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Un análisis del comportamiento económico de los ciudadanos en los servicios de interés público: Una perspectiva de la Unión Europea

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Tesis doctoral

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Essays on Citizens' Economic Behavior in Services of Public Interest. A European Union Perspective

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A mi querida familia,

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Abstract

This doctoral dissertation sheds light on the citizen experience in services of public interest such as banking and health. We incorporate insights from psychology into economics to explain factors related to the economic decisions of citizens and the influence of their demographics on their decision-making processes. In so doing, we first develop a theoretical framework on citizens' engagement in ICT-enabled co-production. Second, we data from two large databases (Household Finance and Consumption Survey and Health Survey of Northern Ireland) to expand this qualitative research with quantitative approaches. Findings show strong evidence that loss aversion exists in saving behavior as regards changes in individual income. We also find strong support that motivations and demographics influence citizen participation in banking and health systems, and that this evidence is supported at the country and regional level. Finally, findings of this doctoral dissertation show that the role of governments has been crucial to enhance citizen participation in the delivery of public services. Practical application of behavioral economics to questions concerning the citizen decision-making may be considered by policymakers to tackle policy interventions in services of public interest.

CHAPTER 1.1

Introduction

More than a decade after the 2008 financial crisis, also known as the "Great Recession", citizens still struggle to overcome the consequences of the economic crisis and its implications for the social and political sphere. Particularly during this period of major economic and social changes, macroeconomic conditions have failed to meet citizen expectations about their future, giving rise to feeling of relative deprivation and dissatisfaction (Clifton et al., 2017). Consequently, citizens may become more reluctant to engage with public institutions, market and society, even blaming them for their loss of social welfare (Kabir & Shakur, 2014). In this context, citizens may reduce their engagement in certain public services or may be more risk-averse in their financial decisions, resulting in loss of investment and opportunities. In this light, this doctoral dissertation aims to understanding the factors influencing citizen behavior in services of public interest. To do so, this research builds on the field of behavioral economics (BE, henceforth) offering relevant insights into human behavior, but also incorporating ideas from other social disciplines, such as Public Administration, Political Science and Political Economy.

Based on European surveys that include citizen behavior and demographic traits as well as those produced by organizations such as the European Central Bank and the Health and Social Care Department in Northern Ireland, this research seeks to provide a new theoretical and empirical framework that explains citizen decision-making and their engagement in different areas of the public sphere. We also focus on understanding motivational and demographic factors at different levels, by allowing for individuals and government factors. As a result of this research, particular policy recommendations are provided in order to be used in the search for developing effective policy implementations.

The fragility of the banking system after the 2008 financial crisis gave rise to larger losses and closure of many banks in the European Union (EU, henceforth). This situation led to the intervention of both central banks and governments in domestic banking system compromising the financial health of member states that suffered a spiralling of government debt and deficit. Consequently, most EU countries were forced to carry out measures focused on cutting public spending and increasing public sector efficiency to solve the delicate public budget position. The financial crisis generated critical considerations on the functioning of markets, particularly in the financial sphere, raising concerns about protecting the social dimension of public services (Neergaard et al., 2013). Because the provision of public services such as health care, education and safety remains a priority to ensure human welfare and economic growth in the aftermath of the financial crisis (OECD, 2014).

In the financial sector, the 2008 financial crisis demonstrated that the existing financial regulation or self-regulation was inadequate. The general recognition that banks are becoming "too big to fail" (Boyd & Heitz, 2016; Demirgüç-Kunt & Huizinga, 2013) and the threat of a new financial turmoil that can jeopardize the welfare state of EU countries have changed the paradigm as regards the role of banking sector in the economy. One widely accepted conclusion by policymakers and scholars is that the banking sector may require a new legal status in society, facilitating citizens' access and use of financial services (Clifton et al., 2017). In this vein, there is a growing support by part of scholars and politicians to treat banking services as "service of public interest" (European Parliament, 2017; Molyneux, 2017), given that both utilities and banks tend to exhibit similar economic characteristics such as regulatory capture and natural monopolies in sectors such as energy, transportation and telecommunication

(Clifton et al., 2016). For example, Molyneux (2017) argues that post-crisis financial regulation could learn from public utilities' regulation as regards implementation of restrictions to the banking business.

But what do we know about the role of services of public interest in the EU? Although the concept of "public services" might be obvious for us, it has not been similarly interpreted by the 28 EU countries (Marcou, 2016). For example, while in countries such as France, Italy and Spain, citizens had enjoyed rights to public services since the nineteenth century, and the legislation of these countries has traditionally included the recognition of public services, other countries such as Germany, the Netherlands and the UK have avoided the use of public services in their public law (European Commission, 2010). However, the problems derived from this ambiguity, the tensions resulting from privatization programmes from 1993, the increasing integrated economy after the Treaty of Maastricht, the Single Market in 1992 as well as the increasing social request for greater focus on citizens (Clifton et al., 2005), resulted in a change in the conception of public services. The European Commission (EC, henceforth) introduced the concept of Service of General Interest (SGIs, henceforth) in the mid-1990s that was later ratified with the Green paper on SGIs (European Commission, 2003). This concept recognizes specific public service obligations for the public authorities in terms of universality and accessibility to public service in EU countries (Van de Walle, 2008). These SGIs can be therefore separated into three groups: first, services of general economic interest (SGEIs) including those services with an economic relationship with the market (European Commission, 2003). Second, those services that are non-economic such as education, health care, safety and other social services (European Commission, 2012). Third, social services of general interest (SSGIs) that, although it was originally launced in 2001, has been recently reinforced as

the result of the financial crisis (Neergaard et al., 2013). This includes those non-profit services such as social housing, child care and social assistance services that require the participation of voluntary workers to operate on the basis of the solidarity principle (European Commission, 2011; Polacek et al., 2011). More recently, in a communication from the EC to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions, a call to strengthen the role of SGIs among EU countries has been made. For example, ensuring access for all citizens to essential services such as basic banking, postal service and telecomunication is seen as a priority (European Commission, 2011).

1.1.1. Citizen engagement in services of public interest

From a citizen perspective, taking in view the banking system or other services of public interest in which citizens are engaged, policymakers such as those overseeing utility services, tend to a rational expectations' behavior. However, more recently, as the view of difficulties experienced by citizens as regards understanding the terms and conditions of certain services such as bank accounts and open government data (Cambra-Fierro et al., 2017; Khayyat & Bannister, 2017), policymakers have adopted BE approaches to understand situations and circumstances in which citizens' decisions might prevent them to maximize their utility.

The field of BE consists of incorporating insights from psychology into economics to explain factors related to the economic decisions of citizens and the influence of their demographic background on this decision-making process (Thaler, 2016; Sunstein, 2018). BE emerged in the late 1970s in opposition to neoclassical models that tended to assume that humans are strictly rational when deciding about

economic choices and they always seek to maximize their individual well-being. BE contributions increased considerably as more and more economists came to recognize that BE insights are more realistic than those from the neoclassical approach (Tomer, 2017). For example, the publication in 1979 of the 'Prospect Theory' (Kahneman & Tversky, 1979) marked a turning point presenting the most accurate description based on cognitive psychology to explain individuals' economic decisions. Since then, BE has gained considerable attention as a result of recent academic recognition with the award of the Nobel Prize in Economics to Daniel Kahneman in 2002, Robert Shiller in 2013 and Richard Thaler in 2017 (The Royal Swedish Academy of Sciences, 2017).

The public administration discipline (Denhardt & Denhardt, 2009; Peters & Pierre, 2012) that focuses on the implementation of government policies in public services has recently incorporated insights from BE to better understand individual behavior in public sector (Clifton et al., 2012; Jilke & Van de Walle, 2013). Eminent public administration scholars such as Herbert Simon and Dwight Waldo have repeatedly stressed the importance of psychological insights for the study of public administration. The emergence of the "behavioral public administration" (Grimmelikhuijsen et al., 2016) as a recent sub-field within public administration has strengthened the connection between public administration and psychology, with a particular focus on citizen behavior. For example, in the United Kingdom a Behavioral Insights Team was created by the Cabinet office with the purpose of applying BE principles to public policy (Thorgeirsson & Kawachi, 2013).

Policymakers have recently expressed concerns about a decrease in the participation of citizens in public services, especially in developed countries

(OECD, 2017c). Insights from BE and the evidence-based approach it exemplifies, are particularly helpful to understand why citizens fail to engage in public services and thereby help governments develop effective policy implementations. In particular, for research questions at the participation level, psychological theories about collaboration and competition may help better understand how and why citizens engage actively in the public service delivery.

Increasing attention has been recently paid to the concept of "co-production" that consists of the idea that the provision of public services may be based on the joint result of activities performed both citizens and the government (Osborne & Strokosch, 2013; Ostrom et al., 1978; Parks et al., 1981). A major research question here concerns the effect of citizen behavior on co-production in different public sectors. To do so, BE scholars have used several methodologies to reflect citizens' behavior. A first way of gathering information from citizens' responses is through the use of surveys including questions on specific citizen attitudes and demographic traits. For example, scholars have demonstrated the influence of motivational factors such as locus of control, self-efficacy (Fledderus & Honingh, 2016) and demographic characteristics such as age, education and gender in different public sectors using surveys as methodology (Alonso et al., forthcoming; Parrado et al., 2013).

The development of a digital public sector, in which citizens can access public services through their smartphones and tablets, encourages new form of collaborations between government and citizens. The deployment of information and communication technologies (ICTs, henceforth) in public services raises a powerful means of boosting the opportunities to co-produce public services. However, understanding the factors which influence citizen engagement in these

digital initiatives is required to avoid scenarios in which certain groups of citizens could find difficulties to participate. For example, Criado & Villodre (2018) pointed out that, just as ICTs created a 'digital divide' as regards telecommunications, ICT-enabled co-production may do a similar thing. In fact, despite citizens' willingness to participate in co-production, the lack of technical aspects and skills as regards ICTs may lead to citizens to diminish their participation in public services (Van der Graaf & Veeckman, 2014).

At the time of writing this doctoral dissertation, important advances have been made to better understand citizens engagement in ICT-enabled co-production in public services. The author and advisors of this doctoral dissertation are contributing as research partners in a H2020 project entitled "Empowering citizens to transform public administration" (CITADEL, henceforth). This 3-year project, that is currently in progress until the end of 2019 and composed by experts from four EU countries, has significantly advanced in the development of a citizen-centered ecosystem in which ICTs play a fundamental role in transforming public administration.

The central objective of CITADEL is to explore, monitor and analyze the drivers, enablers, impact, risks and barriers of open, innovative and collaborative government across a diverse terrain of public administrations using an open and scalable platform based on innovative ICTs to transform public services across Europe. The project is divided into individual work packages (WP) that have involved partners from Belgium, Latvia, Italy and Spain working in different engineering and social science activities. The CITADEL project constitutes an ambitious European project understand the logic of citizen participation in public services through the use of ICTs. The present doctoral dissertation has been

developed in parallel to the CITADEL work packages 2, 3 and 7 (https://www.citadel-h2020.eu/content/home).

1.1.2. Research questions and contributions of the doctoral dissertation

In this doctoral dissertation, we have tried to address the following research questions. As regards the second chapter, are citizens as rational and selfish as the neoclassical approaches suggest? And if they are not, what does this mean for the banking system and its regulators in the real world? In the third chapter the main research question was: what do we actually know about the ways in which ICTs enabler or pose barriers to ICT-enabled production? Finally, in the fourth chapter, the research question was: what do we know about the citizens' motivational and demographic affecting ICT-enabled co-production in health services? Using these questions as a starting point, the objective of this research is to offer relevant insights into human behavior that allow to expand our understanding about the decision-making and citizen participation in services of public interest.

Other sub-goals of this doctoral dissertation consist of:

- Developing a theoretical framework or state of art about citizens' participation in service of public interest by exploring research available in major databases such as Scopus and Web of Science.

- Expanding qualitative research on economic and social changes produced in the financial sector since the financial crisis and how they affected regulation in this strategic market.

- Analyzing patterns of citizen behavior at the micro-level and their consequences at the macro-level by distinguishing between different regions and countries.

- Collecting innovative data from large surveys on financial decisions and health services in the EU.

1.1.3. Outline of the dissertation

In this dissertation we develop 3 scientific essays to evaluate the role of citizens in services of public interest in the EU. Although the BE approach is common to chapters 2, 3 and 4, chapter 2 is more focused on the financial sector that is not a public service in the strict sense. However, as mentioned above, it is considered a service of public interest by financial scholars and it also constitutes an essential service for citizens according to the EU.

Chapter 2 provides mounting evidence that individuals do not always behave as strictly "rational" customers of the banking sector as Neoclassical models of Economics would assume. Instead, scholars and policymakers are increasingly arguing that BE offers a more useful and realistic means of understanding customer behavior in the real economy. Drawing on data from the first ECB's harmonized household survey at the European level, this chapter develops a multi-level model to investigate how individuals actually save. This chapter finds evidence that loss aversion bias exists in saving behavior as regards an individuals' current level of income, and that evidence of this effect is also supported at the country level. This chapter finds strong evidence that demographic factors and cross-country differences influence individuals' saving behavior. This chapter

argues that BE approaches can – and should – be used to understand saving behavior of individuals, and that this insight should be used towards the ongoing quest to improve future banking practice and financial reform, particularly in the aftermath of the 2008 financial crisis.

Chapter 3 reports a state of art about the impact of ICTs on public services co-production by identifying barriers and enablers. Governments and international organizations recognize ICTs as a new solution to augment co-production of public services and a number of major initiatives are being rolled out around the world. In parallel to these activities, a body of scholarly work is emerging that investigates the extent to which ICTs enable, or, pose a barrier, to public service co-production. This chapter performs the first systematic review of this emerging literature and provides insights into the main structural and cultural factors acting as an enabler of, or barrier, to ICT-enabled co-production across government and citizens world-wide.

Chapter 4 presents empirical evidence to explain differences between traditional and ICT-enabled healthcare co-production across the five Health and Social Care Trusts in Northern Ireland (UK). Drawing on a health survey, this paper seeks to capture the effect of individual level factors as well as regional ones. Our estimations indicate that citizens with high levels of self-efficacy, external efficacy, and low perception of their own health are more likely to engage in both traditional and ICT-enabled healthcare co-production. However, citizens with high locus of control and low self-esteem tend to co-produce more using ICTs. We also provide support that demographic traits and regional factors explain differences in healthcare co-production across the country. We argue that policy

measures aimed at designing effective ICT solutions may be advisable to encourage certain citizen groups to co-produce healthcare services.

This doctoral dissertation concludes with chapter 5 which includes a discussion on the policy implications of our findings both in English and Spanish. The three chapters that build the core of this doctoral dissertation have been presented at national and international conferences and they are already accepted or under review in leading SSCI listed International peer-reviewed journals.

Table 1.1 Overview of the doctoral dissertation

Chapter title	Publication status
Introduction. A perspective into citizens' behavior in public services	-
A behavioral perspective on saving behavior. Empirical evidence for policymakers	Under review in Global Policy
ICT-enabled co-production of public services. A systematic review on barriers and enablers	Accepted in Information Polity
Citizens' engagement in ICT-enabled co-production in health services. Evidence from Northern Ireland	Under review in a top international public administration journal
Conclusions	-

CHAPTER 1.2

Introducción

Once años después de la crisis financiera de 2008, también denominada "Gran Recesión", ciudadanos de todo el mundo aún afrontan sus graves consecuencias. Durante este periodo de cambios bruscos tanto a nivel económico y social, las condiciones macroeconómicas en gran parte de los países occidentales no han contribuido demasiado a mejorar las expectativas de los ciudadanos con respecto a sus propias carencias e insatisfacciones (Judith Clifton, Fernández-Gutiérrez, & García-Olalla, 2017). Como resultado, una parte de la población ha manifestado sus reticencias y escepticismo con las instituciones públicas, los mercados financieros y la propia sociedad en su conjunto (Kabir & Shakur, 2014). En este contexto de descontento generalizado, muchos ciudadanos han sido reacios a participar en ciertos servicios de interés público, produciendo cierto grado de exclusión social entre diversos grupos sociales. Esta tesis doctoral tiene como objetivo mejorar el entendimiento de los factores que influyen en las decisiones y la participación de los ciudadanos en los servicios de interés público. Para lograr este objetivo, la presente investigación se centra en la economía del comportamiento (EC, de aquí en adelante), que ofrece claves relevantes sobre el comportamiento humano.

Este trabajo de investigación utiliza encuestas europeas procedentes de instituciones, como el Banco Central Europeo (BCE, de aquí en adelante) y el departamento de Salud y Asistencia Social de Irlanda del Norte, que incluyen información relevante sobre las decisiones económicas de los ciudadanos y sus características sociodemográficas. Esta investigación busca proporcionar un marco teórico y empírico que explique las decisiones de los ciudadanos y su participación en ciertas áreas de la esfera pública. Como resultado de esta investigación, se profundiza en recomendaciones de política económica que puedan ser relevantes para mejorar la provisión de ciertos servicios de interés público.

La fragilidad del sistema bancario de la Unión Europea (EU, de aquí en adelante) tras la crisis financiera de 2008 produjo un deterioro de los balances de muchas instituciones financieras que han acabado quebrando. Esta situación llevó a la intervención del sistema financiero por parte del Banco Central Europeo (BCE), de diversos países miembros, entre los cuales está España. Como consecuencia de estas actuaciones de política económica, en las que se produjo un incremento considerable de la deuda pública, muchos gobiernos fueron obligados a realizar fuertes ajustes en sus presupuestos para resolver la delicada situación financiera. La crisis financiera, por tanto, generó una espiral de críticas hacia el funcionamiento del sector financiero, que incrementó las preocupaciones sobre la sostenibilidad del 'Estado del Bienestar' (Neergaard et al., 2013). Servicios públicos tales como el de salud, educación, seguridad pública siguen siendo una prioridad por parte de muchos gobiernos para garantizar el bienestar social y económico tras la crisis (OECD, 2014).

En el sector financiero, por ejemplo, la crisis financiera de 2008 demostró que la regulación financiera llevada a cabo hasta entonces fue inadecuada. El reconocimiento general de que los bancos son demasiado grandes para caer (Boyd & Heitz, 2016; Demirgüç-Kunt & Huizinga, 2013) y la amenaza de una nueva crisis financiera que pueda amenazar definitivamente el estado del bienestar de los países miembros de la UE hicieron reflexionar sobre el papel del sistema financiero en la economía. Una conclusión de consenso por parte de muchos reguladores y académicos es que el sistema financiero requiere un nuevo estatus legal en la sociedad, que facilite el acceso y uso de los servicios financieros a todos los ciudadanos (Clifton et al., 2017). En este sentido, hay un creciente respaldo por parte de académicos y políticos de cara a considerar los servicios financieros de "interés público" (European Parliament, 2017; Molyneux, 2017), dado que los

bancos poseen unas características económicas comunes a otros servicios de interés público (public utilities) en sectores tales como la energía, el transporte y las telecomunicaciones (Clifton et al., 2016). Por ejemplo, Molyneux (2017) muestra que la regulación financiera tras la crisis tiene mucho que ver con la normativa sobre servicios de interés público, en relación a la restricción de las prácticas bancarias y el impulso al control de capitales y liquidez.

¿Pero que sabemos sobre el papel de los servicios de interés público en la UE? Aunque el concepto de servicio público podría parecer obvio, este no ha sido igualmente interpretado por los 28 países que actualmente son miembros de la UE (Marcou, 2016). Por ejemplo, mientras en algunos países como Francia, Italia y España, los ciudadanos han disfrutado de los derechos asociados a los servicios públicos desde el siglo XIX, y ha habido un reconocimiento de estos servicios en sus respectivas legislaciones, en otros países esta situación cambia. Por ejemplo, en otro países, como por ejemplo Alemania, Países Bajos y Reino Unido se ha evitado la denominación de servicios públicos en sus respectivas legislaciones (European Commission, 2010). No obstante, los problemas derivados de esta ambigüedad, las tensiones producidas tras los programas de privatización desde 1993, la mayor integración económica tras el tratado de Maastricht, el inicio del mercado único en 1992 y las presiones sociales por una mayor preocupación por los ciudadanos (Clifton et al., 2005), produjo un cambio en la percepción de los servicios públicos en la UE. La Comisión Europea (CE, de aquí en adelante) puso en marcha el concepto de Servicios de Interés General (SIG, de aquí en adelante) a mediados de los 90'. Este concepto reconoce obligaciones por parte de las autoridades políticas para con los servicios públicos en términos de universalidad y accesibilidad (Van de Walle, 2008). Estos SIG pueden ser divididos en tres grupos. En primer lugar, los servicios de interés económico general (SIEG) que

incluyen aquellos servicios con una relación económica con el mercado (European Commission, 2003). En segundo lugar, aquellos servicios que no tienen una función estrictamente económica como la educación, la salud, la seguridad y otros servicios sociales (European Commission, 2012). En tercer lugar, los servicios sociales de interés general (SSIG) que, aunque lanzados originariamente en 2001, fueron promovidos fundamentalmente tras la crisis financiera (Neergaard et al., 2013). Estos incluyen servicios sin ánimo de lucro tales como asistentes de hogar, cuidado infantil y asistentes sociales que requieren la participación de voluntarios que operen bajo el principio de solidaridad de la UE (European Commission, 2011; Polacek et al., 2011). Más recientemente, en un comunicado de la CE al Parlamento Europeo, al Consejo, al Comité Económico y Social y al Comité de las Naciones, se insiste en la necesidad de fortalecer el papel de los SIG en los países miembros de la UE. Por ejemplo, garantizando el acceso de todos los ciudadanos a servicios esenciales tales como la banca, los servicios postales y las telecomunicaciones (European Commission, 2011).

1.2.1. La participación de los ciudadanos en los servicios de interés público

Desde una perspectiva ciudadana, los reguladores de los servicios financieros y otros servicios de interés público tradicionalmente han aplicado recetas económicas basadas en modelos neoclásicos. Sin embargo, más recientemente, como consecuencia de los problemas que algunos ciudadanos han experimentado para, por ejemplo, entender las condiciones de ciertos servicios, abrirse una cuenta y acceder a datos de plataformas gubernamentales (Cambra-Fierro et al., 2017; Khayyat & Bannister, 2017), los reguladores han adoptado aproximaciones basadas en la EC para entender mejor las decisiones de los agentes.

El campo de la EC recopila conceptos procedentes de la psicología para explicar fenómenos económicos relativos a las decisiones de los individuos y la influencia de los factores sociodemográficos en tales decisiones (Thaler, 2016; Sunstein, 2018). La EC nace a finales de la década de 1970 en oposición a los modelos clásicos existentes en ese momento que tendían a asumir que los individuos son estrictamente racionales cuando deciden sobre sus ahorros o inversiones, y que, por lo tanto, son propensos a maximizar su bienestar. A pesar de los escasos apoyos recibidos al principio, cada vez más economistas empezaron a reconocer la EC como una disciplina que aportaba una visión mas realista de la economía (Tomer, 2017). Por ejemplo, la publicación en 1979 de la "Teoría de las Perspectiva" (Prospect Theory) por parte de Daniel Kahneman and Amos Tversky (Kahneman & Tversky, 1979) supuso un punto de inflexión. Desde ese momento, la EC ha obtenido una considerable atención como resultado del reconocimiento académico de sus recientes contribuciones científicas. Algunos de sus referentes lograron el Premio Nobel, como por ejemplo Daniel Kahneman en 2002, Robert Shiller en 2012 y Richard Thaler en 2017 (The Royal Swedish Academy of Sciences, 2017).

La disciplina de la administración pública (Denhardt & Denhardt, 2009; Peters & Pierre, 2012), que se centra en la implementación de políticas de gobierno en los servicios públicos, ha incorporado recientemente ideas de la EC para entender mejor el comportamiento de los ciudadanos en el sector público (Clifton et al., 2012; Jilke & Van de Walle, 2013). De hecho, figuras destacadas de la disciplina de la administración pública tales como Herber Simon y Dwight Waldo han remarcado la importancia de considerar ideas procedentes de la psicología para el estudio de la administración pública. El surgimiento reciente de otra disciplina denominada "Economía del Comportamiento de la Administración Pública"

(Behavioral Public Administration) ha fortalecido los lazos entre la psicología y la administración pública, con un énfasis especial en la figura de los ciudadanos. Por ejemplo, la oficina del Gabinete del Gobierno Británico puso en marcha recentemente un centro de investigación sobre EC (Behavioral Insights Team) con el objetivo de aplicar conceptos procedentes de la EC a las políticas públicas (Thorgeirsson & Kawachi, 2013).

En los últimos años, los reguladores han expresado su preocupación creciente sobre la caída de la participacion ciudadana en los servicios públicos, especialmente en los países desarrollados (OECD, 2017c). La EC y la evidencia empírica basada en sus ideas son fundamentales para entender por qué algunos individuos son incapaces de tomar parte en determinados servicios públicos y de esta manera ayudar a los gobiernos a desarrollar políticas públicas eficaces. En particular, las teorías de la EC podrían contribuir a mejorar el entendimiento de por qué algunos ciudadanos participan más activamente que otros en la provisión de servicios públicos. En este sentido, el concepto de co-producción de servicios públicos ha ganado popularidad en los últimos años. Este concepto se caracteriza por la idea de que la provisión de servicios públicos se basa en los colaboración conjunta del gobierno y los ciudadanos (Osborne & Strokosch, 2013; Ostrom et al., 1978; Parks et al., 1981). Una pregunta de investigación que emerge aquí tiene que ver con el impacto de la EC en la co-producción de servicios públicos. Una primera forma de medir este impacto es a través del uso de encuestas que incluyan información específica sobre motivaciones y factores sociodemográficos. Por ejemplo, varios investigadores han demostrado la incidencia de factores sociodemográficos en la co-producción de servicios públicos (Alonso et al., forthcoming; Parrado et al., 2013).

