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Cultural and Creative Industries and the Well-Being of Regions

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Doctoral Thesis

CULTURAL AND CREATIVE INDUSTRIES AND THE WELL-BEING OF REGIONS

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Resum

Les indústries culturals i creatives i el benestar de les regions

En els últims anys, s'ha posat de manifest la necessitat de reconvertir les economies regionals cap a nous models centrats en el benestar i, al seu torn, capaços d'afrontar els reptes de les societats post-industrials i de la transició ecològica. Les Indústries Culturals i Creatives (ICC) han despertat un creixent interés a eixe respecte, i han estat assenyalades com a un potencial vector de generació de benestar. Això no obstant, hi ha poca evidència quantitativa i generalitzada dels seus impactes causals en diverses dimensions del benestar. Per a posar llum sobre aquesta qüestió, es porta a terme una anàlisi per a 209 regions europees fent ús de dades d'ocupació en ICC de l'Enquesta de Població Activa europea (*Labour Force Survey*) com a variable explicativa d'interés, i d'un panell d'indicadors de benestar procedents de la versió regional de l'Índex per a una vida Millor (*Better Life Index*) de l'OCDE com a variables dependents. L'Índex per a una Vida Millor inclou 11 dimensions (accés a serveis, compromís cívic, comunitat, educació, habitatge, ingressos, medi ambient, salut, seguretat, treball i satisfacció amb la vida) que abasten aspectes relacionats amb les condicions materials, la qualitat de vida o la sostenibilitat del benestar futur. En base a models causals en cadascuna de les dimensions, s'estimen els efectes de les ICC utilitzant "boscos causals". S'evidencien efectes mitjans positius per a totes les dimensions, però amb importants diferències entre regions. En algunes dimensions, a més, s'observen discrepàncies en funció de la definició d'ICC utilitzada o de l'horitzó temporal considerat. Amb tot, els resultats suggereixen que les ICC són capaces de millorar la qualitat de vida i el benestar regional tant objectiu com subjectiu, tot i que amb efectes molt heterogenis entre regions i sensibles a diferents definicions de les ICC.

Paraules clau: *economia de la cultura, economia creativa, estudis regionals, Índex per a una Vida Millor, desenvolupament regional, aprenentatge automàtic, bosc causal*

Codis JEL: I31, R11, Z11

Resumen

Las industrias culturales y creativas y el bienestar de las regiones

En los últimos años, se ha puesto de manifiesto la necesidad de reconvertir las economías regionales hacia nuevos modelos centrados en el bienestar y, a su vez, capaces de afrontar los retos de las sociedades post-industriales y de la transición ecológica. Las Industrias Culturales y Creativas (ICC) han despertado un creciente interés a este respecto, siendo señaladas como un potencial vector de generación de bienestar. Sin embargo, existe poca evidencia cuantitativa y generalizada de sus impactos causales en múltiples dimensiones del bienestar. Para arrojar luz sobre esta cuestión, se lleva a cabo un análisis para 209 regiones europeas usando datos de empleo en ICC de la Encuesta de Población Activa europea (*Labour Force Survey*) como variable explicativa de interés, y un panel de indicadores de bienestar procedentes de la versión regional del Índice para una Vida Mejor (*Better Life Index*) de la OCDE como variables dependientes. El Índice para una Vida Mejor incluye 11 dimensiones (acceso a servicios, compromiso cívico, comunidad, educación, ingresos, medio ambiente, salud, seguridad, trabajo, vivienda y satisfacción con la vida) que abarcan aspectos relacionados con las condiciones materiales, la calidad de vida o la sostenibilidad del bienestar futuro. Siguiendo modelos causales en cada una de las dimensiones, se estiman los efectos de las ICC usando “bosques causales”. Se evidencian efectos medios positivos para todas las dimensiones, pero con importantes diferencias entre regiones. En algunas dimensiones, además, se observan discrepancias en función de la definición de ICC utilizada o del horizonte temporal considerado. Con todo, los resultados sugieren que las ICC son capaces de mejorar la calidad de vida y el bienestar regional tanto objetivo como subjetivo, aunque con efectos muy heterogéneos entre regiones y sensibles a diferentes definiciones de las ICC.

