use alternative concepts that are deemed to be more useful for researchers when facing cognitive challenges. These include 'digital inclusion' and 'digital inequalities'. Unlike the digital divide, which is a one-dimensional concept built on access size, the concepts of digital inclusion and digital inequalities are characterized by their multidimensionality, based on more significant factors that combine to condition how individuals interact with the Internet. Along the same lines, Hargittai (2004) affirms that 'it is important to realize that the term digital divide is misleading because it suggests a one-dimensional divide. Rather, divides exist on multiple dimensions – technological access, autonomy, social support, skill, type of uses' (p. 141).

Although it is undeniable that the concept of digital divide played an essential role in describing the initial phase of Internet diffusion and bringing to the fore the need for governmental intervention to guarantee the development of communicative infrastructures, its cognitive function no longer applies. There is now a need to turn to new analytical categories and conceptual constructions. Consequently it is necessary to go beyond the digital divide and address the lack of sociological sophistication (Webster, 1995) that accompanied the term during its early years.

1.2   DIGITAL INEQUALITIES AS A MOVING TARGET

To go beyond the concept of digital divide and, above all, beyond a one-dimensional approach centred on access, it is vital to identify the other areas where the relation between the Internet and the individuals in present-day societies can be explored. This involves both piecing together the picture of how individuals relate to the Internet and identifying the 'moving' aspects of existing inequality. In order to do this, we need to go one step back to take another look at access size. Rather than rehabilitating positions that have already been amply objected to, it is necessary to acknowledge that inequality in access is important, in that it conditions and accentuates all other factors. Acknowledging such relevance

necessarily implies that access size be placed within a wider theoretical context than that used for the classic approach to the expression digital divide (DiMaggio et al., 2004) – a context characterized by a strong concern for the impact of technologies on social inequalities. Written reports indicate that the degree of technology-related inequalities can be found in motivation, access, skill and use (van Dijk, 2005) – or rather in *the accessibility of the offer*, in *informative mobilization* (intended as the ability to use information resources), and in *information awareness* (the ability to use means to obtain resources) (Kim and Kim, 2001).

Apart from the different emphasis given to the motivations that are at the basis of access, it would appear that the two proposals have much in common. In truth, separating motivations from access appears a little forced and is still the result of an interpretation that, despite its intentions, establishes the central importance of the availability of physical means to establish a connection. From a point of view that goes beyond the classic approach of the digital divide, the overlap between the two areas seems clear: people connect when they are motivated to do so. In virtue of this consideration, the concept has been subdivided into three areas: access, skills and use.

With regards to access size, it is worth noting that unlike in the past, when the sole consideration was whether or not there was a connection to the Internet, today there is the question of the quality and autonomy of the connection. In practice, this means that we need to keep paying attention to the data on Internet connection diffusion on both a global and a national level whilst monitoring the achievements of fast connections that allow users to take advantage of all the facilities of an increasingly sophisticated offer requiring ad hoc skills. It is no coincidence that today access is classified as either 'formal' (physically available) and 'effective' (for people with skills that allow them to benefit from technology, Wilson, 2000), or 'technological' (technical means for connection) and 'social' (ability to use them). Whichever pair applies, both distinguish between the physical and technical availability of a connection and the skills required to make the best use of it.

Regarding the physical availability of a connection, it is important to first establish whether broadband is present or absent. A good many studies and research papers have amply documented how broadband provides those who use it with a greater degree of satisfaction, enabling them to take advantage of much of what the Internet has to offer. Empirical data from the US and Europe shows those with broadband as 'strong' users of a wide range of opportunities, often committed to the production of contents and practically always on (Davison and Cotton, 2003; Dutton et al., 2003; Horrigan and Rainie, 2002; Fox, 2005). Unsurprisingly, these