La digitalización del sector público, en la que los ciudadanos toman parte de multitud de servicios públicos directamente a través de sus smartphones o tabletas, permite nuevas formas de colaboración con el gobierno. La adopción de las tecnologías de la información y la comunicación (TIC, de aquí en adelante) en los servicios públicos es un medio fundamental para impulsar las oportunidades de co-producción. Sin embargo, un mejor entendimiento de los factores que hacen posible la participación ciudadana en iniciativas digitales es fundamental para evitar escenarios en los que determinados grupos sociales queden excluidos o tengan dificultades para participar. Por ejemplo, Criado & Villodre (2018) muestran que dado que las TIC crearon una "brecha digital" en el campo de las telecomunicaciones, los procesos de coproducción que usan TIC (ICT-enabled co-production) podrían producir un efecto similar. De hecho, a pesar de la voluntad de ciertos grupos sociales a co-producir, si existe una carencia de conocimientos tecnológicos por parte de estos, esto podría reducir sus oportunidades de participación (Van der Graaf & Veeckman, 2014).

Al mismo tiempo que se escriben estas líneas, importantes avances se están realizando a nivel europeo para entender la participación ciudadana en la co-producción de servicios públicos mediante las TIC. El autor y los directores de la presente tesis doctoral participan activamente en un proyecto de investigación europeo títulado H2020 CITADEL: Empowering Citizens to Transform Public Administration (CITADEL, de aquí en adelante). Este proyecto, de tres años de duración, está enfocado en el desarrollo de soluciones TIC en las que los ciudadanos son el eje central para transformar y mejorar la administración pública en un ámbito europeo. Este proyecto está actualmente en progreso y tiene previsto finalizar en septiembre 2019.

El objetivo central de CITADEL consiste en explorar, monitorizar y analizar los principales facilitadores, barreras, impactos y riesgos que afectan a las administraciones públicas que utilizan soluciones tecnológicas innovadoras, abiertas y escalables para transformar los servicios públicos en la UE. El proyecto está por tanto dividido en paquetes de trabajo (Work packages) en los que participan diferentes socios del consorcio procedentes de Bélgica, Letonia, Italia y España. CITADEL constitute el proyecto más ambicioso para entender la lógica de la participación ciudadana en la digitalización de los servicios públicos. La presente tesis doctoral se desarrolla en paralelo a los trabajos realizados en este proyecto, en concreto en los paquetes 2, 3 y 7. (https://www.citadel-h2020.eu/content/home).

1.2.2. Preguntas de investigación y principales contribuciones de la tesis doctoral

En esta tesis doctoral se han desarrollado las siguientes preguntas de investigación. Con respecto al segundo capítulo, ¿Son los ciudadanos tan racionales y egoístas como los modelos neoclásicos sugieren? Y si no, ¿Qué implicaciones tiene estos comportamientos para el sistema financiero y sus reguladores? En el tercer capítulo la principal pregunta de investigación fue la siguiente: ¿Qué sabemos actualmente sobre los facilitadores y barreras a la co-producción con ICT? Por último, en el cuarto capítulo, la pregunta fue: ¿Cómo afectan las motivaciones y factores sociodemográficos de los ciudadanos a su participación en la co-producción de salud mediante ICT? Partiendo de estas preguntas, el objetivo de esta investigación consiste en ofrecer una perspectiva relevante dentro de la EC, que permita mejorar la comprensión de las decisiones y participación ciudadana en los servicios de interés público.

Otros objetivos de la tesis doctoral son los siguientes:

- Desarrollar un marco teórico sobre participación ciudadana en servicios públicos explorando estudios científicos publicados en revistas de impacto en bases de datos como Scopus y Web of Science.

- Expandir la investigación cualitativa sobre los cambios económicos y sociales producidos en el sector financiero desde la crisis y como han afectado la regulación de este sector.

- Analizar los patrones de comportamiento de los ciudadanos a nivel microeconómico y sus consecuencias macroeconómicas, diferenciando entre regiones y países.

- Recopilar información innovadora de grandes encuestas sobre decisiones financieras y de salud en la UE.

1.2.3. Esquema de la tesis doctoral

En esta tesis doctoral, se desarrollan una serie de estudios de investigación para evaluar el papel de los ciudadanos en los servicios de interés público en la UE. Aunque el enfoque de la EC es común en los tres capítulos, el capítulo 2 está enfocado en el sector financiero, que no es un servicio público per se. Sin embargo, como hemos comentado anteriormente, este sector es considerado de interés público por parte de investigadores en el área de las finanzas y constitute un servicio esencial para los ciudadanos de acuerdo con la UE.

El capítulo 2 proporciona evidencia creciente de que los individuos no siempre se comportan como los modelos neoclásicos tienden a asumir. En su lugar, cada vez más investigadores y reguladores de todo el mundo opinan que la EC ofrece un enfoque más realista del comportamiento de los individuos en la economía real. Utilizando datos de la primera encuesta armonizada del BCE, este capítulo desarrolla un modelo múltinivel para investigar como los individuos realmente ahorran. Este capítulo muestra evidencia de la existencia de aversión a las pérdidas en los ahorros en relación a la renta actual. Además de esto, este estudio muestra evidencia de que los factores sociodemográficos y regionales también afectan el comportamiento del ahorro de los individuos. Este capítulo destaca que el enfoque de la EC puede y debe ser usado para entender las decisiones financieras de los individuos de cara a mejorar las políticas financieras, especialmente tras la crisis de 2008.

El capítulo 3 lleva a cabo un estado del arte sobre el impacto de las TIC en la co-producción de servicios públicos. Los gobiernos y otras instituciones internacionales reconocen que las TIC pueden ser una solución para aumentar la co-producción de servicios públicos y un elevado número de iniciativas ya han sido puestas en marcha a nivel mundial. En paralelo a estas actividades, existe una literatura creciente que investiga los factores que facilitan y/or obstaculizan la co-producción de servicios públicos. Este capítulo, por tanto, lleva a cabo la primera revisión sistemática de esta literatura y proporciona ideas relevantes sobre los principales factores estructurales y culturales que actuan con facilitadores y barreras a la co-producción de servicios públicos a través de las ICT.

El capítulo 4 plantea un modelo multinivel para explicar la participación de los ciudadanos en la co-producción de salud mediante ICT. Utilizando datos de una encuesta de salud de Irlanda del Norte, este capítulo profundiza en los factores motivacionales y sociodemográficos que explican esta participación. Los resultados muestran evidencia de que los ciudadanos que poseen mayores niveles de locus de control, autoeficacia y satisfacción con el gobierno (eficacia externa) son más proclives a participar en la co-producción de salud con ICT. Por el contrario, aquellos individuos con una autoestima más alta, así como una mejor percepción de su propia salud tienden a co-producir menos a través de las TIC. Este estudio también muestra una clara evidencia de que los factores sociodemográficos y regionales influyen en la co-producción de salud utilizando TIC. Como consecuencia de estos resultados, los reguladores deberían enfocar sus políticas públicas en mejorar el diseño efectivo de tecnologías que fomenten la participación de determinados grupos de ciudadanos en la provisión de servicios públicos.

Esta tesis doctoral concluye con el capítulo 5, que incluye una discusión en inglés y castellano de los resultados. Los tres capítulos principales de esta tesis doctoral (2, 3 y 4) han sido presentados en conferencias nacionales e internacionales, actualmente están aceptados o bajo revisión en revistas científicas internacionales de revisión por pares.

Table 1.2 Descripción de la tesis doctoral

Título del capítulo	**Estado de publicación**
Introduction. A perspective into citizens' behavior in public services	-
A behavioral perspective on saving behavior. Empirical evidence for policymakers	En revisión en Global Policy
ICT-enabled co-production of public services. A systematic review on barriers and enablers	Aceptado en Information Polity
Citizens' engagement in ICT-enabled co-production in health services. Evidence from Northern Ireland	En revisión en una revista científica internacional de administración pública
Conclusions	-

CHAPTER 2

Behavioral perspective on saving behavior. Empirical evidence for policymakers

This chapter also appeared as Clifton, Díaz-Fuentes & Llamosas García (Forthcoming)

2.1. Introduction

The financial world – banks, institutions and the policy that regulates them - tends to assume that individuals who use their services (customers) are self-interested, rational individuals, who seek to maximize their utility and make financial choices based on complete information in an unbiased way (Baddeley, 2018; Mathis & Steffen, 2015; OECD, 2017). Banks, by assuming client rationality, are adopting a neoclassical vision of the world, where groups of rational individuals, who learn efficiently, drive the financial markets towards an expected rational choice equilibrium (Altman, 2016).

However, evidence is mounting that individuals are not as rational and selfish as the neoclassical approach suggests. One of the main challenges to this neoclassical perspective is BE. BE incorporates cultural, ethical and psychological insights to explain irrationality in human decision-making (Chibba, 2012). BE emerged in the late 1970s (Kahneman & Tversky, 1979) and its academic contributions have been formally recognized with the award of the Nobel Prize in Economics to Daniel Kahneman in 2002, Robert Shiller in 2013, and Richard Thaler in 2017 (The Royal Swedish Academy of Sciences, 2017). BE is increasingly being used across many fields to better understand human behavior, and is in particular being increasingly used as a starting point to reconsider banking practice and financial regulation, where it is found to provide a more nuanced, and realistic, approach to the neoclassical position (Clifton et al., 2014; Sunstein, 2018). Importantly, insights from BE can help shed new light on how individuals actually save in the real world. Saving is defined as increases in the stock of net assets (Kennickell, 1995) or, simply, as the residual between income and current consumption (Browning & Lusardi, 1996; Jayathirtha & Fox, 1996). One

important implication of BE models is that some elements of individuals' behavior might differ from an optimal saving pattern, because of a range of BE biases, such as "loss aversion" (Altman, 2016). Loss aversion refers to a specific bias, that captures gain-loss asymmetries related to a reference point (Kahneman & Tversky, 1979; Daniel Kahneman & Tversky, 1992). This means that the negative experience of losses has more impact on individual decisions than the positive effects of potential gains (World Bank, 2015). In saving, loss aversion explains the asymmetry by which individual saving reacts more to declines in their current level of income than to increases (Bowman, Minehart, & Rabin, 1999; Shea, 1995). In practice, this may lead bank customers to shun interesting saving opportunities that they think might expose them to a loss.

Saving behavior may be determined by factors at different levels, ranging from the individual to the country level (Bowman et al., 1999; Irandoust, 2017). An analysis carried out exclusively at the individual level may miss specific group-level effects that may be important (Novak & Pahor, 2017; Russo, 2008). The advantage of a multi-level modeling approach is that it allows for understanding how individuals save in different country contexts. These models can estimate individual and country level factors, as well as the possible interaction between the two levels (Hamilton, 2013; Novak & Pahor, 2017). A multi-level approach can help explain why the fact that residing in a particular country can lead to different BE biases in saving behavior (Bowman et al. 1999; Campbell & Mankiw, 1991; Shea, 1995).

The need to rethink how financial market works – or fail to work – for individuals in the real world was compounded by the 2008 global financial crisis. Barberis (2011) argues that BE biases, such as loss aversion, might have exacerbated the

collapse of assets' prices according to the massive reduction in risky asset participation. Clifton et al., 2017 and Fernández-Olit et al. (2018) suggest that some group of individuals, such as the less-educated and women, may not only be more vulnerable to BE biases, but may also be more likely to suffer the consequences of the financial crisis. Moreover, scholars have shown the country differences help explain how the costs of the financial crisis have been very unequally distributed not only between group of individuals but also between European Union's countries (Frieden & Walter, 2017).

The global financial crisis has demonstrated that the pre-crisis financial regulation was woefully insufficient (Stiglitz, 2019). Molyneux (2017) argues that banks exhibit many characteristics of a public utility and should be regulated as such. An important way forward when trying to improve the quality of financial regulation is through using insights provided by BE. Indeed, BE insights have started to shape an emerging theoretical and empirical paradigm to understand circumstances in which individuals' behavior might prevent them from maximising their own welfare (Clifton et al., 2017; Gerhard et al., 2018; Sunstein, 2018; Thaler & Benartzi, 2004). The provision of an appropiate institutional setting, such as access to well-functioning financial markets, may not be sufficient to improve individuals' decisions (World Bank, 2015). Therefore, more proactive policies focused on addressing BE biases in financial decisions such as loss aversion may be useful.

Since saving behavior may be influenced by factors at both the individual and country levels, this chapter develops a multi-level analysis, incorporating both levels. It has two main research questions. Firstly, is loss aversion present in saving behavior? We can assess this by examining whether there is evidence of

an asymmetry in which expected individuals' saving decisions react more to declines in their current level of income than to increases. Secondly, do individuals' demographic factors, including age, gender, education, marital status, labor status, homeownership and household size, influence saving decisions? This study uses data from the first European Central Banks' harmonized household survey carried out in the aftermath of the financial crisis and includes 20 European Union (EU, henceforth) countries. This survey is based on an extensive database that provides individual information on financial behavior.

We find evidence of an asymmetry in the response of saving to changes in the current level of income at individual level. Evidence of this asymmetrical behavior in saving is also supported at country level: loss aversion appears to be smaller for those EU countries which especially suffered the consequences of the financial crisis such as Cyprus and Greece. As regards the influence of individual level factors on saving behavior, we find that the more-educated, married and homeowners are more likely to save more. On the contrary, women, unemployed and individuals living in large households tend to save less. From a country-level perspective, we find that EU countries associated with a smaller loss aversion effect are associated with negative saving rates.

The chapter proceeds as follows. In section 2, we briefly discuss the theoretical underpinnings of the empirical evidence on loss aversion in saving behavior. In section 3, we explain saving behavior by introducing individual demographic and country-level factors. Our data, variable specification and analytical method are outlined in section 4. The estimation results are presented in section 5. Conclusions and policy implications follow section 6.

2.2. Loss aversion in saving behavior

The existence of BE biases that shape the ways by which individuals make decisions may have important consequences for financial markets. Based on Prospect Theory - a cognitive theory from Psychology that describes the way individuals choose between probabilistic alternatives that involve risk (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992) - loss aversion is one of the most important BE biases detected in the BE literature. Loss aversion refers to a particular asymmetric tendency whereby losses have a more important impact on individual decisions than gains. Loss aversion explains why losing an object make someone more intensively miserable that the happiness associated with gaining the same thing (Thaler & Sunstein, 2008). Loss aversion may be important for explaining a large set of phenomena that occur in financial markets. For example, the importance of avoiding losses can be observed when individuals invest too little in risky assets in comparison with the traditional view on risk and return (Guiso & Sodini, 2013).

Numerous studies have presented empirical evidence to support the hypothesis of loss aversion at individual level, including Benartzi & Thaler, (1995), Camerer et al. (1997), Genesove & Mayer (2001) and Steegmans & Hassink (2018). These studies tend to examine loss aversion as regards to a "reference point" that is related to a status quo position (Gal & Rucker, 2018). For example, an individual who obtained \$5 might view the \$5 as a gain, whereas another individual that expected to obtain \$10, but only obtained \$5, might view the \$5 obtained as a loss of \$5 relative to his/her expectations (Kahneman & Tversky, 1979). A significant body of research has provided empirical insights into the relationship between loss aversion and saving behavior. Loss aversion can create an asymmetry

in the response of individuals' saving to changes in their future or current level of income. For example, Bowman et al. (1999) find that individuals tend to behave asymmetrically in their saving decisions in anticipation of future changes in income. In a similar vein, Fisher & Montalto (2011) find evidence of asymmetric saving behavior in the United States when individuals respond to changes in their current levels of income.

Hypothesis 1: Individuals' saving decisions react more to declines in their current level of income than to increases as regards their reference point.

Other scholars have investigated whether loss aversion exists in saving behavior in different countries. Bowman et al. (1999) find that loss aversion is present in all the countries in their sample, although this effect appears to be smaller in the United Kingdom (UK). However, other studies, such as Irandoust (2017), find evidence of an asymmetric behavior in individual saving that varies across Latin American countries. Wang et al., (2017) explain this, showing how cultural, institutional and regulatory factors may explain differences in loss aversion between countries.

Hypothesis 2: Loss aversion, or an asymmetric behavior in saving decisions, tends to vary across EU countries.

2.3. The multi-level perspective of saving behavior: demographic factors and cross-country effects.

Saving behavior is determined by factors at different levels, extending from the individual to the country level (Muradoglu & Taskin, 1996; Ogaki et al., 1996).

As regards individual factors, scholars have argued that the ability of individuals to save may be influenced by a number of demographic factors such as age, gender, education, marital status, labor status, homeownership and household size (Abrahamse & Steg, 2009; Browning & Lusardi, 1996; Gerhard et al., 2018). In particular, empirical evidence shows that individuals' saving tends to increase with age and peaks around the age of sixty (Attanasio, 1998), when individuals are close to retirement (Knoef et al., 2016). In another study, researchers find a U-shaped pattern of saving whereby individuals between 30 and 65 tend to save less than younger and older people (Furnham, 1985).

As regards gender, scholars have identified different saving behavior associated to men and women. For example, Yuh & Hanna (2010) find that single females are less likely to save than single males in the United States. In another study, Barasinska & Schäfer (2018) show that women generally tend to make more risk-free saving choices than men. However, the literature on saving suggests that the propensities to save by men and women tend to be the result of external factors (Seguino & Floro, 2003). Therefore, the influence of gender on saving behavior may essentially depend on other factors, such as marital status, household size and saving expectations (Fisher, 2010).

Education has been found to be an important predictor of saving behavior (Avery & Kennickell, 1991; Bernheim & Garrett, 2003). For example, Fisher (2013) finds that a higher level of educational attainment substantially increases the likelihood of saving at the household level. Other studies argue that low literacy rates affect the ability of individuals to save and to secure a comfortable retirement (Lusardi, 2008). Marital status seems to play an important role to explain saving behavior; in particular, research finds that married couples are more likely to save than

other types of couples' relationships (Avery & Kennickell, 1991; Heckman & Hanna, 2015, Hogarth et al., 2003). As regards the connection between homeownership and saving, this depends on other factors, such as the existence of mortgages and the cost of having children. For example, Lersch & Dewilde (2018) find that individuals tend to reduce their average saving rate in Germany and UK once they have obtained a mortgage. However, this study also shows that homeowners with a mortgage are more likely to save than tenants.

The literature also suggests that labor status is important to understand saving decisions. Several studies report empirical evidence that unemployed individuals are less likely to save regularly than other groups of individuals, particularly among men (Fisher, 2010; Mauldin et al., 2016). As regards household size, it has been found that having dependent children may influence individuals' saving decisions (Hanna & Rha, 2000). Douthitt & Fedyk (1989) provide empirical evidence that families tend to save less in order to meet expenses associated with children.

Hypothesis 3: Demographic characteristics of individuals play an important role in explaining saving behavior.

Scholars have also argued that saving behavior can be explained by country-level factors. The characteristics of each country, such as level of unemployment, accessibility to credit markets, and financial regulation, can predict different saving behavior (Campbell & Mankiw, 1991; Shea, 1995). Besides these characteristics, changes in governments' economic policy as regards government deficits or government saving may change individual perceptions on their income level and therefore affect saving rates (Schmidt-Hebbel, Webb, & Corsetti, 1992).

In particular, the adjustments seen in some EU countries, such as Cyprus, Greece and Baltic countries, since the onset of the financial crisis have changed saving patterns profoundly (European Central Bank, 2016a). For example, Greece has undergone the largest reduction in saving since the beginning of the financial crisis, which fell from 13.2% GDP in 2007 to 4% in 2015 (OECD, 2015). In another study, Hwang & Kim (2018) find empirical evidence that country-level factors account for almost 50% of the saving-investment correlation in a panel of OECD countries using a multi-level model. Finally, Van de Walle & Jilke (2014) find that differences in saving can partly be explained by country-level factors in a sample of 27 EU members.

Hypothesis 4: Country-level factors explain differences in saving behavior between EU countries.

2.4. Methodology

To study loss aversion, as well as the influence of individual demographic traits and country-level factors on saving behavior, we gather data from the second wave (2016) of the Household Finance and Consumption Survey (European Central Bank, 2016b), which is conducted by the ECB in 20 EU countries. This is a large database that provides extensive information on individual balance sheets and demographic factors. The second wave of this survey was published at the end of 2016, having been conducted in countries during the post-crisis period, 2013-2015. Because some of the variables used in this study (individuals' age, level of income and saving) are not available for three countries (Finland, Ireland and Malta) our dataset includes 66,075 observations in 17 countries.

2.4.1. Dependent variable

The dependent variable, saving, can be defined as the difference between income and the current level of consumption. In the HFCS, respondents were asked whether "over the last 12 months their regular expenses were higher than their income, just about the same as their normal income and lower than their income". We use this question to create a binary response that takes value of 1 when expenses were less than income over the last 12 months and 0 if otherwise. Earlier studies have used this measure to reflect saving behavior in empirical studies (Fisher and Montalto, 2010, Fulford, 2015, Le Blanc et al 2016).

2.4.2. Independent variables

A variety of independent measures have been considered as proxies to capture the explanatory part of the model. First, to evaluate whether there is evidence of an asymmetry (loss aversion) in saving behavior, we use a variable of income – *level of income* – as a comprehensive measure defined as the sum of all income sources that a household has received over the last year. Respondents were asked whether their income over the last 12 months increased or decreased compared to what they would expect in a normal year. Using this HFCS question, we set up two explanatory variables that provide information on individual behavior. First, an *increase in income* is coded as 1 if income over the last 12 months increased compared to the reference point and 0 if remained about normal. Second, a *decrease in income* is coded as 1 if income over the last 12 months fell below the reference point and 0 if remained about normal.

Table 2.1 Measures of saving, income and demographic variables

Variables	Min	Max	Mean	Std. Dev.
Dependent variable				
Saving	0	1	0.38	0.49
Income compared to reference point				
Increase	0	1	0.06	0.24
Decrease	0	1	0.28	0.45
Demographic variables				
Education	1	5	3.22	1.40
Married	0	1	0.58	0.49
Female	0	1	0.37	0.48
Homeowner	0	1	0.72	0.45
Age	16	85	55.27	16.05
Household size	1	16	2.49	1.33
Unemployed	0	1	0.05	0.22

Data source: Household Finance and Consumption Survey (2016)

As regards demographic factors, we include a set of variables that might affect saving behavior. First, given scholarly interest in evaluating the impact of age on saving, we include a continuous regressor to measure the *age* of respondents. Second, we account for *gender* by including a dummy variable that takes the value of 1 if the respondent is female. Third, *education* is accounted for by a categorical variable denoting the highest level of education completed: primary or below, lower secondary, upper secondary and tertiary. Fourth, married individuals tend to have a stronger positive correlation with saving than, for example, singles and widowers (Knoll et al, 2012). Hence, to control for *marital status*, we introduce a dummy variable that takes value of 1 for those respondents who answered to be married at the time of the survey and 0 if otherwise. Fifth,

to assess differences in *homeownership*, we include another dummy variable that takes value of 1 if respondents are homeowners and 0 if they are tenants. Sixth, to control for *labor status*, we include a measure of unemployment that takes value if 1 if the respondents were unemployed at the time of the survey and 0 otherwise. Finally, we measure *household size* using another continuous variable that provides information on the number of members living with the respondent. Descriptive statistics on these measures are included in the table 2.1.

2.4.3. Model design

Our model consists of a hierarchical structure formed by individual-level factors nested within country-level factors. The model assumes that individuals make saving decisions in response to increases and decreases in their level of income. Moreover, this model takes into account the influence of individuals' demographic factors on saving choices across a sample of 17 EU countries. Our dependent variable, saving, is a binary variable. When evaluating binary information, using linear regression approaches may result in inconsistent, inefficient and biased estimates due to the discrete nature of binary responses (Horowitz & Savin, 2001; Long, 1997). These properties of binary information suggest that, in our case, a multi-level logistic model might be helpful to account for the binary nature of the dependent variable (Agresti, 2013). To fit such a logit model, we suggest using ordinary least squares (OLS) as the method to maximize the marginal log likelihood. This method generally works properly with multi-level approaches along with discrete distributions. (Rabe-Hesketh & Skrondal, 2002). A robust maximum likelihood estimator is used in the analysis, which yields parameter estimates with standard deviations and a chi-square test statistic that are robust

to non-normality and non-independence of observations. This model includes 17 separate random intercepts, one for each country.

2.5. Results

Table 2.2 reports a summary of the main results in terms of estimated log odds, standard deviations and 95% confident intervals for the statistical model. To test the hypotheses, we fit a multi-level logistic model that includes two main blocks. First, a fixed-effect part, consisting of individual-level predictors to measure the effect of changes in income and demographic factors on saving behavior. Second, this model includes a random-effect part consisting of random intercepts that vary for each of the 17 countries of the sample. In addition, to further facilitate the interpretation of the results, we report percent changes for estimates, holding all other variables constant.

We begin our multi-level analysis by estimating the effects of our two measures of income on saving at the individual level. Consistent with our expectations, these regressors are significant predictors of saving at 95% probability. Estimate coefficients reported in table 2.2 support Hypothesis 1 indicating that individuals' saving decisions react more to declines in their current level of income (-0.3838) than increases (0.2073) as regards their reference point. In terms of percentage changes, it is reported that when individuals' income over the last 12 months falls below the reference point, the probability of saving decreases by 32%. However, it is also reported that when individuals' income increases over the last 12 months compared to the reference point, the probability of saving increases by 23%.