Palabras clave: *economía de la cultura, economía creativa, estudios regionales, Índice para una Vida Mejor, desarrollo regional, aprendizaje automático, bosque causal*

Códigos JEL: I31, R11, Z11

Abstract

Cultural and Creative Industries and the Well-Being of Regions

In recent years, the need to reconvert regional economies towards new models focused on well-being and, at the same time, capable of facing the challenges of post-industrial societies and ecological transition has been highlighted. Cultural and Creative Industries (CCIs) have attracted increasing interest in this respect and have been identified as a potential vector for well-being generation. However, there is hardly any widespread quantitative evidence of their causal impacts on multiple dimensions of well-being. In order to fill this gap, an analysis is carried out for 209 European regions using CCI employment data from the Labour Force Survey as the explanatory variable of interest, and a panel of well-being indicators from the regional version of the OECD Better Life Index as dependent variables. The Better Life Index includes 11 dimensions (access to services, civic engagement, community, education, environment, health, housing, income, jobs, safety and life satisfaction) covering issues related to material conditions, quality of life and sustainability of future well-being. Following causal models in each of the dimensions, the effects of the CCIs are estimated using “causal forest”. Evidence of positive average effects is obtained for all dimensions, but with important differences between regions. In some dimensions, moreover, discrepancies are observed depending on the definition of CCIs used or the time horizon considered. All in all, the results suggest that CCIs are capable of improving quality of life and both objective and subjective regional well-being, albeit with very heterogeneous effects across regions and sensitive to different definitions of CCIs.

Keywords: *Cultural economics, creative economy, regional studies, Better Life Index, regional development, machine learning, causal forest*

JEL codes: I31, R11, Z11

Art is not a mirror held up to reality,

but a hammer with which to shape it.

Bertolt Brecht

Justification

The relationship between CCIs and well-being is a subject of growing interest. Both from the academic and institutional spheres, several positive effects of CCIs on the economy and society have been suggested in recent years, although few of them have been adequately studied with empirical data, nor with advanced techniques that allow causal inference. While their impact on income and productivity already appears to be largely proven, little has been studied regarding well-being in a broader conception.

This thesis therefore fills an important gap in the literature. It is the first research to address the effects of CCIs on a set of well-being indicators for a large sample of regions and adopting a common analytical framework. It provides generalised evidence on the direction, intensity and heterogeneity of these effects on each of the facets of well-being studied. Furthermore, the results extracted may constitute a useful and valuable source of information for policy makers seeking to reconvert the economic structure towards models based on the well-being of the population and capable of facing current challenges.

My interest in addressing this question and filling this knowledge gap stems from the conviction that economic science, and social sciences in general, should always be concerned with the well-being and improvement of people's lives. This is coupled with a personal interest in culture as an inherent form of human expression and its central, though often undervalued, role in any well-functioning society. Thus, I started from the intuition that culture and creativity helps people to live better lives, and the good fortune of joining the fantastic and stimulating team of Econcult (my research unit on cultural economics) enabled me to transform this intuition into knowledge.

United Nations Sustainable Development Goals

This thesis contributes to advancing knowledge to achieve the United Nations Sustainable Development Goals (SDGs). When analysing the effects of CCIs on the multidimensional well-being of the population, it cuts across several of the SDGs that relate directly or indirectly to the dimensions of well-being studied. The results provided here allow us to map out policy strategies to achieve improvements in these areas.

In particular, by assessing impacts on the dimensions of well-being as defined in the OECD's Better Life Index (BLI), the following SDGs are covered: SDG 3 (Good Health and Well-Being), SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth), SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action) and SDG 16 (Peace, Justice and Strong Institutions). Moreover, given that the object of research is the role of Cultural and Creative Industries (CCIs) as part of the productive structure and their multiple contribution to the economy and society, in particular through their strong capacity to foster innovation, SDG 9 (Industry, Innovation and Infrastructure) becomes particularly relevant.

Acknowledgements – Agraïments

Although a doctorate is often seen as a long-distance race that is mostly run alone, reaching the finish line is more of a collective process involving many people. From those who contributed to your background, to the academic and personal supports during the final stretch. Not forgetting the public university system, its commitment to knowledge and the efforts of citizens to fund it. As Isaac Newton said, “if I have seen further, it is by standing on the shoulders of giants”. For this reason, I have many people to thank for having come this far, and I apologise for not being able to name them all.