Table 2.2 Multi-level Model Logit estimates of individuals' saving behavior

Independent variables	Coefficient	% change	Std. Dev.	95% Confidence Interval	
Income compared to reference point					
Increase	0.2073	23.03	0.0342	0.1402	0.2744
Decrease	-0.3888	-32.21	0.0210	-0.4300	-0.3474
Demographic variables					
Education	0.1062	11.20	0.0066	0.0933	0.1192
Married	0.1209	12.85	0.0218	0.0780	0.1638
Female	-0.0866	-8.29	0.0189	-0.1238	-0.0495
Homeowner	0.0920	9.64	0.0205	0.0518	0.1323
Age	-0.0088	-0.87	0.0036	-0.0116	-0.0017
Age Squared	0.0001	0.01	0.0000	0.0000	0.0001
Household size	-0.0533	-5.19	0.0084	-0.0699	-0.0367
Unemployed	-0.4539	-36.48	0.0455	-0.5430	-0.3647
Random effects					
Variance	0.6074		0.1048	0.4331	0.8517
N (EU countries)	17				
N (Population)	66075				
LR test (P-value)	0.0000				
Log-likelihood	-40795.18				

Data source: Household Finance and Consumption Survey (2016)

This effect is represented in Figure 2.1 that reports cross-country differences in loss aversion in the probability of saving through the connection of estimation points. An asymmetry in saving behavior can be observed when the distance between the estimation points depicted in red and 0 is greater than the distance between the estimation points depicted in blue and 0. However, if these distances are similar or symmetric, the effect of loss aversion disappears. These results show that loss aversion seems to be smaller for those EU countries where the financial crisis was most dramatic such as Cyprus, Greece and Latvia. In contrast, loss aversion seems to be stronger in those countries that best withstood the financial crisis, such as Germany, Luxembourg and Netherlands. One possible explanation for this pattern at the country level can be found in Ashta (2017), who argues that loss aversion tends to be lower in poorer countries, since many individuals do not have the possibility of losing a large amount of money. Other scholars state that cultural, economic and regulatory factors at the country level may explain different patterns of loss aversion in saving behavior across different countries (Wang, Rieger, & Hens, 2017). Therefore, this empirical evidence supports our hypothesis 2 that loss aversion, or in other words, an asymmetric behavior in saving decisions, tends to vary across EU countries.

Moving now onto demographic factors influencing saving decisions, it should be noted that the negative coefficient of the estimation age, together with the positive coefficient associated with the squared age term, indicate that, as individuals get older, they tend to save less. As regards gender, the analysis suggests that females are 8.3% less likely to save than males. Our results show that education, marital status and homeownerships are strong and significant predictors of savings. For example, the probability that individuals save increases

by 11% with greater educational attainments. As regards marital status, married individuals increase their probability of saving by approximately 13% in comparison to individuals with other types of relationships. The analysis also indicates that homeowners increase their savings by 9.6% more than tenants. Similarly, these results show that, for an additional household member, individuals living in that household saves approximately by 5% less. These results support Hypothesis 3 that individuals' demographic characteristics play an important role in explaining saving behavior.

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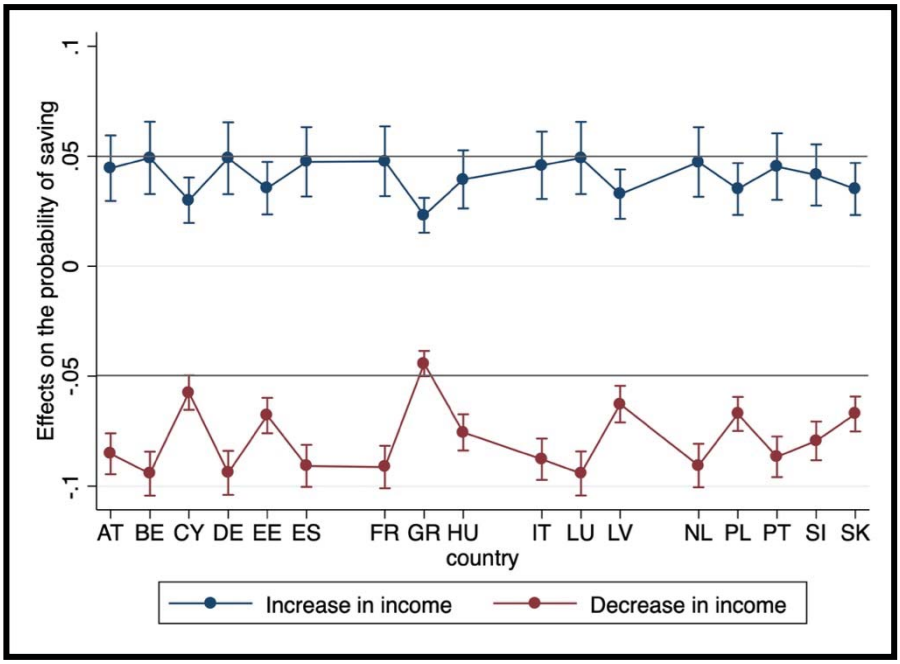

Figure 2.1 Asymmetries in saving behavior across countries

Source: ECB's Household Finance and Consumption Survey (2016). Coding: AT: Austria, BE: Belgium, CY: Cyprus, DE: Germany, EE: Estonia, ES: Spain, FR: France, GR: Greece, HU: Hungary, IT: Italy, LU: Luxembourg, LV: Latvia, NL: Netherlands, PL: Poland, PT: Portugal, SI: Slovenia, SK: Slovakia.

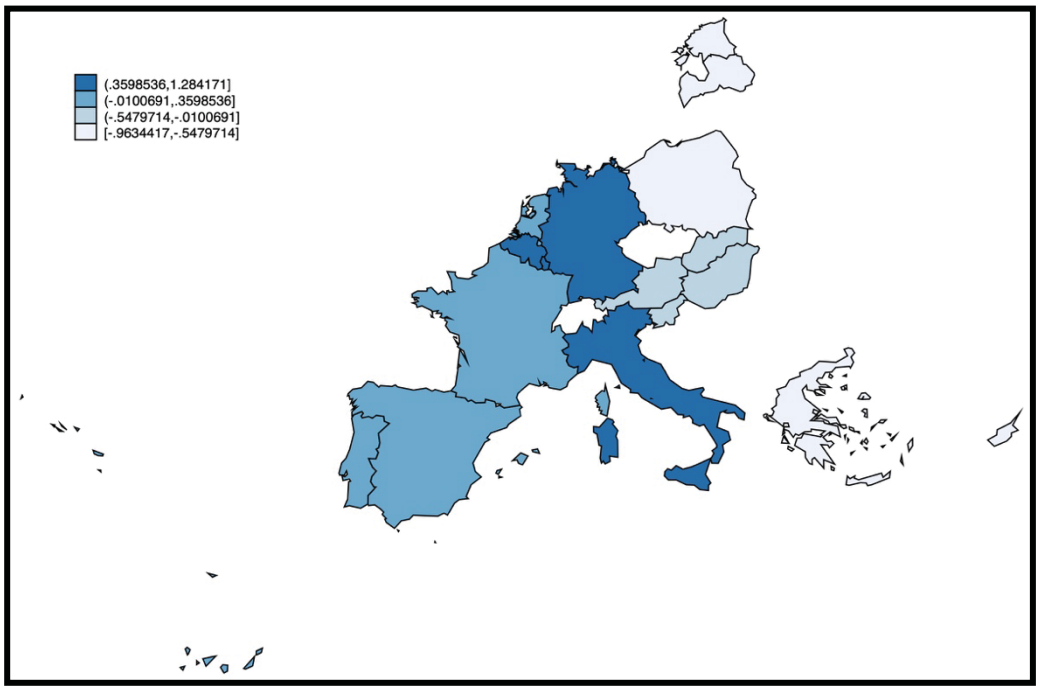

Figure 2.2 Cross-country differences in saving behavior.
Source: ECB's Household Finance and Consumption Survey (2016).

Finally, in order to assess country-level patterns of saving, we introduce random intercepts that capture the tendency of saving behavior across countries, by reducing the problem of spatially correlated errors. Figure 2.2 reveals that, at any given level of our model regressors, the probability of saving differs significantly among EU countries. For example, in EU countries such as Germany, Italy and Luxembourg, depicted in dark blue in the Figure 2.1, individuals save a large share of their income. On the other hand, in other EU countries, such as Cyprus, Greece and Latvia, depicted in a very pale light-blue, individuals spend often more than they earn, resulting in negative saving rates. If these differences persist across countries, they may have important implications for the wider economy. Although this study does not include institutional factors linked with underlying individuals' saving behavior that may partially explain the large differences in saving across the EU, these results support Hypothesis 4 that country-level factors explain differences in saving behavior between EU countries.

2.6. Conclusions and policy implications

Insights from BE have documented the existence of systematic deviations from standard manifestations of rationality that may limit the cognitive capacity of individuals (Kahneman at al., 1991; Thaler, 2016; Tversky & Kahneman, 1992). The concept of loss aversion has been successfully applied in recent years to explain biases in financial choices that are at odds with the neoclassical vision of the world (World Bank, 2015, Bowman et al., 1999).

This study contributes to a particular strand of the BE literature by empirically illustrating the multi-level nature of saving behavior, in the specific context of the EU in the aftermath of the global financial crisis. This study detects that individuals' saving behavior responds more to declines than to increases in customers' current level of income, finding evidence of an asymmetric behavior in saving. Evidence of this asymmetric behavior in saving is also supported at the country-level. For example, loss aversion seems to be smaller for those EU countries where the financial crisis was most dramatic, such as in Cyprus, Greece and Latvia. Wang et al., (2017) argue that cultural, institutional and regulatory factors may explain differences in loss aversion between countries. In particular, Ashta (2017) explains that loss aversion may be lower in poor countries since customers do not have the possibility of losing too much according to their limited liability.

This study also focuses on the influence of demographic and country level factors on saving behavior. From the individual-level perspective, our study provides support for earlier research on saving (Asebedo et al., 2018; Avery & Kennickell, 1991; Bernheim & Garrett, 2003). We find that individuals who are better-

educated, married and homeowners tend to save more than their counterparts. On the contrary, women, unemployed and individuals living in a large households tend to save less. From a country-level perspective, we find that EU countries such as Cyprus, Greece and Latvia exhibiting a smaller loss aversion are associated with negative saving rates.

This analysis reflects the importance of BE insights when trying to understand individuals' saving behavior in the post-crisis period. Incorporating evidence derived from a BE study into policymaking can help address the weaknesses associated with the traditional assumptions which are largely inspired by neoclassical thinking in financial markets. BE approaches applied to policymaking have increasingly gained support and recognition in countries such as the US, Australia and the EU since the financial crisis (Kuehnhanss, 2018). These approaches have allowed the construction of BE tools to help overcome BE biases such as loss aversion in individuals' decision-making.

The financial crisis and its long-lasting impact on financial market and institutions have demonstrated the limitation of the financial deregulation, based on Neoclassical Economic models, that proved ultimately indequate. As governments around the world search to reform financial regulation, BE insights can be used as a complementary approach to conventional tools. BE approaches are practical, and often quite low-cost to implement (Lefevre & Chapman, 2017). An illustration of recent developments is the European Commission's "Key Information Documents" (KIDs) policy. This is an attempt to guarantee banking customers across the EU are provided with clear and understandable information on complicated investments, allowing customers to compare the key features, risks, rewards and costs of different financial products in a user-friendly way (Van

Bavel et al., 2013). KIDs are especially recommended for individuals who are thought to be potentially "vulnerable" customers, such as older people and those on low-incomes, who

have had less experience with formal finance and possess lower levels of financial literacy and skills. KIDs are also recommended to individuals who experienced financial losses during the crisis and, accordingly, are deemed less prone than others to invest in financial assets again. (European Commission, 2015).

Policymakers involved in bank regulation could also benefit from BE insights into how to combat loss aversion and reduce its impact on the evaluation of legislation focus on costs and benefits. For example, policies aimed at minimizing the negative effects of loss aversion could focus on increasing risk tolerance in the presence of losses and diminishing investments short-sightedness (World Bank, 2015). These policies should also facilitate a framework in which losses become less salient, by prioritizing more the long-term benefits (Keys & Schwartz, 2007). One recent example of policy intervention is the UK's Financial Conduct Authority (FCA), which has introduced BE insights into policymaking, with particular concern about the loss aversion bias. This policy promotes, first, improving disclosure methods which may be beneficial for customers, such as targeting annual summaries and, second, changing regulation so that alerts about individuals' financial management becomes 'opt-out' rather than 'opt-out', with a view to helping customers have the information to take saving decisions (OECD, 2017b).

In addition, financial education and training programmes based on BE insights have helped reduce the susceptiability to loss aversion and other biases (Kuehnhanss, 2018). For example, the National Securities Exchange Commission

(CNMV), the leading institution for protecting banking customers in Spain, has acknowledge the importance financial education programmes play by working to influence individuals' saving (OECD, 2017b).

The practical application of BE mechanisms to problems concerning financial decision by policymakers is still in its infancy and is likely to continue growing. Financial services are complex, involve trade-offs between different periods, and require a thorough assessment of risks. This, along with the individuals' tendency to use simplistic rules to take complex decisions can, for example, explain the propensity of individuals to under-save in times of financial crisis. A deeper understanding of how financial and saving decisions are made and why individuals make recurrent mistakes when deciding on financial services is fundamental to designing a more effective financial framework to better protect banking customers.

CHAPTER 3

ICT-enabled co-production of public services. A systematic review on barriers and enablers

This chapter also appeared as Clifton, Díaz-Fuentes & Llamosas García (Forthcoming)

3.1. Introduction

Do ICTs enable, or pose a barrier to, public service co-production? Governments and international organizations often herald ICTs as a new panacea in their quest to augment the co-production of public services by their administrations and citizens (European Commission, 2018; OECD, 2018a). Co-production, conceptualized by Elinor Ostrom and her colleagues at the Workshop in Political Theory and Policy Analysis at Indiana University (Parks et al., 1981), asserts that citizens and clients are often key actors in the design, management, delivery and/or evaluation of public services, and that this involvement can improve service quality and efficiency (Alford, 2014; Bovaird, 2007; Brandsen & Pestoff, 2006; Brudney & England, 1983; Clark, Brudney, Jakobsen, & Andersen, 2013; Musso, Young, & Thom, 2019; Osborne, Radnor, & Strokosch, 2016). Public safety, for example, is not provided by the police alone, rather, it is co-produced by both citizens and police officers in partnership, such as the Neighbourhood Watch scheme (Musso et al., 2019). Co-production, therefore, breaks with the classical view that the government is the sole provider of public services. The co-production concept is often used interchangeably with another concept, co-creation, although some authors argue these are conceptually distinct (Chathoth, Altinay, Harrington, Okumus, & Chan, 2013). Co-creation is usually associated with marketing, referring to the active involvement of end-users in the private sector (Prahalad & Ramaswamy, 2004). An example of co-creation would be a hotel's collection of customer opinions, used to improve future hotel management (Mathis, Kim, Uysal, Sirgy, & Prebensen, 2016). Despite this, increasingly in the public management literature, both co-production and co-creation are used fluidly and interchangeably; we follow Torfing, Sørensen, & Røiseland (2016) and

Voorberg et al. (2015) in including both concepts in our systematic review of co-production.

Following from that, "ICT-enabled co-production" is the term commonly used to refer to the use of ICTs in order to support engagement in the co-production of public services. This may take the form of facilitating traditional forms of co-production of public services (Rodríguez Bolívar, 2015; Webster & Leleux, 2018), or, of helping establish new ways to co-produce. An example of ICT-enabled co-production supporting traditional co-production would be a doctor contacting their patients by e-mail, chat or web-based consultation. This electronic consultation practice is considered a means of improving rapid and easy access to the professional when needed (Timmerman et al., 2016). However, ICTs have also allowed the emergence of new kinds of co-production practices, not available traditionally. For example, Wikipedia is a successful example of how citizens can co-produce public goods using ICTs. This co-production practice allows Internet users to enrich contents according to predefined rules and frameworks (Paletti, 2016). Wikipedia provides citizens with free to access knowledge.

ICT-enabled co-production is thought to be attractive for both instrumental and institutional reasons (Meijer, 2012). From an instrumental point of view, deploying ICTs to support co-production may help cut costs, being increasingly attractive in the era of budget-strapped governments seeking to innovate and improve public value delivery (Linders, 2012). From an institutional perspective, ICT-enabled co-production is advantageous because, if citizens are willing to express their opinions, these technologies are potentially capable of transmitting, storing and interpreting data on a vast scale (Meijer, 2011).

Despite the rhetorical enthusiasm, governments have been slower than expected to adopt mechanisms to promote ICT-enabled co-production (Meijer, 2015, OECD, 2018a). In recent years, however, governments have started to roll out ambitious digital programmes in this direction. Examples include the Australian government's Artificial Intelligence (AI) assistant avatar to facilitate access to government services for the disabled (OECD, 2018a), or the United Nations' partnership with Microsoft to launch a social innovation hub to enable young women to start up their own businesses, by supporting them with ICT training and resources (OECD, 2018b).

In response to the rhetoric around ICT-enabled co-production, and governments' emerging efforts to promote it at a large scale in practice, some scholars have expressed skepticism about the effects ICTs will have on co-production processes (Verschuere at al., 2012). For example, Criado and Villodre (2018) have pointed out that, just as ICTs created a "digital divide" as regards telecommunications have/have nots, "ICT-enabled co-production" may do a similar thing, enabling co-production in some scenarios whilst posing a barrier in other contexts, potentially even creating a "double digital divide". This could mean, for example, that particular countries, regions or groups of citizens, could successfully and fruitfully adopt ICT-enabled co-production, whilst others are left behind.

Indeed, even when looking at traditional co-production (without ICTs), a significant body of research had already found co-production to be highly uneven across government and citizens. Commonly cited enablers and barriers to traditional co-production by government included: funding availability and professional skills (Bovaird and Loeffler, 2012); public professional culture (Tuurnas, 2015); and legal and institutional structures (Torvinen and Ulkuniemi,

2016; Williams et al., 2016). As regards citizens, enablers and barriers to public service co-production have been associated with; motivation to engage (Fledderus and Honingh, 2016); demographic factors (Alonso et al., forthcoming); and social capital (Thijssen and Van Dooren, 2015). Given the insights of research on ICTs and the "digital divide" (Criado and Villodre; 2018; Yu et al., 2018), the impact of ICTs on both already-existing, traditional, public service co-production, as well as new initiatives to co-produce, deserve exploration. Whilst, in some cases, ICTs may well facilitate greater and deeper co-production, there may be other cases where ICTs act as a barrier to these processes.

A body of research has emerged, starting slowly from 2000 onwards, but accelerating from the decade starting in 2010, in parallel with the spread of government initiatives to ostensibly promote ICT-enabled co-production (Bonsón et al., 2012; Ho, 2002; Porumbescu, 2016; Tursunbayeva et al., 2017; Uppström and Lönn, 2017; West, 2004). Within this literature, one sub-strand has examined evidence on the ways in which ICTs enable or pose a barrier to co-production (see, for example, Castelnovo, 2016; Da Silva and Albano, 2017; Lecluijze et al., 2015; Meijer, 2012). To date, there has been no systematic review of this literature; hence, the contribution of this study is to fill this gap, by performing, to the best of our knowledge, the first systematic review on the topic.

Our systematic review identifies the structural and cultural factors that act as barriers to, or enablers of, ICT enabled co-production in the cases of both governments and citizens. We find, for government, the most important factors include financial and technical capacities, legal issues and organizational culture; for citizens, we identify technical skills, demographic factors (particular age and

gender), social dynamics, as well as a number of cultural factors associated with citizen trust to be most relevant.

The rest of the chapter is organized as follows. The second section presents the organizational framework which is adapted from Meijer (2015). The third section provides information on the methodology used for the systematic review as well as data collection. The fourth section discusses the findings of the publication characteristics as well as the literature analysis. The final section concludes with a discussion of the main findings and describes the limitations of this research and future lines for research on this topic.

3.2. Framework for Analysis

This chapter adapts the framework developed by Meijer (2015) as an organising device when performing the systematic review. First, the analysis of the effect of ICTs on co-production processes will be separated into two domains: government and citizens. Second, consideration of enablers and barriers to co-production using ICTs will be divided into "structural" and "cultural" considerations. Commonly cited structural barriers to government innovation include financial capacity, technical skills, managerial support and leadership, and legal issues, amongst others (Meijer, 2015). Cultural barriers to innovation inside government are found in their "organizational culture", which may include negative perceptions and fears on the part of government staff about ICTs. These perceptions might be motivated because ICTs are seen to risk changing their routines (Margetts and Dunleavy, 2002), or because staff fear new technologies may undermine their roles. Finally, bureaucracy (formality, hierarchy, uniformity) may hinder the uptake of ICTs to co-produce. Turning to citizens, use of ICTs to co-produce may be hampered by a range of structural factors, including their technical skills and

motivations, or citizens' demographic factors, such as their gender and age (Angelini et al., 2016; Max-Neef, 2005; Van Deursen and Van Dijk, 2011). Furthermore, citizens may avoid ICTs due to a range of cultural factors, including their reluctance to integrate these practices as a habit into their daily lives, fears that ICTs may invade their privacy, or because they do not trust in government (Fledderus, 2015; Porumbescu, 2016). Third, the consequences of ICTs on co-production will be specified according to what "stage" this is occurring, namely, the design or implementation stages (see also Meijer, 2014). Meijer's (2015) framework also includes analysis of "fixing" and "framing" strategies. Fixing strategies fundamentally refer to the introduction of systems to improve access, overcoming financial and other restrictions, dealing with legal problems and offering training. Framing refers to processes of re-conceptualizing ICT-enabled co-production, for example, by persuading those who resist it that their fears are unfounded. As our study also presents enablers of ICTs in co-production, we adapt his framework, and include in our analysis of government/citizen, structural/cultural and the stage of adoption those factors which have been found to facilitate ICTs in the literature.

3.3. Research Method

3.3.1. Systematic literature review approach

This study uses a systematic and reproducible method of reviewing the literature on co-production to ensure a more transparent and replicable body of knowledge. It follows the 'Preferred Reporting Items for Systematic Reviews and Meta-Analysis' (PRISMA), that help authors improve the quality of a literature review process (Liberati et al., 2009) using a framework focused on responding to specific research questions following strict eligibility criteria (Tursunbayeva et al., 2017).

First, we identify a number of questions based on a preliminary review of the literature. Second, we extract data from studies that deal with the topic, settings and characteristics using a search strategy. Third, we evaluate the studies' quality according to the eligibility criteria and their recommendations. Finally, we include those studies whose evidence is related to the research questions.

3.3.2. Search strategy

This study uses a search strategy to avoid duplication issues. This consists of digging into Scopus and Web of Science, covering published papers from social science disciplines. This search strategy includes keywords with a particular interest in ICTs, co-production and the public sector. The search strategy is set up as follows: Title, abstract and keywords = ("co-production" OR "co-creation") AND Title, abstract and keywords = ("artificial intelligence" OR "internet of things" OR "cloud system" OR "ICT" OR "ICT related innovation" OR "digital public service" OR "information and communication technologies" OR "smart cities" OR "digitally-based solutions" OR "social network" OR "open government" OR "online public service" OR "technological innovation" OR "e-government" OR "m-government"). Type of document = scientific articles. Discipline = Social sciences. Language: English. This research yielded 150 articles in Scopus and 273 articles in Web of Science. The final search was run on 11 August 2018. Full text versions of articles were examined by one researcher according to the eligibility criteria. The other researchers interactively checked the sample of the assessed articles to ensure that the eligibility criteria were applied correctly.

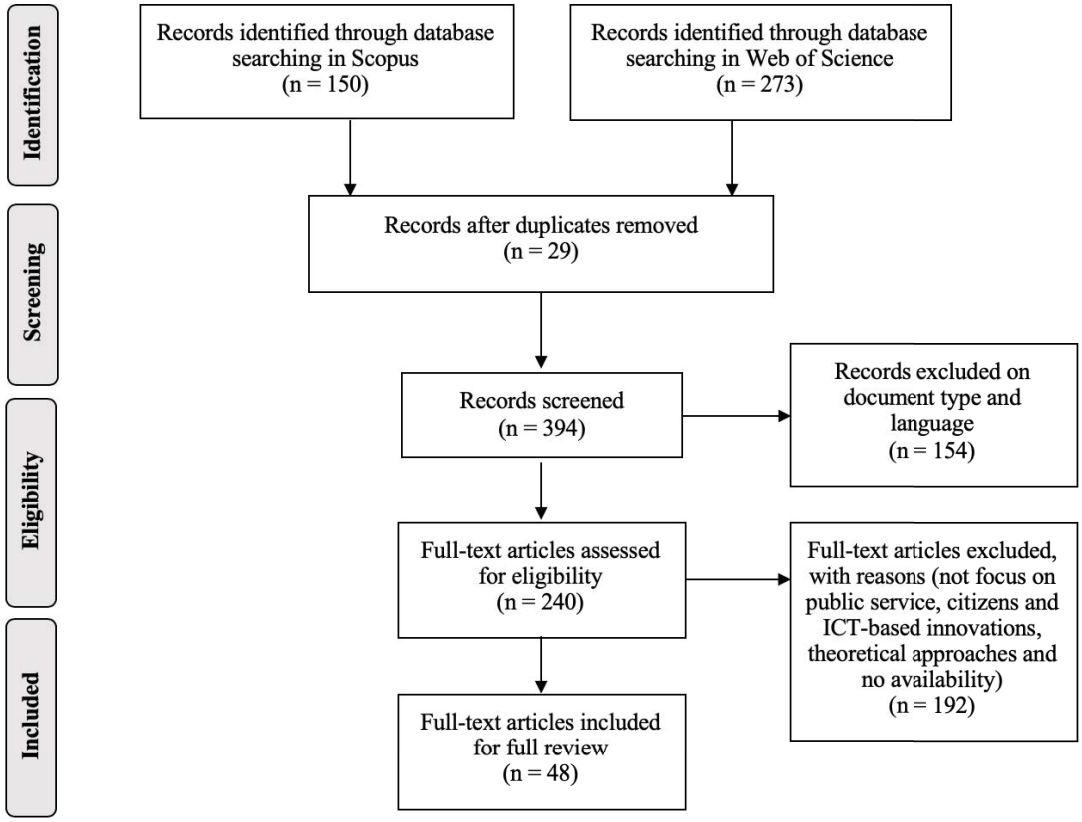

Figure 3.1 Flow diagram of the search strategy

On this basis, the set of criteria that have led to the inclusion of 48 studies are as follows:

3.3.3. Eligibility criteria

The eligibility criteria consist of a set of elements that assess the validity, applicability and comprehensiveness of a study analysis. To do so, the eligibility criteria are formed by the inclusion and exclusion criteria which allow to select relevant studies for the systematic review.

Inclusion criteria

- Published empirical studies focused on ICT-enabled co-production of public services.

Exclusion criteria

- Studies which are not available in English.

- Studies which are not included in the social science area.

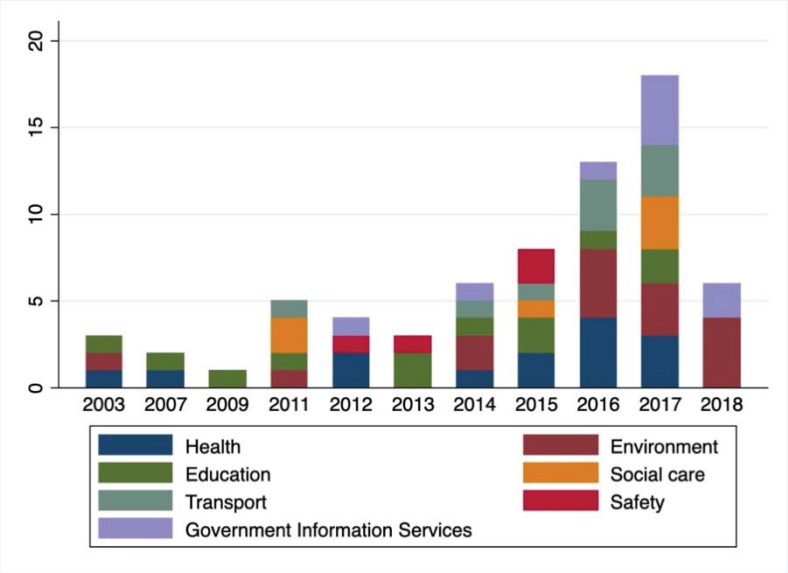

Figure 3.2 Distribution of published studies by sector and publication year

3.3.4. Selection of studies

This section shows the selection process according to the PRISMA statement (Moher et al., 2009). Figure 3.1 presents a flow diagram that maps out the number of identified, included and excluded records, as well as the reasons for exclusion.

3.4. Description of publications

The search strategy generated 423 results, of which 394 were eligible records after removing 29 duplicates. Of these records, 154 were excluded on document type and language. After examining the full texts and excluding articles according to the inclusion and exclusion criteria, 48 qualifying articles remained. These studies were published within a period of 15 years (between 2003 and 2018). We observe that more than three quarters of records were published from 2008 onwards (Figure 3.2). 19 articles were focused on the health sector, 15 on environment, 15 on education, 12 on government information, 10 on transport and 4 on safety.

Table 3.1 shows the geographical focus of empirical cases found in articles using regional grouping. According to the distribution of co-production initiatives by regions and countries, we find that Europe concentrates most ICT-enabled co-production initiatives across the world with 39 cases. In Europe, we find that United Kingdom, the Netherlands and Spain were the countries most cited by qualifying articles. According to the UN-E-Government Survey (United Nations, 2016), United Kingdom is ranked as a global leader on the e-participation index, followed by Japan, Australia, Republic of Korea and the Netherlands. Other countries outside Europe which also were mostly cited in the systematic review were United States and Canada.

Table 3.1 Distribution of ICT-enabled co-production initiatives by region and country

Region and country	No. Initiatives	Region and countries	No. Initiatives
Europe	**39**	**North America**	**11**
United Kingdom	8	United States	8
Netherlands	6	Canada	3
Spain	4	**Asia and Oceania**	**4**
Belgium	3	Indonesia	2
Denmark	3	Japan	1
Finland	3	Taiwan	1
Italy	2	**Africa**	**1**
Germany	2	Zambia	1
Lithuania	2	**Latin America**	**4**
Sweden	2	Argentina	1
Greece	1	Brazil	1
Ireland	1	Mexico	1
Norway	1	Uruguay	1
Switzerland	1		

Figure 3.3 shows the most used ICTs in public services' co-production reported by the literature. Our search shows that by far the most frequently mentioned ICT - with 23 studies referring to it - is social networking. The other most commonly cited ICTs are information management systems (10); mobile phones (7); and e-mail (5).

In terms of methodology, the majority of studies are based on qualitative data (Figure 3.4). In total, 20 studies are based on interviews, which is the most commonly employed research method. Other research methods are narrative descriptions (8); focus groups (7): document analysis (7); and experiments (5).

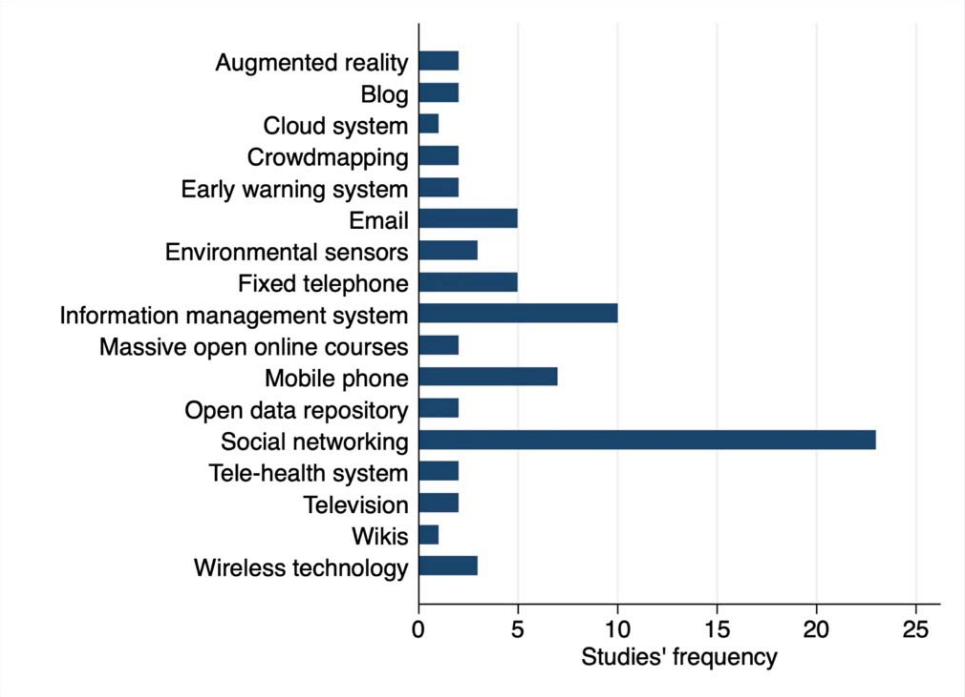

Figure 3.3 ICTs used in public services' co-production

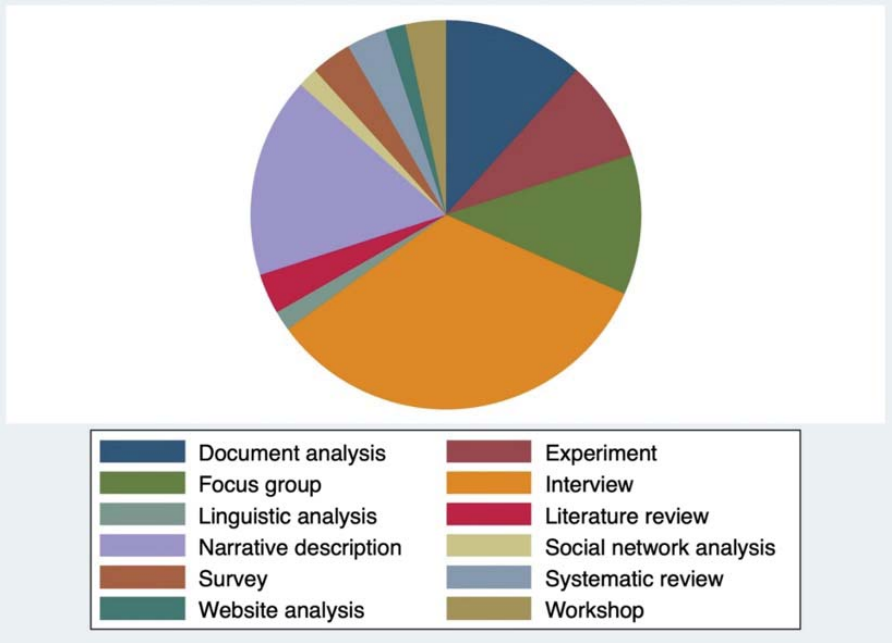

Figure 3.4 Distribution of studies by research method

3.5. Findings

First, we highlight the main factors cited in the literature in the systematic review associated with enabling or posing a barrier to government ICT co-production, after which, we turn to the citizen domain.

3.5.1. Government barriers to and enablers of ICT co-production

Some 25 out of the 48 studies included findings on specific characteristics of government that influence the take-up of ICT-enabled co-production. Table 3.2 presents information about the government characteristics analysed, as well as the ICT and public sector in question. The most commonly cited structural barriers are financial, technical and legal factors, whereas the most important cultural feature is the organizational characteristics of government. As regards enablers, the most commonly cited were cases where the cost of ICTs are low, reducing the financial risk around failure, and when governments facilitate the engagement of citizens at an early stage of the development process.

Financial capacity

Shortage of finance is a common barrier to a government's promotion of ICT-enabled co-production: lower cost projects tend to be most successful.

Barriers

- The significant financial resources required to establish and maintain ICT-enabled co-production.

- Politically motivated governments may not prioritize projects promoting ICT-enabled co-production.

- A lack of coordination may negatively affect efforts to scale-up locally-based ICT-enabled co-production initiatives to the national level.

Enablers

- Low-cost approaches to ICT-enabled co-production diminishes the financial burden to government.

- Financially autonomous governments, such as local government, face fewer barriers to implementing ICT-enabled co-production projects.

Financial capacity as a barrier to ICT-enabled co-production is discussed in 7 of the papers. Most of these studies examine how financial capacity affects the early stages of ICT-enabled co-production, principally, whether or not it was taken up in the first place. One of the major barriers to government take-up of ICT-enabled co-production, reported in all seven studies, is related to problems surrounding a shortage of finance. Three main kinds of barriers to ICT-enabled co-production are identified. The first barrier is the vast financial resources required to establish and then maintain a major ICT-enabled co-production initiative, such as an online open innovation community (S1), which may spiral upwards as regards costs (S12, S15, S41). The second barrier to finance is political: S46 shows that government's financial priorities are often politically motivated, and when these do not coincide with the ICT initiative, this is likely to be blocked. The third

barrier is associated with financial coordination, which may negatively affect efforts to scale up locally-based ICT initiatives to the national level. If budgets are controlled locally, forging collaboration at the national level can be an impediment (S34). Where competition exists among local providers, such as the case of US hospitals, local financial support is highly uneven, complicating the task of financial support to scale up a national ICT initiative (S48).

As regards enabling factors associated with finance, two key issues emerge. Overall, financial impediments to the deployment of ICTs in co-production are reported as lower where governments or public agencies opt to use low-cost ICTs (S2, S6, S27, S32, S48, S43). For example, S32 finds that the use of ICTs such as wikis and social networking are effective in involving citizens and other users in co-producing academic knowledge at a low cost. Should the deployment of ICTs be unsuccessful, governments do not have to bear a high financial risk – in other works, the cost of technological failure is low (S39). In addition, where ICT initiatives are established in a financially-autonomous community, ICT-enabled co-production is reported to have been successful (S33, S34). For example, S30 demonstrates that the introduction of open-source sharing services in the design of digital platforms allows citizens to access software codes to engage in the development of their own online communities while maintaining government financial requirements relatively low. Finally, the use of low-cost ICTs on part of government in financially autonomous communities has been quite successful in promoting ICT-enabled co-production initiatives.

Technical capacities

Skilled workforce shortages constitute a barrier to ICT-enabled co-production. This can be rectified with adequate improvement in staff training, which also reduces the likelihood of technical failures.

Barriers:

- Poor project execution gives rise to technical errors in the use of ICT-enabled co-production.

- Lack of planning for the day-to-day ICT use may lead to the failure of ICT-enabled co-production initiatives.

- Establishing regular technical training reinforces staff knowledge to support ICT-enabled co-production.

- A planning manual that supports staffs on how to act in case of doubt is useful to minimize failures in the process.

Table 3.2 Distribution of studies, sectors and ICT typologies at government level

#	Studies	ICT type	Sector	Structural government factors			
				Financial capacities	Technical capacities	Legal issues	Government culture
S1	Amann et al. (2016)	Social networking	Health	⊗		⊗	⊗
S2	Angelini et al. (2016)	Mobile phone	Health, public transport	✓			
S3	Artto et al. (2016)	-	Health, public transport		✓		
S4	Baka (2017)	Information management system	Education, health and safety		✓	⊗	
S6	Brynskov et al. (2018)	Environmental sensors	Environment	✓			
S11	Da Silva and Albano (2017)	Information management system	Government information service		⊗		
S12	Feller et al. (2011)	E-mail, open data repository and social networking	Health, education and government information service	⊗			
S15	Ghanbari et al. (2017)	Mobile phone, wireless technology	Health, public transport	⊗			
S18	Gutiérrez et al., (2018)	Environment sensors, mobile phone and wireless technology	Education, environment and public transport		✓		
S20	Henwoord and Hart (2003)	Information management system	Environment, health				⊗
S23	Khayyat and Bannister (2017)	Open data repository	Government information service		✓⊗		
S24	Kinawy et al. (2018)	Social networking	Environment		✓		
S26	Lecluijze et al. (2015)	Early warning system	Health		✓	✓	⊗
S27	Linders (2012)	Social networking	Education, government information service and health	✓			
S28	Löbel et al. (2016)	Information management system	Environment		⊗	⊗	
S30	Maciuliene (2018)	Augmented reality, mapping and social networking	Environment	✓			
S32	Medaglia (2012)	-	Government information service	✓			
S33	Meijer (2012)	Social networking and telephone (fixed or mobile)	Safety	✓			
S34	Meijer (2015)	Social networking and telephone (fixed or mobile)	Safety	✓⊗			✓⊗
S39	Szkuta et al. (2014)	Social networking	Education, health and public transport	✓			
S40	Timmerman et al. (2016)	Tele-healthcare system	Health				⊗
S41	Trivellato (2017)	Social networking and information management system	Environment, public transport	⊗			
S43	Uppström and Lönn (2017)	Information management system	Environment	✓	✓⊗	⊗	
S46	Van den Hazel et al. (2012)	Social networking	Health	⊗			
S48	Yaraghi et al. (2015)	Information management system	Health	✓⊗			

Source: Scopus and Web of Science. Coding: ✓ = enabler, ⊗ = barrier

Enablers:

The technical capacity of government staff is a highly significant factor when explaining both barriers to and enablers of ICT-enabled co-production in government. Logically, when government-employed staff lack adequate technical capacities, this proves a significant barrier to ICT-enabled co-production projects. Four studies in the systematic review detect major difficulties associated with managing ICTs in government once projects have been installed. These difficulties are linked to an initially badly executed implementation of an information management system, whereby technical errors lead to bad decision-making (S43), or a lack of planning for day-to-day use by staff of the system once introduced. For example, where data is complex to manage and staff have not been provided with the necessary knowledge about the tools or a helpdesk (S11, S28), ICT-enabled co-production projects are hindered. In another study, staff exhibited strong reluctance to acquire the necessary technical capacities to engage in an Open Government initiative when they had not been given guarantees about plans to make data available in the longer-term (S23).

However, the literature also offers some factors whereby technical capacity of government staff positively develops ICT-enabled co-production. For example, S26 finds that, where staff training is improved, fewer technical failures occur, due to two mechanisms. First, a well-designed work manual that guides staff on how to act in the case of doubt proves useful. Second, the organization of extra training sessions to reinforce staff knowledge is important. These mechanisms have a knock-on effect in that staffs' technical knowledge about software and hardware, and their enhanced pedagogical skills, help them to improve the use of ITCs citizens, which, in turn, reduces technical failure (S23, S43). This is seen in

S18, where a set of rewards is introduced within an online platform, OrganiCity, to promote citizens' collection of data using Internet of things devices in order to identify possible errors. Another finding is that the engagement of citizens at an early stage of the development process enables pedagogical action by staff to be more fluid and rapid (S3, S4, S24).

Legal issues

Complex regulation can prevent government from taking up ICTs to co-produce. A clearer and well-defined regulatory framework that promotes deployment of ICTs may facilitate co-production.

Barriers:

- When regulation is very complex, governments may require the participation of external agents or experts, increasing the operating costs and time required to implement ICT-enabled co-production projects.

- Regulatory changes may alter the implementation and development of ICT-enabled co-production.

Enablers:

- Government support of the introduction of regulation focused on facilitating ICT-enabled co-production

Legal issues are a fundamental factor as regards helping and hindering ICT-enabled co-production projects. As regards barriers, four studies find that when

regulation is highly complex, this can prevent governments from taking up ICTs to co-produce. S1 concludes complex issues surrounding required legal changes on data protection and privacy in healthcare caused significant delays in the deployment of ICT solutions in co-production in several countries. Another situation where legal issues present barriers to ICT-enabled co-production is when regulatory changes alter the tasks and organization of the actors involved in the process. For example, S4 finds that legal changes delayed the implementation of a web-based platform across Zambia. In another study, S43 finds that changes in the Swedish Forestry Act require constant updates of eAvverka, a management information system for handling forest-felling applications, that resulted in failures when participants used old versions. Finally, legal issues act as barriers to ICT-enabled co-production when regulation is so complex that it requires the intervention of external consults or legal experts. For example, S28 finds that, as result of a burdensome legislation on environmental and labor protection, the German authorities required the intervention of legal intermediaries to support them in the deployment of ICTs in co-production.

As regards enablers, one paper establishes a positive relationship between law and ICT-enabled co-production: this is the case of the Dutch government which proactively introduced regulation to fully address concerns about professional confidentiality between practitioners and patients in healthcare services (S26). Highly complex legislation is proven to discourage the deployment of ICTs in co-production and it requires the intervention of external intermediaries as legal advisers. The development of a specific regulatory framework on the use of ICTs in public services concerning data protection and privacy is fundamental to facilitate ICT-enabled co-production.

Government culture

Perception on the part of government staff that ICTs are intrusive creates resistance to ICT-enabled co-production. Great efforts to persuade staff of the benefits of ICT-enabled co-production go towards improving this situation.

Barrier:

- Negative attitudes on the part of staff towards ICTs because they feel this is a threat to their professional position.

Enabler:

- Efforts to convince staff on the advantages of ICTs as an adequate instrument to improve the provision of public services.

A number of papers from the systematic review provide insights into the cultural factors exhibited by government organizations (governments or public agencies) that are associated with being a barrier to or an enabler of ICT-enabled co-production.

Five papers analyse how organizational culture may create resistance to the use of ICT in co-production. Several papers discuss situations in which government staff perceive ICTs as potentially controlling and intrusive, introducing too much rigidity to the organization. For example, S20 finds that midwives perceive medical ICTs such as electronic patient records as a threat hampering their professional position and work organization at the hospital. Other papers (S1,

S26, S40) report negative attitudes on the part of physicians to co-produce with patients, expressing a preference to not have to contact patients by email or web-based chats. In another study, police officers are reluctant to use ICTs for co-production with citizens as they felt this diminishes their importance as a service provider (S34).

As regards cultural factors associated with enabling ICT-enabled co-production, government efforts have focused on persuading staff to use ICTs to improve the efficiency of the public service in question. A good illustration is in the police force where efforts convinced professionals working in the safety and justice system that Citizens Net was a better instrument to solve crimes than, for example, television programmes on missing persons (S34).

3.5.2. Citizen barriers to and enablers of ICT-enabled co-production

Some 33 out of the 48 studies included findings on specific citizen factors that influence the take-up of ICT-enabled co-production. Table 3.3 presents the distribution of studies which report information of the citizen factors analysed, the public services in which co-production takes place, as well as the ICTs involved in the process. The most commonly cited structural barriers included technical skills and demographics (particularly, age and gender), whilst a number of cultural barriers were also discussed, including trust in government and social factors.

Technical Skills

A lack of technical skills, along with a negative attitude toward ICTs, tend to reduce the participation of citizens in ICT-enabled co-production. The combination of bottom-up processes and ICT training is key to reduce citizens gap of technological skills.

Barriers:

- Lack of training to prepare citizens for ICT-enabled co-production.

- Difficulties in understanding the terms and conditions associated with certain ICTs.

Enablers

- Including citizens in the early stage of ICT-enabled co-production enhances their knowledge of ICT use.

- Deploying only the most common ICTs, such as telephony, encourages participation of citizens from different demographic backgrounds in ICT-enabled co-production.

Twelve studies analyse the relationship between technical skills and citizen ICT-enabled co-production. Five studies find that citizens with fewer technical skills, or a negative attitude towards trying out new ICTs, were less engaged with government ICT-enabled co-production initiatives than citizens with more skills

(S14, S16, S25, S29, S37). The major reason for this is that citizens are simply unprepared, technically or psychologically speaking, for specific ICT developments (S22, S45). For example, S45 examines the City of Ghent's promotion of mobile phone-based applications to facilitate citizen co-production of public services. However, a lack of technical skills or perceived difficulty on the part of the citizen are shown to be a major hindrance to ICT-enabled co-production by citizens (S45). Other factors include difficulties experienced by citizens as regards understanding the terms and conditions of open government data (S23), and a general fear of being humiliated (S35).

The literature also includes mechanisms which may enable citizen ICT-enabled co-production. One key method is to reduce citizens' "gap" of technical skills required by a given technology using a combination of bottom-up processes and technological "push". Including citizens with diverse technical and demographic backgrounds in the early stages of ICT development, for example, within Living Labs and Smart City initiatives, has been found to increase the successful use of ICTs for co-production (S5, S17, S45). Another strategy with a similar aim pursued by co-production initiatives is to only deploy the most commonly used ICTs, such as fixed and mobile telephony, as in the case of Citizens Net (S34).

Demographics

Older people and females use ICT-enabled co-production less than their younger and male counterparts. Regardless of age and gender, those citizens possessing technical skills tend to actively use ICTs in public services' co-production.

Barriers:

- Older people who lack technical skills have more trouble using ICTs to co-produce.

- The adoption of ICT in co-production might bring a "second digital gender divide".

- Generational differences: older women tend to use ICTs to co-produce less than younger women.

Enablers:

- Government can design ICT training programmes focuses on older people.

- The design of ICTs matters for older people. Co-production may be facilitated through the use of user-friendly ICTs.

- Government policy is an essential instrument to reduce the gender digital divide in ICT-enabled co-production "egalitarian discourse".

Table 3.3 Distribution of studies, sectors and ICT typologies at citizen level

				Structural citizen factors			Citizen culture	
#	Studies	ICT type	Sector	Age	Technical skills	Gender	Trust	Social dynamics
S1	Amann et al. (2016)	Social networking	Health				✓	
S2	Angelini et al. (2016)	Mobile phone	Health, public transport	✓✗				
S5	Bifulco et al. (2017)	-	Environment, public transport		✓			
S7	Buchmüller et al. (2011)	E-mail, social networking and telephone (fixed or mobile)	Education, environment, public transport			✓✗		
S8	Burch and Harris (2014)	Massive Open Online Courses (MOOCs)	Education			✓		✗
S9	Chatfield et al. (2013)	Early warning system	Government information service					✓
S10	Criado and Villodre (2018)	Social networking	Government information service			✗		
S11	Da Silva and Albano (2017)	Information management system	Government information service				✓	
S13	Ferreira (2017)	Social networking	Education			✓		
S14	Gao (2018)	Social networking and fixed telephone	Government information service		✗			
S16	Granier & Kudo (2016)	Information management system	Environment	✗	✗		✗	✗
S17	Gutiérrez et al. (2016)	Environmental sensors (IoT)	Environment		✓			
S19	Hardill & Mills (2016)	E-mail, social networking and mobile phone	Education	✓✗				
S20	Henwoord & Hart (2003)	Information management system	Environment and Health			✗		
S21	Huang (2015)	Massive Open Online Courses (MOOCs)	Education	✓✗				
S22	Karahasanović et al. (2009)	Blogs, e-mail, social networking and television	Education	✓✗	✗			
S23	Khayyat & Bannister (2017)	Open data repository	Government information service		✗			
S25	King & Cotterill (2007)	Information management system	Education and health		✗		✗	
S27	Linders (2012)	Social networking	Education, government information service and health				✓	
S28	Löbel et al. (2016)	Information management system	Environment				✓	
S29	Maciulienè and Skarzauskienè (2016)	Augmented reality, crowd-mapping and social networking	Environment		✗		✗	
S31	Mayangsari and Novani (2015)	-	Education, health, public transport and safety					✓
S33	Meijer (2012)	Social networking and telephone (fixed or mobile)	Safety			✗	✓✗	
S34	Meijer (2015)	Social networking and telephone (fixed or mobile)	Safety		✓			
S35	Millward (2003)	E-mail, fixed telephone and television	Education	✓✗	✗			
S36	Muñoz-Erickson (2014)	Social networking	Environment					✗
S37	Nambisan and Nambisan (2017)	Information management system and social networking	Health		✗			
S38	Roussinos and Jimoyiannis (2013)	Blogs, social networking and wikis	Education					✓
S39	Szkuta et al. (2014)	Social networking	Education, health and public transport				✓	
S42	Tursunbayeva et al. (2017)	Social networking	Health					✓
S44	van den Heerik et al. (2017)	Social networking	Health					✓
S45	van der Graaf and Veeckman (2014)	Cloud system, social networking and wireless technology	Environment, public transport		✓✗			
S47	Wildevuur and van Dijk (2011)	Tele-healthcare system	Health	✓				

Source: Scopus and Web of Science. Coding: ✓ = enabler, ✗ = barrier

The two most commonly cited demographic traits of citizens in the studies are age and gender. As regards the use of ICTs by older people more generally, it is already well-known that a so-called digital "generational" or "grey" divide exists. In its crudest form, this suggests younger people are more active ICT users than older people. Overall, the systematic review confirms this pattern: of the 7 studies which include the analysis of age, the majority find that, although older people often have a positive attitude towards ICT-enabled co-production, they tend to engage in these activities less frequently than younger people overall. There are, however, many important nuances as regards the relationship between age and use of ICTs to co-produce. To fully understand this, other factors, including technical skills, emotional needs, type of technology and the perceived ease of use of the ICT in question also need considering.