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Acronyms and abbreviations

AI	Artificial Intelligence
AROPE	At Risk Of Poverty or social Exclusion
ATE	Average Treatment Effect
BCI	Basic Capabilities Index
BLI	Better Life Index
CATE	Conditional Average Treatment Effect
CCI	Cultural and Creative Industries
CCS	Cultural and Creative Sectors
DAG	Directed Acyclic Graph
DCA	Department of Communications and the Arts (Australia)
DCMS	Department for Digital, Culture, Media & Sport (United Kingdom)
DEA	Data Envelopment Analysis
EPO	European Patent Office
EQLS	European Quality of Life Survey
EU	European Union
EU-SILC	European Statistics on Income and Living Conditions
EUIPO	European Union Intellectual Property Office
EUTM	European Union trade mark
FTE	Full-Time Equivalent
GAM	Generalised Additive Model
GDI	Gender Development Index
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GII	Global Inequality Index
GLS	Generalised Least Squares
GNH	Gross National Happiness
GNH/GNW	Gross National Happiness / Well-being
GNI	Gross National Income (former GNP)
GNP	Gross National Product (now GNI)
GPI	Genuine Progress Indicator
GVA	Gross Value Added
HALE	Healthy Life Expectancy
HDI	Human Development Index
HPI	Human Poverty Index / Happy Planet Index
ICT	Information and Communications Technology
IDB	Ibero-American Development Bank
IDI	Inclusive Development Index
IHDI	Inequality-adjusted Human Development Index
IP	Intellectual Property
ITE	Individual Treatment Effect
ISCO	International Standard Classification of Occupations
ISEW	Index of Sustainable Economic Welfare
ISIC	International Standard Industrial Classification

IWI	Inclusive Wealth Index
KMO	Kaiser-Meyer-Olkin
KPI	Key Performance Indicator
LAU	Local Administrative Units
LFS	Labour Force Survey
LOESS	Locally Estimated Scatterplot Smoothing
MEW	Measure of Economic Welfare
MPI	Multidimensional Poverty Index
ML	Machine Learning
MSA	Measure of Sampling Adequacy
NACE	Statistical Classification of Economic Activities (for the French *Nomenclature statistique des Activités économiques dans la Communauté Européenne*)
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCA	Principal Component Analysis
PI	Prosperity Index
PPP	Purchasing Power Parity
PPS	Purchasing Power Standard
R&D	Research and Development
SD	Standard Deviation
SDG	Sustainable Development Goal
SDI	Sustainable Development Index
SEM	Structural Equation Modelling
SPI	Social Progress Index
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USA	United States of America
VIF	Variance Inflation Factor
WHO	World Health Organisation
WIPO	World Intellectual Property Organisation

Country codes:

NUTS	**Country**
AT	Austria
BE	Belgium
CH	Switzerland
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain

FI	Finland
FR	France
HU	Hungary
IE	Ireland
IS	Iceland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
NL	Netherlands
NO	Norway
PL	Poland
PT	Portugal
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom

Introduction

Disruptions ranging from the Great Recession, the Covid-19 crisis and the climate crisis have brought to the surface some of the imbalances in the current economic system and their damaging effects on the well-being of current and future populations. This has been particularly noticeable in some European regions whose prosperity, moreover, has been stagnating or is at risk of stagnating for years, with consequences both for the quality of life of the population and for political stability (Andreas Diemer et al., 2022).

In the European context, furthermore, the loss of hegemony and the apparent stagnation of the USA and the Western world is observed with concern, which, together with the emergence of new Asian powers such as China and India, are shaping a multipolar world that is already more present than future. Within this new scenario, it is essential to configure a new European specialisation strategy. This raises the need to redirect regional economies towards new productive models capable of meeting the challenges of post-industrial and knowledge societies and ecological transition, while pursuing not only economic growth but also the generation of well-being for the population in a broad sense, without compromising that of future generations. In short, an economy at the service of the community that makes it work.

Cultural and creative industries (CCI) have aroused growing interest in this respect and have been identified, both from academic (Phil Cooke & Lisa De Propris, 2011; Pau Rausell-Köster, 2017; Christer Gustafsson & Elisabetta Lazzaro, 2021) and institutional spheres (European Commission, 2018; European Commission & KEA European Affairs, 2019), as a potential vector for European specialisation and well-being generation. It is argued that their role as creators and disseminators of ideas and symbolic content allows innovation to flourish. As well as provoking cultural experiences with emotional, social, aesthetic or cognitive impacts on those who participate in them. Besides, in a context of increasing automation and rapid emergence of artificial intelligence, it is pointed out that activities involving a greater creative component will become increasingly important in the economy, taking on a central role (Hasan Bakhshi et al., 2015).

However, the empirical knowledge that has been provided so far is still scarce. There are a number of studies that address the effects of culture on different dimensions of well-being such as health (Daisy Fancourt & Saoirse Finn, 2019; Rarita Zbranca et al., 2022), education (Michael C. Knaus, 2021), civic engagement (Desirée Campagna et al., 2020), social cohesion (Hanka Otte, 2019), environment (Miriam Burke et al., 2018; Bo Li et al., 2022), crime reduction (Peter Taylor et al., 2015) or life satisfaction and perceived subjective well-being (Daniel Wheatley & Craig Bickerton, 2019; Enzo Grossi et al., 2019). Despite this, most of these studies focus on the effects of different forms of cultural participation, and not on the role of CCIs as such, which is only indirectly addressed as producers of cultural goods and services.