One finding common to many studies is that older people who lack technical skills are hindered from using ICTs to co-produce. Experiments conducted at the Swiss Senior Living Lab experimentation, for example, report older people without ICTs skills perceive technologies as being too hard to learn how to use (S2). Similar findings are found in S16, S19, S21, S22 and S35. Older people lacking technical skills are more prone to worry about cyber-crime, as seen in S19. In addition, S35 conducted surveys in a deprived zone of England, and shows older people believed they lacked the skills or were "too old" to use the Internet, and were worried about being humiliated by their grandchildren.

A second, related, finding is that older people lacking technical skills may reject using ICTs to co-produce when they perceive this may reduce their social contact with others. For example, as regards co-production in health, S21 and S35 find older people believe using ICTs might diminish their contact time with health

professionals. In the context of energy co-production in Japanese smart cities, S16 finds older people would prefer to co-produce collectively rather than use ICTs to co-produce in an individualistic fashion.

Turning to factors that enable older people's co-production, possessing technical skills seems central. First, when older people have the ICTs required, they can be just as active – and on specific occasions, even more active – than younger people co-producing. This is particularly the case when older people perceive using ICTs to improve social bonding or using their "memory" to improve the world. Technically-skilled older people seem motivated to co-produce with ICTs in order to improve their own personal safety, health, and that of their families (S19). For example, a field experiment with older people with dementia in a nursing home showed the potential of communicating to their social circle using a tele-healthcare device, Scottie, in a non-verbal way (S47). Similarly, older people with technical skills are just as likely to use the internet to contact Public Administration, and even more likely to use ICTs to express their political opinion than younger people (S22). Clearly, governments can tailor ICT training with specific consideration for the elderly. Though some studies show cross-generational teaching (by the young to the elderly) can make some older citizens feel ashamed (S35), there are other positive examples where the young successfully help older citizens overcome their fears and negative approaches to technology (S21). A second major factor repeated across the studies is that the design of ICTs matters. Interestingly, older people often reject using technology that appears to be made "for" older people – as this is tantamount to admitting one belongs to this group and is thus "stigmatising" (S2). Instead, co-production may be facilitated when user-friendly, easy-to-operate and universally used ICTs are deployed, such as intuitive touchscreen smartphones.

As regards the relationship between gender and ICT use, the so-called "gender digital divide" – whereby women tend to be less active users of ICTs than men – has been widely explored (Hilbert, 2011). Given this, some scholars have worried that the introduction of ICTs to the co-production process might bring about a "second digital gender divide" (S10).

Two of the studies in the systematic review which considered gender found women were indeed less likely than men to use ICTs to co-produce. This was the case for a range of scenarios, including studies taking into account citizens of different ages and occupations within different ICT sectors. However, to provide a nuanced understanding of the relationship between gender and ICT-enabled co-production, other factors, including age, education, profession, and technical skills, also need to be considered.

A first set of studies found women less likely to use ICTs to co-produce than men in diverse scenarios. For example, S10 finds that female public sector workers tend to use less than their male co-workers the most successful social media community, NovaGob, implemented across Spain and Latin America to collaborate and exchange knowledge and create public sector innovation. In a similar vein, S33 finds that females were less likely than males to participate in Citizens Net, an ICT service to co-produce safety. A number of studies present findings on the reasons for which women may resist ICT-enabled co-production. For example, S20 finds that women working as midwives in the UK Maternity Service actively resisted the introduction of ICTs - in the form of the electronic patient record (EPRs) – because either they perceive they have insufficient time or interest to undertake this, or they believe manager (usually, male) are intent

on interfering with their job that is to fundamentally help other women successfully give birth.

A second major finding in the studies is that there is an important generational difference: older women are less likely to use ICTs to co-produce than younger women. So, for example, S7 found that older women often preferred traditional social contact, and, when using ICTs, preferred traditional voice telephony over more recent technologies. Older women expressed their reluctance to use ICTs as these were perceived to encroach on their private lives, adding to existing stress levels.

As regards factors associated with enabling ICT-enabled co-production in the category of gender, youth is central. S7 found young girls at school to be just as motivated as boys to use ICTs for social networking. This finding suggests that any gender digital divide can be broken down through targeted government policy. For example, S13 demonstrated how strong gender stereotypes around ICT use are still deeply pervasive even among young school children, and that campaigns to attract female students to the Internet are further required to disrupt stereotypes. S8 similarly finds the promotion of "egalitarian discourse" crucial to improving take-up of internet-based open courses by females.

As regards older women, those who possess ICT skills, and are heavily involved in a professional career and/or family, tended to use ICTs to co-produce in specific fields, particularly, with a view to improve the organizational complexity of their lives, such as for physical and psychological health, as well as for emotional connectedness with family (S7).

Citizen culture

A number of cultural attributes are shown to be significant as regards citizens' propensity to engage in ICT-enabled co-production. The most commonly cited issues in the literature include trust in government and social and other dynamic aspects.

Trust in Government

A lack of trust in the government tends to reduce the participation of citizens in ICT-enabled co-production.

Barriers:

- Citizens who are suspicious of the government are less likely to engage in ICT-enabled co-production.

- Immigrants and young people are suspicious of staff members and tend to not use ICTs to co-produce with them.

Enablers:

- Adopting policies aimed at enhancing citizen engagement in ICT-enabled co-production initiatives increases trust in government.

- Including intermediaries in ICT-enabled co-production helps to strengthen trust between citizens and governments.

The image citizens have of governments constitutes an important barrier to ICT-enabled co-production: a lack of trust in government means a citizen is less likely to use ICTs to co-produce (Margetts and Dunleavy, 2002). This relationship is also found in the systematic review, which underlines the centrality of trust in government to achieve ICT-enabled co-production. Five studies detected a lack of trust in government impeded citizens from using ICTs to co-produce (S16, S25, S29, S33). For example, S16 finds lack of trust (a fear the government may be manipulating citizens) as a key impediment to the promotion of citizen co-production of energy in Japanese smart cities. In another study, researchers find immigrants and young people were suspicious of the police and avoided using ICTs to collaborate with them (S33).

Where trust in government is greater, studies (six) found that ICT-enabled co-production becomes more prevalent. Indeed, some studies find that the active involvement of citizens in public service delivery and trust in government may be positively be correlated in a bidirectional way. S39 demonstrates that the greater the citizen participation in public service delivery, the greater the trust they have in the government. S33 finds that the success of the initiative, Citizens net, in which citizens co-produce with the police to improve the effectiveness of safety services in the Netherlands, led to a bolstering of citizen trust in the police. In contrast, S1 and S27 argue that the more citizens trust government, the more they will actively participate in government ICT-enabled co-production initiatives. Other studies highlight the important role of intermediaries as a "bridge" of expert knowledge that help to strengthen trust between citizens and government through ICTs (S11, S28). For example, S28 shows that in specific cases that are highly complex legally and technically, such as the one that affects environmental protection regulations in Germany, the involvement of

intermediaries or experts on these issues improved the relationship of mutual trust with the government by using a common technical language.

Social dynamics

ICT-enabled co-production may be avoided if citizens feel it may disrupt existing social dynamics or where there is an impediment to participation. However, if citizens think co-production will increase new collaboration, they may accept it.

Barriers:

- Citizens avoid engaging in ICT-enabled co-production when they fear their traditional forms of co-production can be threatened by ICTs.

- Specific ethnic, social and language differences may hinder ICT-enabled co-production.

Enablers:

- Where ICT-enabled co-production created collaboration, it seems to be more attractive for citizens.

Social dynamics also influence ICT-enabled co-production. As regards barriers, several papers found that citizens avoid participating in ICT-enabled co-production if they feared their traditional forms of social interaction were threatened by technologies. For example, in the case of the Japanese smart city (S16), older citizens avoided ICT-enabled co-production because they perceived

this replaced more traditional, social and collective form of co-production. Other studies find that specific ethnic, social and language differences may hinder citizen participation in ICT-enabled co-production (S8, S36).

As regards enablers, where ICT-enabled co-production creates collaboration, it may prove attractive to some citizens. For example, S38 finds that highly collaborative groups, rather than groups composed of individual learners, were more likely to be active "wiki" content creators. In other studies, highly collaborative groups constituted an essential form of 'social capital', with a shared sense of identity, and actively engaged in the co-production of public services (S9, S42, S44, S31). S9 finds that collaborative groups in Indonesia with a shared understanding about disaster situations played a fundamental role in the co-production of time-critical information services on tsunamis and earthquakes using social networking such as Twitter. S44 similarly finds that collaborative groups were able to boost the impact of campaign messages aimed to reduce unhealthy behavior such as smoking, through the co-production of the health campaign initiated by the Dutch Cancer Society on Facebook and Twitter.

3.6. Conclusions

This study offers the first systematic review on what we know about the barriers to, and the enablers of, ICT-enabled co-production among government and citizens around the word. Policymakers and politicians have voiced their support for the deployment of ICTs and a number of initiatives have been rolled out. Theoretically speaking, ICT-enabled co-production of public services is justified by the idea that this can improve the delivery of public services. Before summarizing the findings and pointing out a future research agenda, we mention

the limitations of the methodology used in this study, the systematic literature review.

First, with the aim of achieving maximum objectivity, we carefully applied inclusion and exclusion criteria to screen potentially relevant studies for our systematic review. However, there is unavoidable subjectivity in the screening process that may affect the results of the systematic review. Second, although this systematic review covered two important scientific databases, Scopus and Web of Science, it did not cover other sources, such as Google Scholar, which means potentially relevant contributions on the topic may have been missed. Third, this study relies to a great extent on empirical studies which have relevant policy implications. However, the systematic review methodology offers few possibilities for generalization, making comparison between these studies very difficult. In this vein, further research based on quantitative analysis, such as experiments, could be relevant to obtain greater knowledge. Fourth, though a systematic review provides an overall picture of what has been published on the topic to date (country, sector and type of ICT), policy recommendations cannot be drawn. For example, we have little idea about the relative importance the kind of ICT has upon the potential success of ICT-enabled co-production based on this methodological approach.

As regards our findings, we looked at possible government enablers and barriers affecting ICT-enabled co-production. We distinguished difference between structural and cultural factors first looking at the government side. On the structural side, the key government barriers are associated with shortage of finance, inadequate technical skills of staff and complex regulation, including, for example, privacy legislation that is not adapted to share patient data among

practitioners. On the cultural side, barriers are associated with resistance of professional staff to use ICTs in co-production. One specific case in point is a medical practitioner, for example, who may be opposed to sharing medical data with patients directly through e-mail or chats. As regards government enablers, these are also associated with structural factors: government selection of lower cost ICT solutions, adequate staff training, and government support to adapt regulation to ICT-enabled co-production. In this regard, the literature provides examples in which governments undertook action to overcome problems associated with the lack of professional confidentiality between practitioners and patients when using different types of ICTs in healthcare services. On the cultural side, the review includes examples of government solutions to restore trust between citizen and governments. For example, one way of strengthening trust in government is through intermediaries or experts as advisers in ICT-enabled co-production initiatives.

On the citizen side, our we found that major barriers are related to demographic factors. Some studies reported that older people and females tend to use ICTs to co-produce less than their younger and male counterparts. To some extent, then, the literature review identifies a "second digital divide" as regards ICT-enabled co-production. In addition to the lack of technical skills, citizens may decline to use ICTs because of their worries and negative emotions around technology, such as the fear of being humiliated by their grandchildren when using them. As regards cultural barriers, a lack of trust in government, specific ethnic, social and language differences, and fearing disruption of traditional forms of social interaction were relevant. Older people may avoid using ICTs if they perceive that these technologies reduce their social contact with other groups of citizens. As regards citizens' enablers, most reviewed studies identify an earlier

involvement of citizens in ICT-enabled co-production, particularly in the design phase, as a means of encouraging interaction using ICTs. Other enablers consist of running tailored technical training for citizens in order to overcome their barriers to use ICTs. For example, government implementations aimed at designing user-friendly and easy-to-use applications, which are attractive and avoid stigmatizing certain groups of citizens, may encourage citizens to co-produce. Finally, this review shows that citizens are more likely to participate in ICT-enabled co-production when they constitute collaborative groups as a form of social capital, which tends to strengthen trust among participants.

What should the future of this research agenda look like? Both conceptual and methodological advances are required. As regards the first, greater work is needed on the conceptualization of different modalities of ICT-enabled co-production. Beyond categorizing ICT-enabled co-production by the name of the ICT (telephony, social networking, email, etc.), it may be worth categorization by affordability and ease of use, given this review found that the simple and cheaper ICTs tended to face fewer barriers – but this finding needs testing and development. As regards the second, future research could aim to apply a quantitative approach to better understanding the barriers to and enablers of ICT-enabled co-production, perhaps by doing experiments. What we found in this review is that a category such as "gender" has no fixed influence as regards a barrier to or enabler of ICT-enabled co-production. Instead, gender needs to be considered alongside other factors, such as education, family situation, work status, and so forth. Hence, experimental approaches are ideal to learn more about the potentially interactive effects of the multiple factors included in this review.

CHAPTER 4

Traditional vs ICT-enabled co-production in healthcare. A multi-level approach

This chapter also appeared as Clifton, Díaz-Fuentes & Llamosas García (Forthcoming)

4.1. Introduction

Co-production, conceptualized as joint production of activities by government officials, individual citizens and communities in the design, management, delivery, and/or evaluation of public services, is an important strand of ongoing public services reform (Alford, 2014; Bovaird, 2007; Brandsen & Honingh, 2018; Strokosch & Osborne, 2016). In the healthcare sector, co-production refers to the active involvement of patients, healthcare providers, and/or family members in the provision of healthcare services from which actors benefit (McMullkin & Needham, 2018). Co-production of healthcare services has been increasingly championed by researchers and policy-makers worldwide, since the engagement of both patients and healthcare providers in the design and delivery of health services is seen as an important means to improve the quality of care (Holland-Hart et al., 2019; Vennik et al., 2016). Increasingly, co-production is promoted as a central strand of health policy. For example, the National Health Service (NHS) in England recently launched a national programme to lead "collaboratively with patients and communities", inviting patients, healthcare providers, caregivers, and community-based leaders to come together to explore how to develop collaborative relationships and lead system changes (NHS England, 2015, The King's Fund, 2016).

With the rapid spread of ICTs, the intensity, potential for, and nature of public participation in "traditional" forms of co-production has changed (European Commission, 2018; OECD, 2018; Mukhtarov, Dieperink, & Driessen, 2018). "ICT-enabled co-production" is the term commonly used to refer to the use of ICTs to support engagement in more traditional forms of co-production of public services. One high-profile example is the use of E-healthcare systems (health

information technologies) which consists of using internet and computer as a medium whereby the doctor interacts with their patients to improve their health (DonHee, 2017; Susanto & Kang Chen, 2017; Timmerman et al., 2016). Many Health Organizations around the world try to improve these medical technologies in order to make people much healthier. For example, in the USA, the government spent approximately 38 billion dollars over a decade to support health information technologies (Lustria et al, 2011). However, ICTs can also contribute to create new opportunities to co-produce healthcare services (Procter et al., 2018). A practical example of such ICT-enabled co-production in healthcare was the Whole System Demonstrator (WSD), the largest controlled trial of tele-healthcare to date, carried out in United Kingdom between 2008-2011 (Wherton et al., 2015). This system was aimed at providing evidence of cost-effectiveness through the use of assisted living technologies (ALTs) that ensure citizens with reduced mobility living in their home to remain in contact with healthcare providers. In another example, the engagement of citizens in the collection of atmospheric information through their mobile phones helped scientists understand the effects of pollution on health, climate, and air traffic (World Health Organization, 2017).

But who engages in traditional and ICT-enabled co-production in healthcare services, and why? As regards traditional co-production in public services more generally, there is already a large body of research that has largely analysed citizens' motivational and demographic factors which may influence engagement with co-production (Bovaird et al., 2015; Fledderus and Honingh, 2016; van Eijk and Steen, 2016). However, we know relatively little about the factors that explain citizen engagement with ICTs to co-produce public services (Meijer, 2015, for a systematic review, see Clifton et al., Forthcoming). Of the existing, emerging research, some authors have suggested that ICTs may facilitate but, also, block,

citizens' engagement in co-production. Just as ICTs created a "digital divide" as regards haves/have nots (Asgarkhani, 2005; Millward, 2003), ICT-enabled co-production may have a similar effect, presenting a "double digital divide" affecting specific groups of citizens (Criado and Villodre, 2018). For example, the deployment of rehabilitation robots for caring geriatric patients in hospitals prevented a good number of intended users to not be capable of interacting with (Lember et al., 2019). This "double digital divide" could feasible lead to new healthcare inequalities (Ravn and Mejlgaard, 2015). Recognizing this undesired outcome, some healthcare organizations have already started to offer citizen training on basic online skills and use of electronic health apps (World Health Organization, 2017).

This study seeks to understand factors influencing citizens' participation in healthcare co-production comparing traditional and ICT-enabled co-production. To do so, we analyze data from a large healthcare survey of 5850 individuals and develop a multi-level approach to compare citizen engagement in traditional and ICT-enabled co-production in healthcare services across the five health and social care Trusts in Northern Ireland. We first construct an index of traditional co-production for each respondent in relation to specific healthcare activities which do not require the use of ICTs. For example, regular exercise, following a healthy diet, visit a healthcare professional, reduce stress in life, clean up the fireplace in home regularly, and care-giving activities. Second, we provide an index of ICT-enabled healthcare co-production which covers specific healthcare activities carried out through ICTs. For example, Internet searches for health information, request for medical prescriptions online, scheduling a medical appointment through the Internet, communication with a healthcare provider by e-mail, usage of chat groups on health topics, and purchase of medicines over the Internet.

Our exploration seeks to capture the effect of individual level factors as well as regional ones. Multi-level approaches are particularly advisable for studying individual-level factors within cluster or groups, in which it is possible to measure regional effects (Hox et al., 2017). First, we explore the influence of individual-level factors on both traditional and ICT-enabled co-production. In particular, we explore motivations, such as self-efficacy, citizens' perception of government performance (external efficacy), self-esteem, locus of control, and citizens' perception of their own health (health status) (Fledderus and Honingh, 2016), and demographics, such as technical skills, age, gender, religion, marital status and labour status (Alonso et al., forthcoming; Parrado et al, 2013), all of which may have a significant influence on citizen participation in healthcare co-production. The success of the integrated healthcare system in Northern Ireland may vary across its five Health and Social Care Trusts. Hence, secondly, we examine the influence of regional-level factors on traditional and ICT-enabled healthcare co-production across different areas in Northern Ireland.

Our findings suggest that citizens who exhibit high levels of self-efficacy, external efficacy, and a low perception of their own health are more likely to co-produce healthcare services with and without ICTs. However, citizens with high locus of control and low self-esteem tend to co-produce more using ICTs. As regards demographic traits, we detect an "inverse gender" effect, whereby females are more likely than males to participate in both forms of healthcare co-production. On the contrary, we observe a low involvement of older people in ICT-enabled co-production, suggesting evidence of a digital "generational divide". As regards regional factors, citizens who live in rural areas are less prone to participate in ICT-enabled co-production. Finally, we find that traditional forms of healthcare co-production significantly differ among the five Health and Social Care Trusts,

whilst ICT-enabled co-production is not significantly prone to reveal regional differences.

The rest of the chapter is organized as follows: We first review the literature on citizen and regional factors which influence traditional and ICT-enabled co-production, including motivations, demographics and urban-rural effects. We then explain the key measures, hypotheses and analytical method that comprise our research design. Thereafter, we present the results of the analysis we undertake, before concluding with the findings and policy challenges of the study.

4.2. The influence of citizen and regional factors on healthcare co-production

This section summarises findings in the literature about motivation, demographics and regional factors explaining both traditional and ICT-enabled co-production of public services in general. As regards motivations, the literature has failed to provide a deep understanding on how specific motivations significantly influence citizen engagement in ICT-enabled co-production. This is the case, for instance, of intrinsic motivations based on the idea that citizens are willing to engage when they find it interesting, worthwhile and enjoyable. For example, Fledderus & Honingh (2016) and Loeffler & Bovaird (2017) suggested that motivations such as self-efficacy, external efficacy (citizens' perception of government performance), self-esteem, locus of control, and health status (citizens' perception of their own health) are important predictors of co-production. "Self-efficacy" consists in the belief in one's ability to perform a given action, and it is recognized as one of the most relevant and recognized factors explaning citizen co-production (Bovaird et al., 2016; Loeffler and Bovaird, 2016; Parrado et al., 2013). Another type of motivation may also affect the citizens'

belief that the responsiveness of government authorities influence co-production. "External efficacy" or, in other words, the perception of citizens about government performance is another important predictor to explain citizens' co-production (Bovaird et al., 2016; Tuurnas, 2016). For example, Parrado et al. (2013) found a positive correlation between external efficacy and citizens' engagement in the co-production of healthcare in Denmark and France.

The literature has emphasized the relevance of additional motivations to explain citizen co-production. It has been argued that "self-esteem", defined as the overall value one places one-self as a person (Fledderus & Honingh, 2016), is positively correlated with co-production. For example, Mayer & McKenzie (2017) found that co-production with mental health workers in UK had a psychological great impact on participants' self-esteem. In another study, the effects of co-production initiatives in residential social care in several European countries increased both citizens' satisfaction with the service and the self-esteem of citizens with disabilities (Angelova-Mladenova, 2016; European Commission, 2018). "Locus of control" may be also used to examine whether some groups of citizens are more prone to others to engage in public services' coproduction (Bendapudi & Leone, 2003). The literature distinguishes between internal and external locus of control. The first is the belief that it is possible to influence things to happen while the second is more related to the feeling that events may occur as result of fate or luck (Fledderus, 2015). Empirical evidence found that internal locus of control is somewhat associated with higher engagement in public service delivery (Fledderus & Honingh, 2016). "Health status" reflects the perception of citizen's own health. Preceding empirical studies on healthcare co-production found a very strong negative association between health status and the co-production of healthcare in different European Union's countries (Bovaird et al., 2016; Parrado et al., 2013).

In addition to citizens' motivations, the literature has also addressed the association between demographic traits and both traditional and ICT-enabled co-production, including technical skills, age, gender, religion, marital status, and labour status (Alonso et al., Forthcoming; Bovaird et al., 2015; Bovaird et al., 2016; Parrado et al., 2013). More specifically, scholars have argued that citizens with fewer technical skills, or negative attitudes towards trying out new ICTs are less likely to engage in ICT-enabled co-production (Granier and Kudo, 2016; Van der Graaf and Veeckman, 2014; for a systematic review, see Clifton et al., Forthcoming). Compelling reasons to explain this lack of technical skills are, for example, fear or being humiliated (Khayyat and Bannister, 2017), misunderstanding with term and conditions of ICTs (Khayyat and Bannister, 2017), and a lack of training to support citizens in ICT-enabled co-production (Karahasanović et al., 2009).

The literature on "traditional" co-production finds that age is an important predictor of co-production. In particular, previous empirical evidence showed that older people tend to co-produce more than youth in individuals form of co-production (Bovaird et al., 2016; Parrado et al., 2013). However, it is already well-known that a so-called digital "grey divide" exists, or in other words, the unfavorable effect of ICTs on older people may impede their engagement in co-production activities. A body of research confirms that, although older people often have a positive attitude towards ICT-enabled co-production, they are less likely to engage than younger people overall. For example, Huang (2015) and Millward (2003) found that older people believe that using ICTs reduces their contact time with healthcare professionals.

Gender has also been considered as an important factor of citizen's co-production (Ferreira, 2017), particularly in the healthcare sector in which females are socially disadvantaged as regards their health (World Health Organization, 2012). For example, Parrado et al. (2013) argue that women tend to co-produce and volunteer more than men in the case of traditional co-production. However, the deployment of ICTs in the co-production process may change or even reverse this gender effect because of the so-called "gender digital divide". Indeed, scholars have worried that the deployment of ICTs in public service delivery might lead to a lower engagement of women in these activities, giving rise to a "second digital gender divide" (Criado & Villodre, 2018). For example, Meijer (2015) found that women were less likely to participate in Citizens Net, an ICT service to co-produce safety, than men.

The literature on co-production has also investigated the relevance of networks and the social capital resulting from these networks – for example religious activities, marital status, and other kind of group memberships influence citizens' participation (Putnam, 1993; Svendsen & Svendsen, 2000; Van Eijk & Gascó, 2018). According to the literature on both political participation (Timpone, 1998), and volunteering (Dekker & Halman, 2003), other demographic traits such as labour status are found to affect citizens' decisions to participate. Finally, other scholars stress that social forms of interaction may be threatened by the use of ICTs. For example, empirical evidence shows that specific ethnic groups, religions, and language differences may hinder citizens' co-production (Burch & Harris, 2014; Muñoz-Erickson, 2014).

A body of research has also investigated the influence of regional factors on public services' co-production (OECD, 2018a). It has been argued, that regional

differences present specific infrastructures which, consequently, may influence citizens' engagement in co-production. Indeed, institutionalized structures in the healthcare sector are required within a government to facilitate cross-regional problem-solving approaches to address power imbalances (World Health Organization, 2012). In Northern Ireland, for example, there are five Health and Social Care Trusts, which are geographically defined areas responsible for the delivery of primary, secondary, and community healthcare (Heenan & Birrell, 2009). Since regional factors are assumed to produce uncertain healthcare outcomes (Alford & Yates, 2016), scholars have investigated how rural-urban factors impact on citizen engagement in healthcare co-production. For example, Vrangbaek (2015) illustrated different forms of citizen involvement in health care in Denmark, depending on local and regional practices that are particularly relevant for healthcare issues. In particular, some scholars have identified a "urban-rural divide" that affects the participation of citizens in ICT-enabled healthcare co-production. For example, Van Velthoven et al. (2018) found empirical evidence that citizens residing in rural areas, such as older people and citizens with low education levels, were less likely to co-produce healthcare services through the Internet than their counterparts living in different urban areas in the UK.

4.3. Methodology

We compare traditional versus ICT-enabled co-production behavior in healthcare services using individual-level data from the 2014/15 Heath Survey Northern Ireland (HSNI), which is conducted by the Department of Health, Social Services, and Public Safety in Northern Ireland (DHSSPS). This wave is the fourth year of the survey and is the most recent survey's wave available for public access in

the UK Data Service. The 2014/15 HSNI surveyed 5,850 people across the five Health and Social Care Trusts. Data were collected using face-to-face interviews which were administered in a face-to-face setting. This database provides evidence on peoples' views about different topics including general health, online health, medicine, and wellbeing, among others. This database constitutes the only UK health survey that includes questions related to peoples' participation in health activities using ICTs, specifically, using a computer. It also allows for the analysis of demographic variables, such as age, gender, educational attainment, and so on that may provide insights into individual healthcare behavior. The target sample consists of people aged 16+ living in private households (people living in prisons or homeless are excluded). Our dataset includes those people responding to questions about healthcare activities using ICTs that represent a subsample of 3078 individuals.

4.3.1. Measures

A variety of measures have been considered to capture the effect of citizens' factors associated with traditional and ICT-enabled healthcare co-production. Table 4.1 reports descriptive statistics of these measures, including the dependent variables, individual-level factors associated with citizen engagement, and other regional measures that provide additional information on how co-production varies among different regions or areas.

As regards the dependent variable, we include two comprehensive measures of healthcare co-production which are summed to construct two co-production indexes. To form these measures, different healthcare activities are included, with each behavior coded 1 = respondent conducted the activity and 0 = otherwise. One dependent variable reflects traditional healthcare co-production that does

not require the use of ICTs, while the other includes ICT-enabled healthcare co-production that requires the use of an online computer. The first involves the following healthcare activities: 1) regular exercise, 2) following a healthy diet, 3) visit a healthcare professional, 4) reduce stress in life, 5) clean up the fireplace in home regularly, and 6) care-giving activities. The second variable includes the following healthcare activities: 1) Internet searches for health information, 2) request for medical prescriptions online, 3) scheduling a medical appointment through the Internet, 4) communication with a healthcare provider by e-mail, 5) usage of chat groups on health topics, and 6) purchase of medicines over the Internet.

Table 4.1 Descriptive statistics

Variables	Min	Max	Mean	Std. Dev.
Co-production behavior				
Traditional healthcare co-production	0	6	1.12	0.96
ICT-enabled healthcare co-production	0	6	0.59	0.76
Motivation variables				
Self-efficacy	0	1	0.71	0.45
External efficacy	0	1	0.35	0.48
Self-esteem	1	4	1.91	0.28
Locus of control	0	3	1.88	0.96
Health status	0	1	0.83	0.37
Demographic variables				
Technical skills	0	5	2.57	1.80
Age	1	7	4.22	1.77
Female	0	1	0.59	0.49
Religion	0	1	0.91	0.28
Married	0	1	0.56	0.49
Employed	0	1	0.50	0.50
Rural	0	1	0.37	0.48

Data sources: Health Survey Northern Ireland (2014/15)

Besides these co-production measures, we include individual factors associated with traditional and ICT-enabled co-production. In particular, we focus on motivations and demographic characteristics that may have a significant influence on citizen engagement. As regards motivations, a variety of variables have been identified by the literature. First, to evaluate the influence of self-efficacy on healthcare co-production, we include a proxy variable based on the following question of the HSNI survey: "Do you feel that there is anything you can do to make your life healthier". This variable takes the value of 1 if the respondents answer "yes", or 0 otherwise. Self-efficacy is associated with higher levels of citizen engagement in traditional co-production of public services (Parrado et al., 2013), however this logic may be different when it is associated with ICT-enabled co-production. Second, we also include "external efficacy", or in other words, the citizen perception of government performance, using the following HSNI question: "Has the support or treatment you received from health and social care services improved your quality of life?" The possible responses were: "Yes, definitely", "to some extent", and "no". To simplify this interpretation, we convert this question into a binary "proxy" variable that takes the values of 1 if the respondent answer "yes" and 0 for "no". Third, we introduce a proxy variable of "self-esteem" into the model through the following HSNI question: "Have you recently been thinking of yourself as a worthless person?" This variable takes the value from 1 (Not at all) to 4 (Much more than usual). To facilitate the interpretation of results, we reverse the variable scale so 1 is "much more than usual" and 4 stands for "not at all". In this way, if we observe a negative effect of this variable on the model, this would mean that citizens with a lower level of self-esteem are more prone to co-produce. Fourth, to evaluate the influence of internal "locus of control", we use the following survey question: "how much influence do you think you have

on your own health?". This consists of a binary "proxy" variable which takes a value between 1 (a great deal) to 4 (none at all), depending on the importance the respondents give to the question. To facilitate the subsequent interpretation of our results, we invert the scale of the variable that 0 stands for "none at all" and 3 for "a great deal". It has been argued that people with a high sense of internal locus of control tend to select challenging tasks (Bandura, 1989), and are more likely to get involved in public initiatives (Fledderus & Honingh, 2016). Finally, "health status" reflects the perception of citizens' own health. We use the question "Over the last months, would you say that your health has on the whole been good, fairly good, or not good?" to construct a binary variable that takes the value 1 if respondents consider that their current health is "good" or "very good" and 0 if it is "bad" or "very bad".

As regards demographic factors, this study includes a set of variables, that as discussed earlier, might affect healthcare co-production. First, "technical skills" is measured through a categorical variable that asked for the highest level of qualification attained. Response categories are the following: degree level or higher, higher education, GCE Level, GCSE A-C or equivalent, GCSE D-G or equivalent, no qualification. To facilitate the interpretation of this variable, we reverse the scale so that a score of 0 is coded as "no qualification" while a score of 6 accounts for "degree level or higher". Second, "age" is one of the most cited demographic traits along with gender in the co-production literature. In order to analyze "generational" effects as regards traditional and ICT-enabled co-production, we include a categorical variable that takes value from 0 (16-24 years old) to 7 (75+ years old). Third, we account for respondents' gender by including another binary variable that takes the value of 1 the respondent is a "female". Fourth, to assess the effect of different religious minorities on healthcare co-

production in Northern Ireland, where these social groups have a great political and cultural importance in the country, we include a binary variable that reflects the effect of being religious ("religion"). This variable takes the value of 1 if the respondent belongs to a specific religion and 0 otherwise. Fifth, we control for marital status by including a "binary variable" that takes value of 1 for those individuals who answered to be "married" at the time of the survey and 0 if they were single. Sixth, we include a binary variable that measures if respondent's labor status explains health co-production. This variable is coded 1 if the respondent was "employed" at the time of the survey and 0 if they were not. Finally, as regards regional measures, we include a binary variable that takes the value of 1 for those respondents who reside in "rural" areas and 0 if they reside in urban areas.

4.3.2. Hypotheses and model design

In order to examine the influence of citizens' motivations, demographics, and regional factors on traditional and ICT-enabled co-production in healthcare services, we construct a multi-level setting approach consisting of two models. The first includes a dependent variable consisting of a traditional healthcare co-production measure, while the second includes an ICT healthcare co-production measure. Multi-level approaches are used to evaluate populations that are located within other clusters or groups, that in this case, consist of five health and social care Trusts in Northern Ireland. Taking this into account, the objective of this modeling construction is to test the following hypotheses:

- *Hypothesis 1: Citizens' motivational factors have a significant influence on both traditional and ICT-enabled co-production in healthcare services.*

- *Hypothesis 2: Demographic characteristics of citizens play a fundamental role in both traditional and ICT-enabled co-production in healthcare services.*

- *Hypothesis 3: Regional factors explain differences between traditional and ICT-enabled co-production in healthcare services in Northern Ireland.*

In the analysis of count data, the literature advises to use discrete models, including Poisson distribution. The use of simple linear regression methods can lead to inefficient biases as result of the characteristics of the dependent variable that takes only non-negative integer values (Cameron & Trivedi, 1986). Therefore, the selection of a multilevel Poisson distribution might be preferred to address the discrete structure of our two co-production indexes. To fit these Poisson models, we propose to use Gauss-Hermite quadrature to evaluate and maximize the marginal log likelihood. This method generally works well with multi-level approaches used along with discrete distributions (Rabe-Hesketh & Skrondal, 2002).

4.4. Results

This section introduces the results of our multi-level analysis by estimating the effects of citizens' individual level and regional level factors on the two models (traditional and ICT-enabled co-production).To test the hypotheses, we estimate the two models containing our two co-production indexes together with five random intercepts, one for each Health and Social Care Trust in Northern Ireland. Table 4.2 summarizes these results in terms of log odds, derived from the two estimation models included, in which standard errors and 95% confident intervals

are reported. Additionally, this table includes estimated standard deviations for the random intercepts associated with regional factors. We include percentage changes of our estimations in order to facilitate the interpretation of coefficients in the two models.

4.4.1. Citizens' motivations and demographics towards healthcare co-production

We first address the effect of citizens' motivations and demographic factors on the two healthcare co-production models. Figure 4.1 compares the results of the two models and, in so doing, this provides average marginal effects along with their respective 95% confident intervals. As regards motivations, we find that self-efficacy, external efficacy (citizens' perception of government performance), and health status are the strongest predictors influencing healthcare co-production. These motivations appear to have a significant effect on both traditional and ICT-enabled healthcare co-production. By contrast, locus of control and self-esteem only appear to have a significant impact on ICT-enabled healthcare co-production. These results suggest that the use of ICTs plays a crucial role to explain differences between different citizen motivations in healthcare co-production. Covered by a 95% confident interval, we can, therefore, infer that those citizens with a high level of locus of control and low self-esteem are more prone to participate in ICT-enabled healthcare co-production. These results are not observed for traditional healthcare co-production, whose two regressors appear as insignificant. Since both forms of healthcare co-production appear to be influenced by different motivations, these results, therefore, support hypothesis 1 that citizens' motivational factors have a significant influence on both traditional and ICT-enabled healthcare co-production.

Table 4.2. Mixed Model Poisson estimates of healthcare co-production

	Model 1: Traditional co-production					Model 2: ICT-enabled co-production				
Independent variables	Coefficient	% change	Std. Dev.	95% Confidence Interval		Coefficient	% change	Std. Dev.	95% Confidence Interval	
Motivation variables										
Self-efficacy	0.2078	23.10	0.0474	0.1156	0.3015	0.1921	21.18	0.0655	0.0637	0.3205
External efficacy	0.2911	33.79	0.0370	0.2185	0.3636	0.2709	31.11	0.0482	0.1765	0.3653
Self-esteem	-0.0646	-6.25	0.0585	-0.1793	0.0501	-0.1618	-14.94	0.0744	-0.3076	-0.0161
Locus of control	-0.0267	-2.63	0.0494	-0.0999	0.0939	0.1532	16.55	0.0743	0.0075	0.2990
Health status	-0.1745	-16.01	0.0503	-0.2731	-0.0760	-0.1820	-16.64	0.0686	-0.3164	-0.0476
Demographic variables										
Technical skills	0.0601	6.19	0.0103	0.0392	0.0798	0.1929	21.28	0.0139	0.1655	0.2204
Age	0.0384	3.91	0.0133	0.0122	0.0646	-0.0914	-8.73	0.0173	-0.1253	-0.0575
Female	0.1554	16.81	0.0350	0.0867	0.2241	0.3089	36.19	0.0457	0.2192	0.3986
Religion	0.0441	4.51	0.0572	-0.0679	0.1562	-0.2375	-21.14	0.0615	-0.3581	-0.1168
Married	0.1391	14.92	0.0362	0.0678	0.2103	0.1476	15.90	0.0463	0.0569	0.2384
Employed	-0.0747	-7.20	0.0391	-0.1499	0.0307	0.0391	3.99	0.0513	-0.0614	0.1397
Organizational variables										
Rural	0.0415	4.24	0.0368	-0.1137	0.0308	-0.1767	-16.20	0.0470	-0.2688	-0.0846
Random effects										
Variance	0.0070		0.0055	0.0015	0.0327	0.0005		0.0017	0.0001	0.0274
Health and Social Care trusts	5					5				
N (Population)	3078					3078				
LR test (P-value)	0.0002					0.1437				
Log-likelihood	-4081.17					-3126.25				

Data source: Health survey Northern Ireland (2014/15)

Moving now to the regression results for demographic traits, table 4.2 reports point estimates, robust 95% confidence intervals, and percent changes to facilitate interpretation of results. Citizens who are better-educated, married, and females tend to co-produce healthcare services (with and without ICTs) more than their counterparts. These results appear consistent with previous studies on ICT-enabled co-production, except for gender in which the literature showed that females usually co-produce less than men through ICTs (Criado & Villodre, 2018, Meijer, 2012).

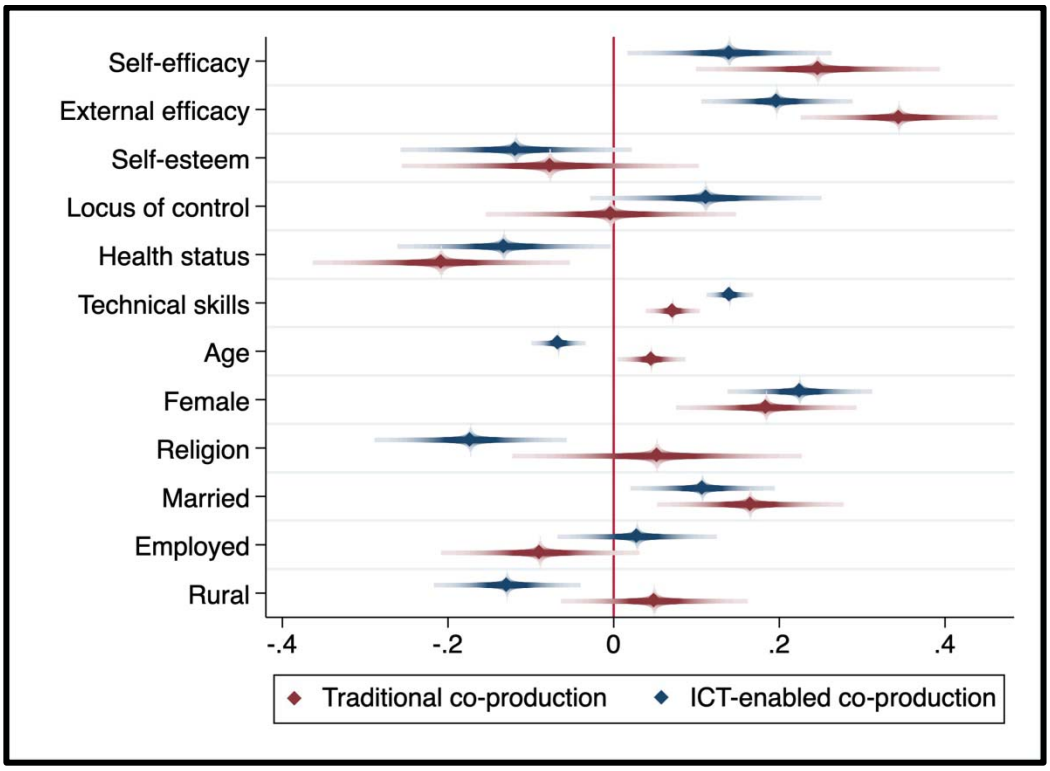

Figure 4.1. Average marginal effects and 95% confident intervals

As regards gender, the analysis suggests that females are more likely to engage than males in both traditional and ICT-enabled co-production. In addition, this

gender effect is greater for ICT-enabled healthcare co-production (35.67%) than traditional healthcare co-production (16.19%). Regarding age, it should be noted that the coefficient sign of "age group" is positive in traditional forms of co-production while it is negative for the case of ICT-enabled co-production. This result confirms the so-called digital "generational" divide, whereby younger people are more active ICT users in co-production than older people. Regarding religion, the probability that religious people use ICTs in healthcare co-production decreases by 21.14%, compared to non-believers. This result differs substantially from traditional healthcare co-production, in which this predictor is not significantly prone to reveal differences in healthcare co-production. We can therefore deduce that the use of ICTs significantly reduces the likelihood that religious people can participate in healthcare co-production. This result is noteworthy given the considerable presence of religious people in Northern Ireland, being this country the most religious part of the UK, with approximately 45% regularly attending church (Tearfund, 2007). Hence, these results support hypothesis 2 that demographic characteristics of citizens play a fundamental role in both traditional and ICT-enabled co-production in healthcare services.

4.4.2. Regional factors towards healthcare co-production

We now turn to the effect of regional factors on both traditional and ICT-enabled healthcare co-production in Northern Ireland. We firstly analyze the impact of urban-rural factors on co-production. Table 4.2 shows this estimated impact, reporting that citizens residing in rural areas tend to participate less in ICT-enabled co-production than their counterparts living in urban areas. However, this predictor does not appear to have a significant impact on traditional healthcare co-production. These results support previous research which argued

that an urban-rural divide exists in co-production in as result of the presence of ICTs in rural areas. For example, Hale et al., (2010) showed that persistence of a digital divide between urban and rural areas can be explained by other factors such as a lack of training or education, low levels of income, and poor broadband conditions.

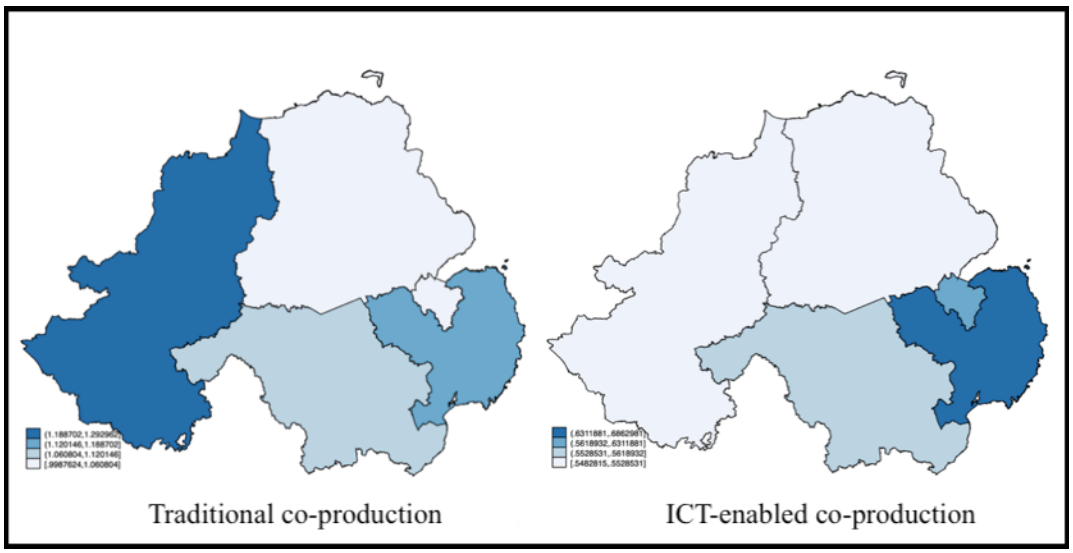

Figure 4.2. Average distribution of traditional and ICT-enabled co-production

Finally, in order to assess regional patterns of healthcare co-production in Northern Ireland, we introduce random intercepts which capture regional co-production variations across the five Health and Social Care Trusts in the country. In order to provide a sense of the study's geographical context, Figure 4.2 shows the spatial distribution of traditional and ICT-enabled co-production, recognizing the existence of clear differences between the five Health and Social Care Trust in terms of citizens' involvement in healthcare co-production. The results of the LR test, reported in table 4.2, show that traditional forms of healthcare co-production significantly differ among the five health and social care

trusts, whilst ICT-enabled co-production appears as not significant to reveal regional differences according to the LR test. These results support hypothesis 3 that regional factors explain differences between traditional and ICT-enabled healthcare co-production in Northern Ireland.

4.5. Conclusions

This chapter contributes to the burgeoning literature on co-production by empirically illustrating individual and regional factors influencing traditional and ICT-enabled healthcare co-production in Northern Ireland. The main difference between traditional and ICT-enabled co-production consist of the use of ICTs to improve the delivery of public services (Rodríguez Bolívar, 2015; Webster & Leleux, 2018b). For example, recently the NHS England has made great efforts to encourage the use of electronic health applications and ICT training among citizens in England in order to strengthen their health outcomes (World Health Organization, 2017).

This study suggests that citizens who exhibit high levels of self-efficacy, external efficacy, and a low perception of their own health are more likely to participate in both traditional and ICT-enabled co-production. However, citizens with high locus of control and low self-esteem tend to co-produce more using ICTs. Evidence of these findings are also supported by empirical studies on traditional co-production in other EU countries (Bovaird et al., 2016; Salvador Parrado et al., 2013). For instance, Alonso et al. (Forthcoming) found that those citizens with a higher level of self-efficacy are more prone to participate in environmental co-production initiatives in different municipalities in Wales.

This study also explores the influence of demographics and regional factors on traditional and ICT-enabled co-production. From an individual level perspective, this study provides partial support for earlier research on co-production (Meijer, 2012). As regards gender, findings suggest the existence of an "inverse gender" effect whereby women tend to co-produce more than their male counterparts in both traditional and ICT-enabled co-production in healthcare services. Findings are therefore inconsistent with previous empirical studies in ICT-enabled co-production which argued exactly the opposite: a "second digital divide" in which women were less active users of ICTs in co-production than men (Criado & Villodre, 2018). On the contrary, findings show that older people tend to exhibit a lower participation in ICT-enabled co-production in healthcare sector than young people, confirming evidence of a digital "generational" divide. These findings support similar evidence with other studies in which older people who lack technical skills were hindered from using ICTs to co-produce (Angelini, Carrino, Khaled, Riva-Mossman, & Mugellini, 2016; Gutiérrez et al., 2016). From a regional level perspective, firstly this study finds that citizens who live in rural areas are less prone to engage in ICT-enabled co-production, supporting previous research which argued about the existence of a "urban-rural" digital divide. Secondly, findings show that traditional forms of healthcare co-production differ among the five Health and Social Care Trusts in Northern Ireland, whilst ICT-enabled co-production is not significantly prone to reveal regional differences. One important implication of this might therefore be the inclusive nature of ICTs, which enable access to healthcare co-production from any regional area in Northern Ireland connected to the Internet.

This study highlights the importance of addressing policies to promote ICT-enabled co-production in the healthcare sector. The spread of ICTs tends to

reduce the distance between different country areas in terms of accessing to health services. In particular, in isolated rural areas with a lack of adequate road infrastructure, which may find difficulties travelling to major cities. Citizens living in remote places may be willing therefore to welcome ICTs as a support tool to connect more easily to other people around the world and engage in different healthcare co-production initiatives. However, those groups of citizens lacking technical skills or with a poor Internet connection, may be hindered to co-produce healthcare services. In response to that, government around the world may run tailored technical training programs for citizens in order to overcome negative emotions and fear around ICTs. For example, government implementations which consists of designing user-friendly and easy-to-use applications, which are more attractive for certain groups of citizens, may encourage citizens to co-produce.

Despite due diligence applied in this research design, this chapter poses important limitations which may encourage future research. The first is concerning that our approach is focused on cross-sectional data, or in other words, on a specific point of time. In this light, future research based on longitudinal data may be advisable to capture additional information on healthcare co-production. Second, we extract conclusions from individual and regional perspectives looking only at one public service. It would therefore be advisable to compare different public services as regards ICT-enabled co-production to analyze, for example, whether higher women participation in ICT-enabled co-production is as results of an increased interest in healthcare services on the part of women or it is a general behavior applicable to any public sector.

In conclusion, this study has studied the impact of individual and regional level factors on traditional and ICT-enabled co-production in healthcare services in

Northern Ireland (UK). In so doing, this study uses a multi-level model to understand citizens' engagement through different healthcare activities performed with and without ICTs. This study provides hence a humble contribution to the literature on traditional and ICT-enabled co-production in the healthcare sector and constitutes another link in the chain for supporting further research focused in the topic to expand their knowledge on healthcare co-production

CHAPTER 5.1

Conclusions

This doctoral dissertation contributes to the growing literature on understanding the factors influencing citizen behavior in services of public interest. The analysis consists of three part. First, a quantitative study which investigates how citizens actually save across 17 European Union's countries in the aftermath of the financial crisis. Second, a qualitative study performing the first systematic review of the emerging literature on ICT-enabled co-production of public services using an approach focused on government and citizens. Third, a quantitative study which builds on the theoretical basics of the second study to explore the role of citizens motivations and demographic factors in ICT-enabled co-production of health services in Northern Ireland.

This chapter provides therefore a review of the findings of the doctoral thesis, highlighting the relative importance of the citizen decision-making and their engagement in the different areas of the public sphere, including banking services for being considered by some scholars to have features that characterize public utilities. This thesis reflects the importance of BE insights when trying to understand citizens behavior in the post crisis period. For example, when citizens make bad decisions as regards their savings, with all that implies in terms of financial well-being. In addition, these results show how government, institutional and cultural factors related to regions or countries may influence citizens' behavior. This thesis also demonstrates that the attitudes, motivations and the demographic background of citizens matter to explain differences in the public service delivery, especially when it is required the use of ICTs. These findings have two implications. First, it can therefore be concluded that specific group of citizens can be excluded from participating in public services with severe consequences in terms of social marginalization and inequality. For example, findings show evidence of a second digital divide affecting ICT-enabled co-

production processes, particularly among the elderly, women and those less-educated. Second, the role of government or practitioners has been demonstrated to be essential in the engagement of citizens in public services. This study has found a strong relationship between citizens' motivations towards government such as trust and external efficacy and ICT-enabled co-production. Consequently, a better understanding of the factors related to citizens behavior and participation should be considered by policymakers when deciding about new policy initiatives to services of public interest.

The following section provides a summary of the main chapters of the doctoral dissertation. Following this, we discuss the findings of this dissertation as regards their implications for the literature which provides the foundations of the analytical framework of each chapter.

5.1.1. Main results

The literature on BE and public administration has put forward a variety of considerations as to why citizens decide to engage in the public service delivery. However, a part of the literature has not yet addressed some issues that are necessary and that have been considered in this doctoral dissertation. First, claims of the existence of BE biases influencing the decision-making of citizens are mostly based on psychological insights that limit or deviate their cognitive capacity to make decisions. However, little research has focused on the demographic background of citizens and its consequences on their financial decisions, in particular, those "vulnerable citizens" who have had less experience with financial products and possess lower levels of financial skills. Second, many studies of citizens' engagement in public services' co-production do not take into account the perspective of barriers to explain why, for example, certain groups of citizens

tend to engage less than others in these activities. Thirdly, little research has sought to identify which attitudinal and demographic characteristics explain citizens' participating in public services' co-production, particularly when there are ICTs involved in the process. This thesis is an attempt to shed lights on these issues by highlighting the relevance of providing an adequate theoretical framework to develop empirical cases to test and explore citizen behavior.

The starting point of this doctoral dissertation is to perform a demand-side analysis to provide knowledge on the questions concerning the engagement of citizens in different public services in the EU. In the development of this study, we have detected a variety of reasons that may explain citizens decision-making and participation. The BE literature recognizes that cultural, demographic, ethical and psychological factors may explain differences in citizen behavior (Bowman et al., 1999; Chibba, 2012; Clifton et al., 2014; Schmidt-Hebbel et al., 1992). Other scholars have argued that factors related to the deployment of ICTs in public services can also influence citizen behavior (Benoit Granier & Kudo, 2016; King & Cotterill, 2007; Albert Meijer, 2015). In particular, in those scenarios in which citizens lack technical skills and, as a result, reject to use ICTs to engage in the public service delivery. Subsequently, this doctoral dissertation puts various hypotheses to test.

The findings from testing the main hypotheses can be summarized in the following arguments. First, BE biases such as loss aversion influence citizens' saving decisions in the post-crisis period. Chapter 2 provides empirical evidence supporting this hypothesis. Findings show that individuals' saving behavior respond more to declines than to increases as regards their current level of income. This asymmetric behavior referred as loss aversion reflects the importance of

suffering losses in income when citizens make decisions on financial choices. This cognitive psychological concept reflects a "mere ownership effect" (Kahneman & Tversky (1979), whereby losses are twice as powerful as gains. Indeed, there is previous empirical evidence testing loss aversion in saving, consumption and investment models (Bowman et al., 1999; Irandoust, 2017; Iwata & Naoi, 2017; Karle, Kirchsteiger, & Peitz, 2015), highlighting the existence of loss aversion and its implications in a wider array of economic situations.

Second, the hypothesis that citizens' demographic characteristics of citizens play an important role in explaining citizens behavior can be confirmed. Chapter 2, 3 and 4 provide support evidence that citizens' demographic factors explain, first, the individual decision-making in financial services and, second, the engagement of citizens in ICT-enabled co-production. The literature on saving and consumption has corroborated this hypothesis, showing evidence of these circumstances (Brown & Taylor, 2016; Haveman, 2006; Lusardi, 2008; Muradoglu & Taskin, 1996). For example, Clifton et al., (2017) and Fernández-Olit et al. (2018) suggest that some groups of individuals, such as the less-educated and women, may not only be more vulnerable to BE biases, but may also be more likely to suffer the consequences of the financial crisis. It is assumed, for example, that children, the elderly, less-educated, the structurally poor, the physically handicapped, minorities and those with language problems are more likely to find difficulties when hiring a financial product than their counterparts (Cartwright, 2015). As regards Chapter 3, this reports a systematic review of studies focusing on the relationship between demographic factors such as age, gender and ICT-enabled co-production. Although this relationship is not straightforward, the analysis shows that a general pattern is detected whereby older people and females use ICT-enabled co-production less than their younger and male counterparts. In

chapter 4, however, the relationship between gender and ICT-enabled co-production has significantly changed. In this study, females tend to engage more than males in ICT-enabled co-production in health services in Northern Ireland. This 'inverse gender' effect is inconsistent with previous studies showing that females engage less than males in ICT-enabled co-production.

Third, it is hypothesized that country-level factors explain divergences in citizens' saving behavior between EU countries and between regions. Based on a multi-level approach – a hierarchical structure formed by individual-level factors nested within country-level or regional-level factors – Chapter 2 and 4 demonstrate that specific geographic contexts (countries or regions) within the EU matter to explain differences in the making-decision process in financial services and the engagement in ICT-enabled co-production. Chapter 2 shows that loss aversion seems to be smaller for those EU countries where the financial crisis was most dramatic, such as in Cyprus, Greece and Latvia. Scholars have argued that cultural, economic, institutional and regulatory factors may explain differences in loss aversion between countries (Wang et al., 2017). For example, Ashta (2017) asserts that loss aversion may be lower in poor countries since citizens do not have the possibility of losing too much given their limited liability. Chapter 2 also reports that EU countries such as Cyprus, Greece and Latvia exhibiting a smaller loss aversion are associated with negative saving rates. On the other hand, chapter 4 provides evidence that regional differences affect the engagement of citizens in ICT-enabled co-production in health services. Findings show that the use of ICT is less prevalent in rural areas, suggesting the existence of a rural-urban digital divide. While regional differences across the five Health and Social Care trusts in Northern Ireland are significant to explain health co-production without ICTs,

findings do not support the fact that these regional differences have a significant influence on ICT-enabled co-production.

Fourth, findings support the hypothesis that citizens' motivational factors have a significant influence on ICT-enabled co-production in health services. Citizens who exhibit higher level of locus of control, self-efficacy, government performance as well as lower levels of self-esteem and health perception are more likely to co-produce health using ICTs. These findings are consistent with previous studies which argue that internal and external efficacy are among the most important predictors of co-production (Alonso et al., Forthcoming; Bovaird et al., 2015; Parrado et al., 2013). As regards locus of control and self-esteem, findings show that such motivations are only significant for ICT-enabled co-production behavior, suggesting that ICTs might have a major role in explaining these differences. These findings are the first to indicate that motivational factors may be correlated with citizens' participation in ICT-enabled co-production. Other scholars have shown this relationship previously but focusing rather on co-production cases without the presence of ICTs.

Finally, findings of this doctoral dissertation also refer to government participation in ICT-enabled co-production in public services. The role of governments has been commonly considered by the literature as crucial to enhance the co-production of public services (Meijer, 2015; Albert Meijer, 2012; Trivellato, 2017). Chapter 3 identifies structural and cultural factors that act as barriers to, or enablers of, ICT-enabled co-production in the cases of both governments and citizens. As regards government, the most important factors include financial and technical capacity, legal issues and organizational culture. Findings report that some barriers associated with government engagement are

lack of financial capacity and autonomy, inadequate technical skills of staff, complex regulation and so on. On the other hand, enablers include low cost ICT solutions and failure, situations where government enjoyed greater financial autonomy to operate and so on. The literature shows a range of ICTs used in public services, for example, wikis, social networking, massive open online courses and wireless technologies. Although some scholars have expressed skepticism about the effect ICTs have on traditional co-production, ICT have also allowed the emergence of new kinds of co-production practices, not available traditionally.

5.1.2. Policy implications of these findings

The aim of this thesis was to determine the most important factors that explain citizen behavior and engagement in services of public interest in order to provide insights that may be used towards the ongoing quest to improve policy practices. Despite the limitations of this research, discussed within each chapter, our findings may help policymakers address the weaknesses associated, for example, with the traditional assumptions which are inspired by neoclassical thinking that assumes that individuals who use their services (customers) are moved by the principle of perfect rationality. So, what policy implication can be extracted from our findings?

One of the main conclusions of this doctoral dissertation in terms of policy implications is that the practical application of BE insights to problems concerning the decision-making of citizens is still in an initial phase and is likely to continue growing. Chapter 2 shows evidence that citizen behavior does not correspond to the neoclassical principles and are moved by their emotions and moods when making financial decisions. Policymakers that implement public policies need to understand human behavior and explore the application of BE

insights into different stages of the policy cycle. However, BE tools may not be considered the only approach to tackle policy interventions in financial markets, but they should be used as complementary to conventional approaches. One recent example of policy interventions is the UK's Financial Conduct Authority (FCA), which has introduced BE insights into policy-making, with particular focus on loss aversion. Besides specific policy implementations, financial education programs focused on BE insights are needed for protecting citizen from being excluded in financial markets (OECD, 2017b).

Chapter 3 also provides evidence for policymakers. Policymakers tend to see technology as a solution in itself. However, findings highlight that there are factors associated with the use of ICTs that can pose barriers to these activities. Public policies should not only consider a better understanding of the government factors that make co-production work such as financial, technical, legal and cultural aspects but also those related to citizen participation such as technical skills, demographic factors and cultural attributes. It should be noted that co-production has already moved up the ladder in the managerial toolkit, from a promising alternative to manage public services to an efficient and real innovative tool whereby it is possible to reach a greater number of potential citizens. Hence, the use of ICTs in co-production should be seen as a tool capable of providing added value to the process and not just something that can get in the way.

In chapter 4, policy implications are an extension to what was discussed in chapter 2 incorporating, on this occasion, the influence of citizens' motivational factors on the co-production of public services. Some reflections should be made from the point of view of the public sector included in chapter 4, the health sector. For example, as some scholars argue (von Thiele Schwarz, 2016), "co-caring" or "co-

care" is a concept that leads to the recognition that healthcare requires the interaction between patients and healthcare providers and that can be performed using ICTs that enable knowledge to be created and shared among the participants. Findings in chapter 4 report significant differences in terms of motivational, demographic and geographical factors between a case of co-production behavior using ICTs and another which does not require ICTs to carry out health activities. What can we then deduce from these findings that work for policymakers? The first implication is that understanding patients' behavior and demographic factors is key to design adequate technological implementations to enhance the well-being of patients in hospitals. The second implication is that the place of residence does not matter much if the patient has a computer or a mobile device with an Internet connection around. For example, a patient from home could consult health information on his/her illness, communicate with his/her doctor and even buy medicines. Presented in this way, policymakers should consider the importance of introducing ICTs, emphasizing their ease of use and adaptability to all citizens and the active collaboration of practitioners in the process, with the main objective to improve the general well-being of many patients around the world.

5.1.3. Limitations and areas of future research

Despite due diligence applied in the research design, the analysis of the literature and the empirical analysis, this doctoral dissertation has limitations – some practical and some conceptual – which may encourage future research. Whereas the empirical approaches in this dissertation yields value insights and allows the researchers to approach the topic from different perspectives, this research has four main drawbacks. The first concerns the fact that, in the qualitative analysis,

there is an unavoidable subjectivity in the screening process that may affect the results of the analysis. This problem is familiar to researchers who use methodologies that offer few possibilities for generalization. The second relies to a great extent on the period considered. For example, chapter 2 focuses on a specific time in the aftermath of the 'great recession'. Hence, it is likely that findings are somehow distorted by the impact of the 2008 global financial crisis. The third is related to the structure of data. In chapter 2 and 4, we carry out a cross-sectional analysis, or in other words, an empirical analysis focused on a specific point of time. In this light, there are good reasons to extend the period of the analysis to a panel structure that allows for the capture of additional information on citizens' behavior and engagement in public service across the time. Fourth, chapter 4 provides empirical evidence about ICT-enabled co-production based on a single sector, without considering a cross-sector comparison. The availability of data on ICT-enabled co-production for different sectors is the main reason for this limitation. Future research based on ICT-enabled co-production could extend the empirical analysis of chapter 4 to cross-sector data, if information were available.

Other factors which have possibly received too little attention in this doctoral dissertation are the following. First, more evidence on BE biases is lacking to fully understand citizens' behavior in financial market. As stated, BE is at the beginning of its development and additional empirical research on the consequences of irrational behavior on financial decisions is needed. Second, future research could investigate whether the "inverse gender" effect (whereby female are more likely to engage in ICT-enabled co-production in health) only occurs in the health sector, and not in other sectors. Third, this doctoral dissertation has provided knowledge on citizen and government factors influencing ICT-enabled

co-production. However, research on the third sector, private sector and other stakeholders' factors influencing ICT-enabled co-production may be of interest for scholars and policymakers. Finally, future research may take advantage of chapter 3's systematic review to develop an empirical analysis on government factors that may explain ICT-enabled co-production.

CHAPTER 5.2

Conclusiones

Esta tesis doctoral contribuye a la comprensión del comportamiento de los ciudadanos en los servicios de interés público. Este análisis consta de tres partes fundamentales. En primer lugar, un estudio cuantitativo que investiga cómo los ciudadanos toman decisiones sobre sus ahorros en diferentes países de la Unión Europea tras la crisis financiera. En segundo lugar, un estudio cualitativo que conceptualiza y analiza la coproducción de servicios públicos a través de las TIC. Por último, un estudio cuantitativo que explora el efecto de factores motivacionales y sociodemográficos en la co-producción de servicios de salud que emplean TIC.

Estas conclusiones, por lo tanto, proporcionan una discusión de los resultados más relevantes de la tesis doctoral, destacando tanto la importancia de la toma de decisiones, como la participación de los ciudadanos en las diferentes áreas de la esfera pública, incluidos los servicios bancarios. Esta tesis doctoral reconoce la importancia de los conceptos de la EC para comprender los comportamientos de los ciudadanos tras la crisis económica. Los resultados de esta tesis doctoral muestran cómo factores gubernamentales, culturales y regionales pueden influir en la toma de decisiones de los agentes. Esta tesis también muestra cómo las actitudes y motivaciones, así como los antecedentes sociodemográficos de los ciudadanos son relevantes para explicar diferencias en la prestación de servicios públicos, especialmente cuando ser requiere el uso de las TIC. Estos resultados tienen dos importantes implicaciones. En primer lugar, existen grupos de ciudadanos que pueden ser excluidos de participar de ciertos servicios públicos, con graves consecuencias para estos en términos de marginación social y desigualdad. Por ejemplo, la presente tesis doctoral muestra evidencia de una "segunda brecha digital" en la co-producción de servicios públicos a través de las TIC, que afecta especialmente a ancianos y mujeres. En segundo lugar, estos

resultados muestran que el papel del gobierno es fundamental para mejorar la participación ciudadana en estos procesos. Esta tesis doctoral, por tanto, muestra una relación significativa entre las motivaciones de los ciudadanos hacia el gobierno (satisfacción, por ejemplo) y su participación activa en procesos de co-producción. En consecuencia, los reguladores (policymakers) deberían tener en consideración aspectos de la EC que influyen en las decisiones de los ciudadanos en los servicios públicos.

La siguiente sección proporciona un resumen de los capítulos principales de la tesis doctoral. Tras esto, se procederá a discutir los principales resultados y sus implicaciones para la literatura.

5.2.1. Principales resultados

La literatura de la EC y de la administración pública presenta una variedad de consideraciones en cuanto a por qué los ciudadanos participan en la prestación de servicios de interés público. No obstante, un parte de esta literatura todavía no ha abordado algunos temas que son relevantes y que han sido considerados en esta tesis doctoral. En primer lugar, las afirmaciones de la existencia de sesgos que afectan la toma de decisiones de los individuos y que se basan fundamentalmente en ideas psicológicas que limitan o desvían su capacidad cognitiva. En este sentido, no existe demasiada literatura que se haya centrado en la influencia de los factores sociodemográficos de los individuos en sus decisiones financieras. Por ejemplo, se ha mostrado que, con la crisis financiera, aquellos ciudadanos más vulnerables han experimentado problemas para tomar decisiones financieras (por ejemplo, ahorrando menos cantidad de su renta anual). En segundo lugar, tampoco existe mucha literatura que se haya ocupado de las barreras a la co-producción de servicios públicos que utilizan TIC. Un ejemplo de

esto son las dificultades que tienen ciertos grupos de trabajadores y ciudadanos, con baja cualificación tecnológica, a participar de estos procesos con tecnología. En tercer lugar, existe una escasez investigadora que aborde el estudio de los factores motivacionales y demográficos de los ciudadanos que participan en co-producción de servicios públicos con tecnología. Esta tesis doctoral es por tanto un humilde intento de arrojar luz sobre estos temas, resaltando la relevancia de disponer de un adecuado marco teórico de cara a desarrollar casos empíricos que den respuesta a las anteriores preguntas. En el desarrollo de esta tesis doctoral, se han detectado una gran variedad de factores que podrían explicar este proceso de toma de decisiones y participación ciudadana. La literatura de la EC reconoce la existencia de factores culturales, sociodemográficos, éticos y psicológicos que podrían explicar diferencias en estos comportamientos (Bowman et al., 1999; Chibba, 2012; Clifton et al., 2014; Schmidt-Hebbel et al., 1992). Otros investigadores, en cambio, han argumentado que los factores directamente relacionados con la difusión de las TIC también pueden influir los comportamientos de los ciudadanos (Granier y Kudo, 2016; King & Cotterill, 2007; Albert Meijer, 2015). En particular, en aquellos escenarios en los que determinados grupos sociales carecen de las habilidades tecnológicas necesarias para participar en la prestación de servicios públicos. En este sentido, esta tesis doctoral intenta contrastar varias hipótesis.

Los principales resultados se pueden resumir de la siguiente manera. En primer lugar, los sesgos relativos a la EC pueden influir las decisiones financieras de los individuos, particularmente en un periodo post-crisis. El capítulo 2 de la presente tesis doctoral muestra evidencia empírica sobre esto. Los principales resultados demuestran que las decisiones de ahorro de los individuos responden más a las caídas que a los incrementos en la renta. Este comportamiento asimétrico recibe

el nombre de aversión a las pérdidas (loss aversion) y refleja la importancia de factores emocionales en la toma de decisiones financieras. Este concepto cognitivo refleja, por tanto, un "efecto de propiedad" (Kahneman & Tversky, 1979) cuando el hecho de perder genera el doble de malestar que la satisfacción las ganar. En efecto, existe evidencia empírica previa que muestra la existencia de este sesgo de la EC en diferentes muestras poblacionales (Bowman et al., 1999; Irandoust, 2017; Iwata & Naoi, 2017; Karle et al., 2015), mostrando una amplia variedad de implicaciones de tipo económica.

En segundo lugar, se puede confirmar la hipótesis de que las características sociodemográficas de los ciudadanos juegan un papel importante para explicar estos comportamientos. Los capítulos 2, 3 y 4 proporcionan un respaldo a esta hipótesis. La literatura financiera ha mostrado evidencia de estas eventualidades (Brown y Taylor, 2016; Haveman, 2006; Lusardi, 2008; Muradoglu y Taskin, 1996). Por ejemplo, Clifton et al., (2017) y Fernández-Olit et al. (2018) sugieren que algunos grupos de individuos, como los menos formados y las mujeres, pueden no sólo ser más vulnerables a los sesgos de la EC, sino también tener más probabilidades de sufrir vulnerabilidad financiera. Se supone, por ejemplo, que los niños, los ancianos, las personas con menor nivel educativo, aquellos que poseen deficiencias estructurales, los discapacitados físicos, las minorías y las personas con problemas en el lenguaje tienen en general más dificultades para contratar un producto financiero (Cartwright, 2015). En el capítulo 3, por otro lado, se plantea una revisión de la literatura que focaliza en la relación entre estos factores sociodemográficos, como la edad, el género, la formación tecnológica y la co-producción de servicios públicos que utilizan TIC. Por ejemplo, los ancianos y las mujeres tienden a encontrar más problemas que los jóvenes y los hombres para participar en estos procesos. En el capítulo 4, no obstante, esta relación entre

género y co-producción de servicios públicos mediante TIC cambia significativamente. En este capítulo, las mujeres tienen a involucrarse más que los hombres en la co-producción de salud con tecnología. Este "efecto inverso" de género no es consistente con estudios anteriores que muestran justamente lo contrario.

En tercer lugar, se plantea la hipótesis de que los factores regionales explican diferencias en el comportamiento financiero de los individuos en la Unión Europea. Mediante un enfoque multinivel, los capítulos 2 y 4 reflejan que los contextos regionales importan para explicar estas diferencias. El capítulo 2 muestra, por un lado, que la aversión a las pérdidas es menor en los países que sufrieron más intensamente los efectos de la crisis, como por ejemplo Chipre, Grecia y Letonia. Algunos académicos han mostrado que factores culturales, económicos, institucionales y regulatorios pueden explicar las diferencias existentes en la aversión a las pérdidas entre distintos países (Wang et al., 2017). Por ejemplo, Ashta (2017) afirma que la aversión a las pérdidas puede ser menor en los países de baja renta, ya que los ciudadanos no tienen mucho que perder dados sus escasos recursos. Este capítulo también muestra que los países con menor aversión a las pérdidas, como Chipre, Grecia y Letonia, están asociados con tasas de ahorro negativas. El capítulo 4 muestra, por otro lado, que las diferencias regionales también influyen la co-producción con TIC, concretamente en salud. En primer lugar, porque el uso de las TIC en co-producción tiende a ser menos frecuente en las zonas rurales que en las urbanas, sugiriendo la existencia de una brecha digital. En segundo lugar, porque existen diferencias significativas entre las cinco principales áreas de salud de Irlanda del Norte (UK) que influyen principalmente las formas tradicionales de co-producción en salud. Estos resultados no respaldan, en cambio, el hecho de que estas diferencias regionales influyan las formas de co-

producción en salud que utilizan TIC. Una explicación a estas diferencias puede estar en el hecho de que en el segundo caso es posible el acceso desde cualquier área, minimizando los desplazamientos de aquellos que vivan en zonas rurales.

En cuarto lugar, los resultados de la presente tesis doctoral también apoyan la hipótesis de que los factores motivacionales influyen la participación en procesos de coproducción con TIC. Aquellos ciudadanos con niveles más elevados de locus de control, autoeficacia, satisfacción con el gobierno (eficacia externa), así como bajos niveles de autoestima y percepción de su propia salud tienen mas probabilidades de participar en procesos de co-producción de salud con TIC. Estos resultados muestran que motivaciones tales como locus de control y autoestima solamente son significativas en los casos de co-producción con TIC. Esto sugiere que las TIC tienen un papel relevante a la hora de explicar estas diferencias.

Por último, los resultados de esta tesis doctoral hacen referencia a la participación del gobierno en la co-producción de servicios públicos con TIC. El papel del gobierno ha sido comúnmente considerado por la literatura como crucial para mejorar estos procesos (Meijer, 2015; Albert Meijer, 2012; Trivellato, 2017). El capitulo 3 identifica factores estructurales y culturales en el ámbito del gobierno que actúan tanto como facilitadores como obstáculos en la co-producción de servicios públicos con TIC. Los factores más importantes, en este sentido, influyen en la capacidad financiera y técnica, los problemas legales y la cultural organizativa. Los resultados muestran que las principales barreras de gobierno están asociadas con la falta de autonomía financiera, falta de habilidades tecnológicas por parte del personal, regulaciones excesivamente complejas, etc. Por otro lado, los principales facilitadores incluyen soluciones TIC de bajo coste, mayor autonomía para operar por parte del gobierno, etc. La literatura también

muestra una amplia variedad de TIC que son utilizadas en la co-producción de servicios públicos. Por ejemplo, wikis, redes sociales, cursos online y otras tecnologías inalámbricas. En definitiva, existe un amplio consenso académico de que, a pesar de sus desventajas, el potencial de las TIC en la co-producción de servicios públicos es inmenso.

5.2.2. Principales implicaciones de política económica

El objetivo de la presente tesis doctoral es determinar los factores más importantes que explican las decisiones económicas y la participación de los ciudadanos en los servicios de interés público para la mejora de políticas económicas. A pesar de las limitaciones de esta investigación, discutidas en cada capítulo, los principales resultados pueden ayudar a los reguladores a abordar las carencias de las políticas tradicionales basadas en el pensamiento neoclásico. Entonces, ¿Qué implicaciones de política económica pueden extraerse de estos resultados?

Una de las principales conclusiones en términos de política es que la aplicación práctica de la EC todavía se encuentra en una fase inicial, pero es probable que continúe creciendo en el futuro. El capítulo 2 de la presente tesis doctoral muestra que los ciudadanos no cumplen con los supuestos de los modelos clásicos ya que se sienten influenciados por sus emociones y estados de ánimo. Las políticas públicas deben comprender los comportamientos humanos y explorar la aplicación práctica de los conocimientos de la EC en sus diferentes etapas. No obstante, los instrumentos basados en la EC no pueden ser considerados como instrumentos únicos que aborden actuaciones de política en los mercados financieros, sino instrumentos complementarios a los enfoques tradicionales. Un ejemplo reciente de estas actuaciones de política es la Autoridad de Conducta Financiera del Reino

Unido (ACF), que introdujo la perspectiva de la Comisión Europea en la formulación de políticas, con un especial énfasis en la aversión de las pérdidas. Además de estas políticas, se precisan programas concretos de educación financiera centrados en la EC para proteger a los ciudadanos de ser excluidos en los mercados financieros (OECD, 2017b).

El capítulo 3 también muestra evidencias de políticas económicas. Los reguladores tienden a ver la tecnología como una solución en sí misma. Sin embargo, los resultados resaltan que hay factores asociados al uso de las TIC que pueden representar importantes barreras a estas actividades. Las políticas públicas deben considerar una mejor comprensión de los factores de gobierno, que es clave para garantizar un buen funcionamiento de la provisión de servicios públicos. Cabe señalar que la co-producción de servicios públicos ya es considerada una herramienta importante para fomentar la participación de los ciudadanos. Por tanto, el empleo de las TIC en estos procesos debe considerarse un instrumento adicional que sirva para aportar valor añadido.

En el capítulo 4, las implicaciones de política son una extensión práctica de lo discutido previamente en el capítulo 3 aplicados al sector de la salud. Por ejemplo, algunos estudios muestran (von Thiele Schwarz, 2016) conceptos tales como "co-caring" o "co-care" que requieren la participación activa de pacientes y proveedores de servicios sanitarios. En estos procesos, el uso de las TIC es recomendable, lo que permite que el conocimiento pueda ser creado y compartido conjuntamente por los participantes. Los resultados del capítulo 4 muestran grandes diferencias en términos de factores motivacionales, demográficos y regionales en la co-producción de salud con TIC. ¿Qué podemos deducir, por tanto, de estos resultados de cara a los responsables de estas políticas? La primera

implicación es que una mayor comprensión de la EC es fundamental para diseñar tecnologías adecuadas que sirvan para mejorar el bienestar de los pacientes tanto fuera como dentro de los hospitales. La segunda implicación es relativa al lugar de residencia de los pacientes, que parece no ser un factor relevante para explicar la co-producción de servicios de salud a través de TIC. Por ejemplo, un paciente puede consultar información relativa a su enfermedad, comunicarse con un médico e incluso realizar compras de medicamentos a través de Internet. Como consecuencia, los reguladores deberían enfatizar más en la facilidad de uso y adaptabilidad de las TIC, fomentando la colaboración activa de los profesionales médicos en el proceso.

5.2.3. Limitaciones y áreas de investigación futuras

A pesar del rigor aplicado en la presente investigación, esta tesis doctoral presenta algunas limitaciones, tanto conceptuales como prácticas, que pueden alentar futuras investigaciones. Si bien los enfoques empíricos de esta disertación brindan la oportunidad de abordar el tema desde diferentes perspectivas, existen cuatro limitaciones principales.

En primer lugar, existe una limitación que afecta el periodo considerado. Por ejemplo, el capítulo 2 se centra en un periodo de tiempo concreto, tras la crisis financiera. Es probable por tanto que los resultados estén en cierta medida influenciados por el impacto de la crisis financiera global En segundo lugar, existe cierta subjetividad en el proceso de selección de artículos científicos en el capítulo 3 que puede influir los resultados del análisis. Esta limitación tiende a ser demasiado familiar para los investigadores que utilizan metodologías con escasas posibilidades de generalización. En tercer lugar, la estructura de los datos también puede implicar una limitación. En los capítulos 2 y 4 se realiza un análisis

cuantitativo que utiliza datos de corte transversal. Con el fin de reducir los sesgos asociados a la identificación del modelo, sería ideal extender el periodo de análisis a una estructura tipo panel que permita capturar información adicional sobre las observaciones a lo largo del tiempo. Por último, otra limitación de esta tesis doctoral tiene que ver con la inexistencia de un análisis comparativo entre diferentes sectores públicos. La escasez de datos homogeneizados para diferentes sectores es la razón fundamental. Investigaciones futuras basadas en la co-producción de servicios públicos que utilizan TIC podrían extender el análisis del capítulo 4 a diferentes sectores públicos.

Existen otros ámbitos de estudio que apenas han obtenido atención en esta tesis doctoral. En primer lugar, un mayor énfasis en factores relativos a la EC y como estos afectan las decisiones financieras de los individuos. La EC es una disciplina joven y por tanto estudios adicionales que aporten información acerca de como los individuos se comportan en los mercados financieros son recomendables. En segundo lugar, sería apropiado prestar más atención al efecto inverso de genero, es decir, al hecho de que las mujeres participen más que los hombres en la co-producción de servicios públicos a través de las TIC. El objetivo aquí es el de comprobar si este efecto se produce en el sector de la salud de manera exclusiva, o si se observa también en otros sectores públicos. En tercer lugar, esta tesis apenas investiga el papel de otros actores susceptibles de tomar parte en los procesos de co-producción con TIC, como por ejemplo el sector privado, y el tercer sector. Una mayor atención a estas actores importantes en la co-producción con TIC tendría un gran interés científico. Por último, futuras líneas de investigación podrían profundizar más en factores de gobiernos que influyan en los procesos de co-producción de servicios públicos con TIC de forma cuantitativa.

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Appendices

Appendix 6.1: Chapter 2 Supplementary material

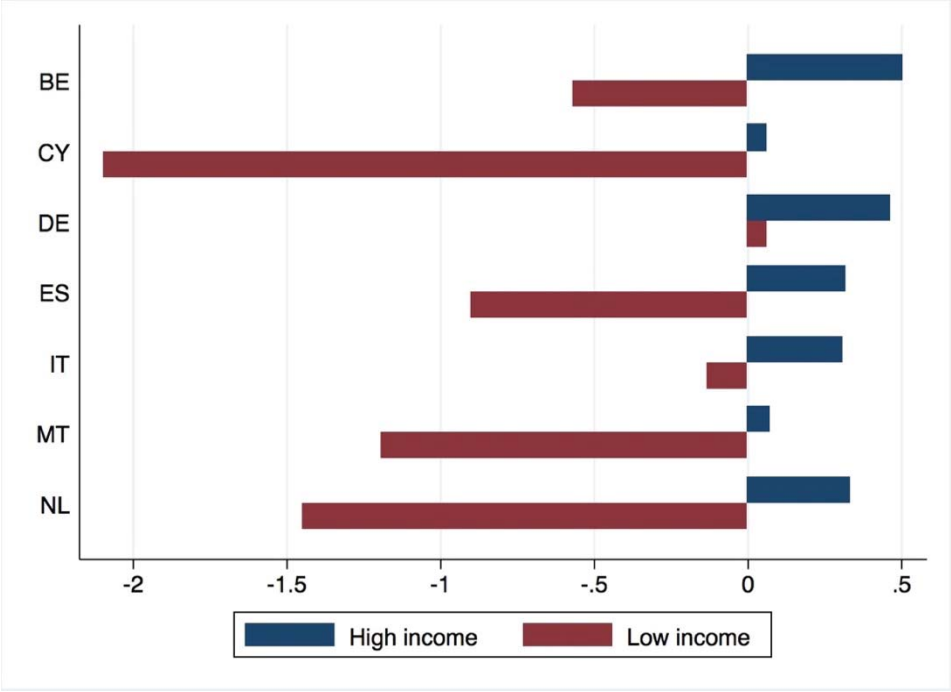

Figure 6.1 Total income variation effects on log odds saving by countries. Source: Household Finance and Consumption Survey (ECB, 2013 – 2016).

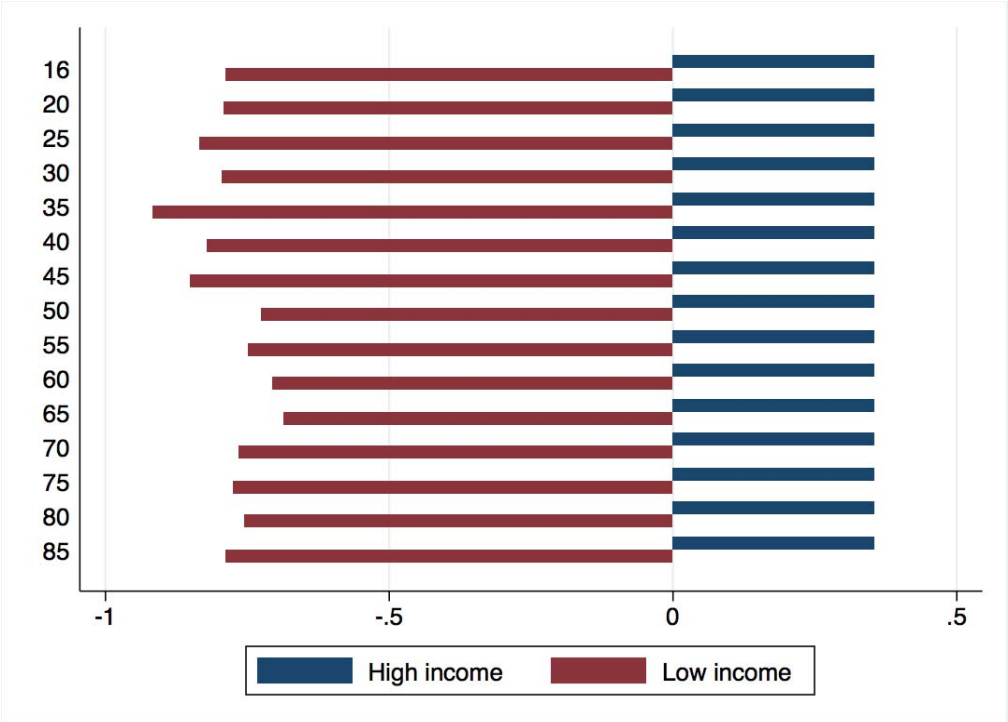

Figure 6.2 Total income variation effects on log odds saving by age groups. Source: Household Finance and Consumption Survey (ECB, 2013 – 2016)

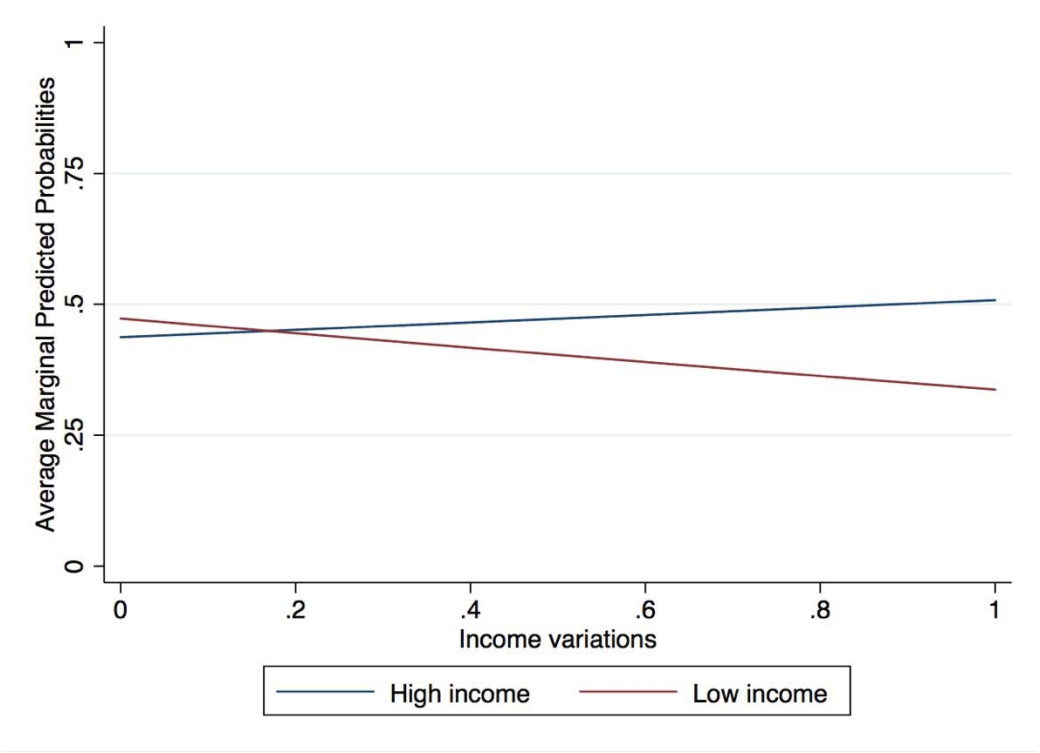

Figure 6.3 Effect of income variations on the log odds saving in terms of average marginal predicted probabilities. Source: HFCS (ECB, 2013 - 2016)

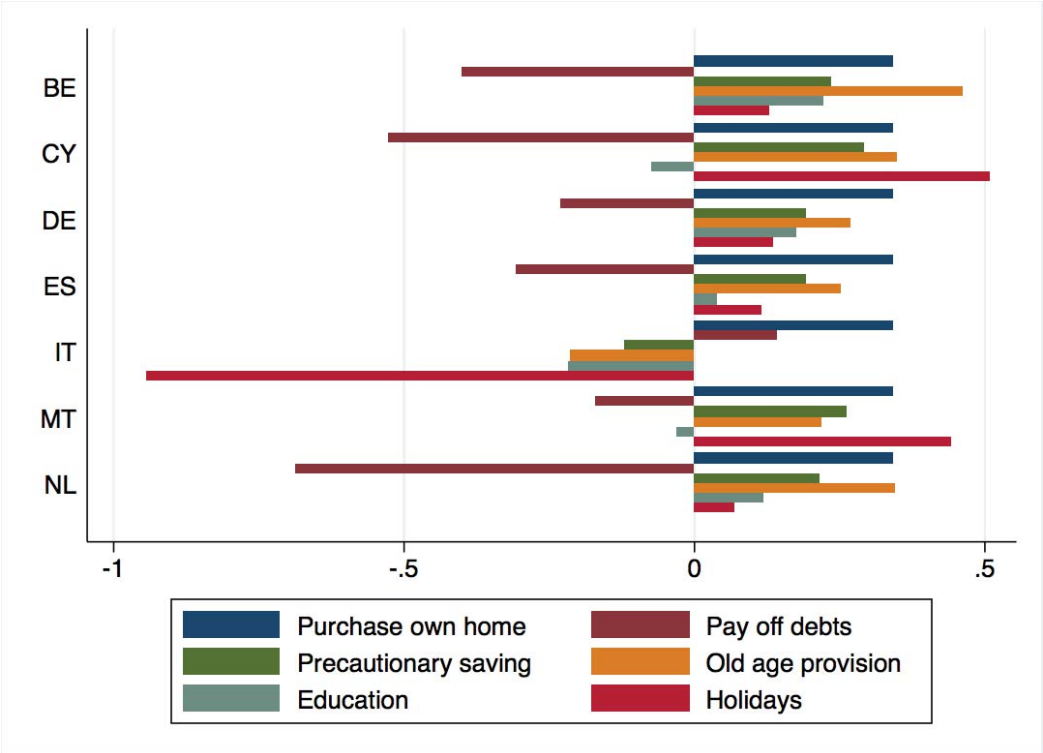

Figure 6.4 Saving motives effects on log odds saving by countries. Source: Household Finance and Consumption Survey (ECB, 2013 – 2016)

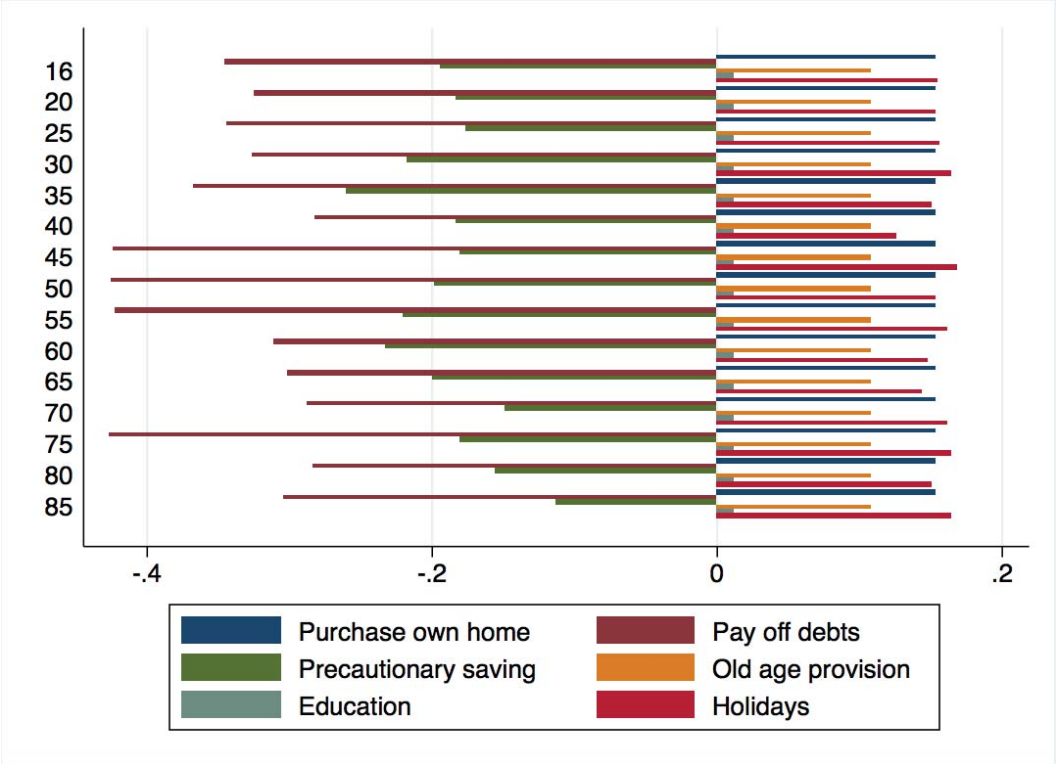

Figure 6.5 Saving motives effects on log odds saving by age groups. Source: Household Finance and Consumption Survey (ECB, 2013 – 2016)

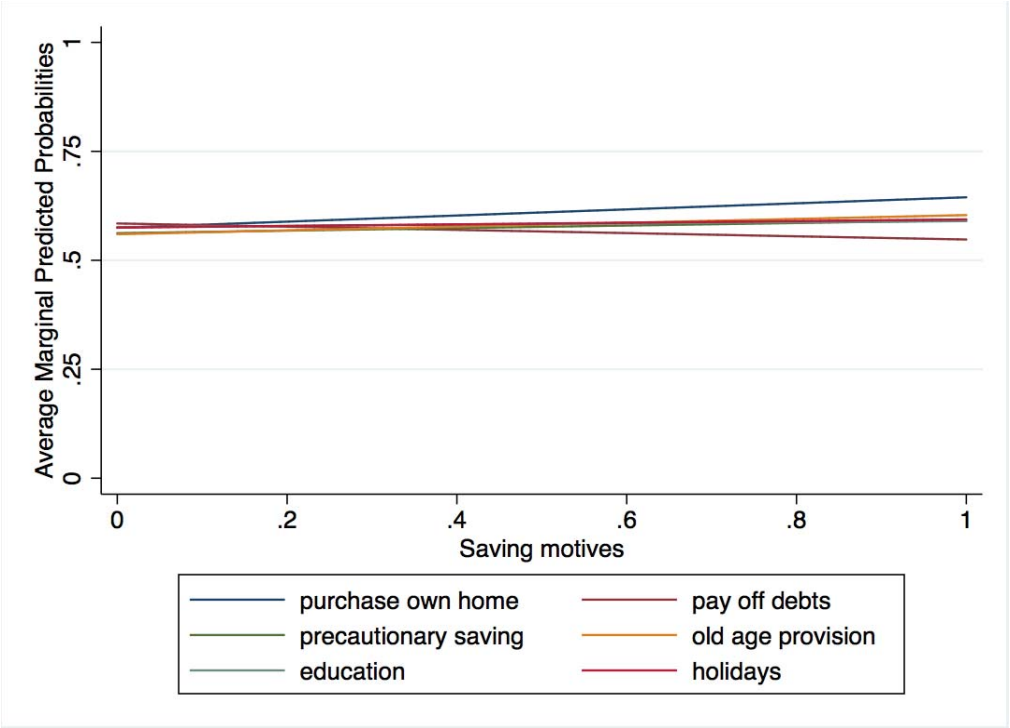

Figure 6.6 Effect of saving motives on the log odds saving in terms of average marginal predicted probabilities. Source: Household Finance and Consumption Survey (ECB, 2013 – 2016

Appendix 6.2: Chapter 3 Supplementary material

Table 6.1. Summary of the main literature review's findings

	Government				Citizens		
	Financial capacities	**Technical capacities**	**Legal issues**	**Government culture**	**Technical skills**	**Demographics**	**Citizen culture**
Barriers	- Need of financial resources - Lack of political support - Lack of ICT coordination	- Technical errors in the use of ICTs - Lack of planning in ICT-enabled co-production	- Complex regulation increases costs and time - Regulatory changes prevent ICT-enabled co-production	- Negative attitudes of professional staff towards ICTs	- Lack of ICT training - Difficulties in understanding terms and conditions of ICTs	- Troubles for older people to use ICTs in co-production - A "second digital divide" affects woman to engage	- Citizens suspicious of the government - Citizens fear their traditions can be threatened - Specific ethnic, social and language differences reduce engagement
Enablers	- Low cost ICT solutions - Financial autonomous organizations are more prone to cooperate	- Technical training reinforces staff knowledge - A planning manual for staff to minimise failures	- Government facilitates legislation based on ICT-enabled co-production	- Convince staff on the advantages of ICTs to co-produce	- Including citizens in earlier ICT-enabled co-production stages enhances their knowledge - Most common ICTs encourage citizen engagement	- Design ICT training programmes focused on older people - The use of user-friendly ICTs - Government policy aimed at an "egalitarian discourse"	- Enhancing citizen engagement increases trust in government - Including intermediaries helps to strengthen trust - When ICT-enabled co-production creates collaboration, it is more attractive for citizens

Appendix 6.3: Chapter 4 Supplementary material

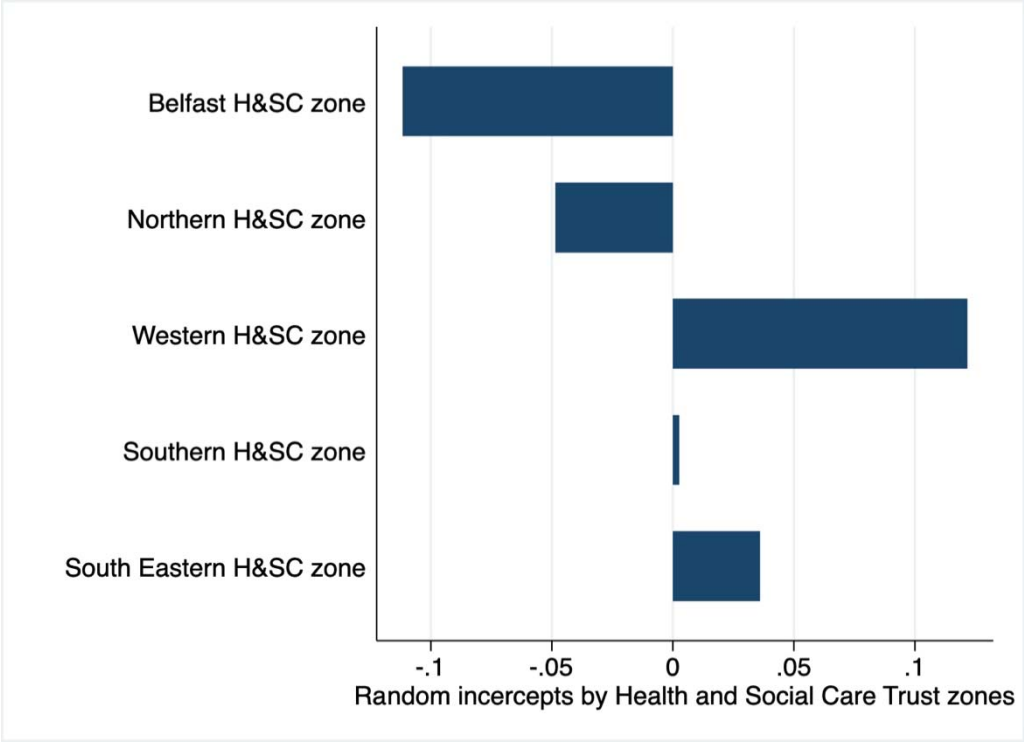

Figure 6.7 Random intercepts capturing the tendency of saving behaviors across Health and Social Care trusts. Source: Health Survey of Northern Ireland

Resumen

El objetivo de la presente tesis doctoral es arrojar luz sobre la perspectiva de los ciudadanos en los servicios de interés público. Se incorporan por tanto ideas procedentes de la psicología para explicar las decisiones económicas y la influencia de los factores demográficos de los individuos en este proceso. En primer lugar, se desarrolla un marco teórico que evalúe la participación de los ciudadanos en la co-producción de servicios públicos que utiliza tecnologías de la información y la comunicación. En segundo lugar, se amplia esta investigación con un enfoque cuantitativo que investiga el comportamiento de los ciudadanos en los servicios de interés público en diferentes países y regiones de la Unión Europea. Para ello, se emplea información procedente de dos importantes bases de datos (Encuesta financiera europea de los hogares y encuesta de salud de Irlanda del Norte). Los resultados muestran aversión a las pérdidas en el ahorro de los ciudadanos con respecto a su renta. También se observa evidencia de que los factores motivacionales y demográficos influyen la toma de decisiones en los servicios financieros y de la salud y que esta evidencia se respalda tanto a nivel nacional como regional. Finalmente, los hallazgos de esta tesis doctoral muestran que el papel del gobierno es fundamental para mejorar el papel de los ciudadanos en la prestación de servicios públicos. Los reguladores pueden hacer uso de los conocimientos de la economía del comportamiento para afrontar cuestiones relativas a la toma de decisiones de los ciudadanos que aborden intervenciones de política en diferentes servicios de interés público.