Regarding CCIs specifically, previous studies have mainly focused on their impacts on productivity, growth, and per capita income (Francisco Marco-Serrano et al., 2014; Rafael Boix-Domènech & Vicent Soler-i-Marco, 2017; Rafael Boix-Domènech et al., 2022). More recently, other fields such as education have also been addressed (Filippo Berti Mecocci et al., 2022). But beyond these fields, there is hardly any widespread quantitative evidence of their causal impacts on multiple dimensions of well-being.

Thus, this thesis aims to fill this knowledge gap and answer the following research question: do CCIs have a substantial effect on the well-being of regions? The starting hypothesis is that CCIs do have a positive causal impact on different dimensions of well-being, and are capable of activating a virtuous circle of well-being in the territories in which they are inserted. The objective of the research is therefore to identify and quantify the impacts of CCIs on each of the components of well-being. On the basis of these evidence, a series of policy recommendations are proposed.

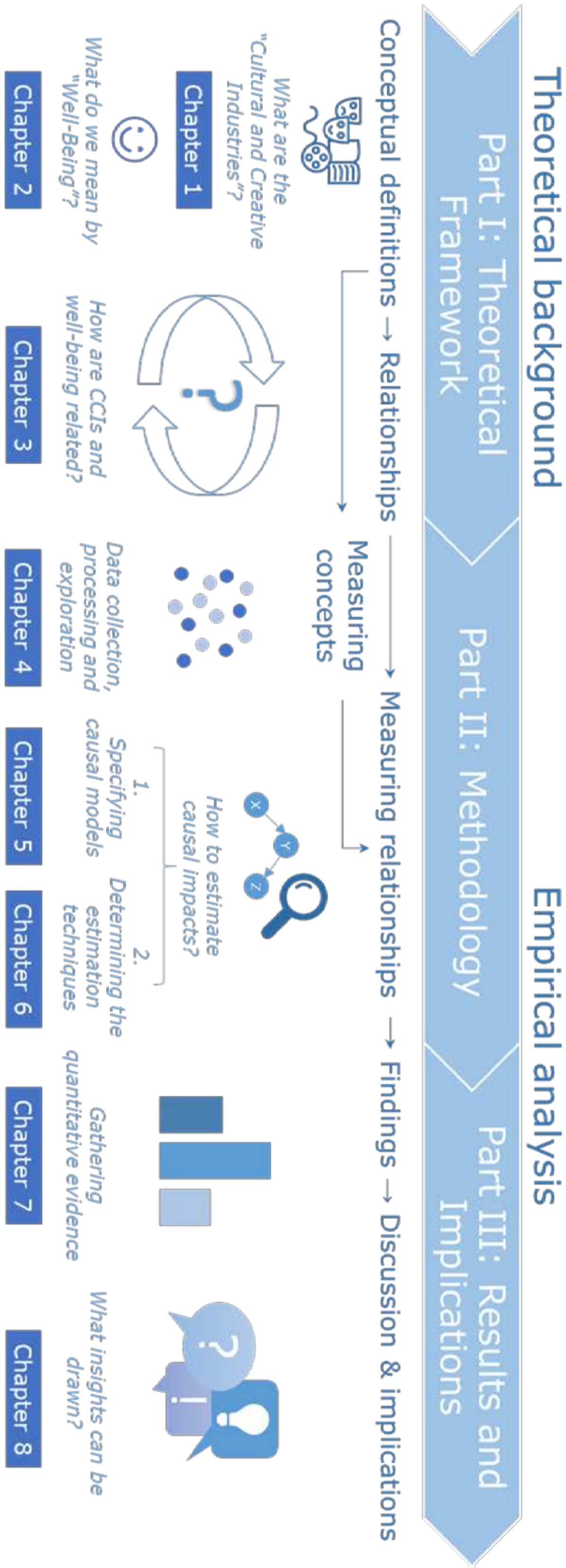
This thesis is the first study to address the effects of CCIs at the regional level on a broad set of well-being indicators. As a result, generalised evidence on the direction and intensity of these effects on each of the facets of well-being studied is provided, thus contributing to a better understanding of the impacts of CCIs on the well-being of regions. Not only is this of academic interest, but the results extracted from the causal models constitute a useful source of information for public institutions when adopting policies. Especially for shaping a CCI-based European specialisation strategy that is sustainable and well-being-enhancing.

Moreover, the new techniques that have been developed in the field of machine learning (ML) offer enormous potential and allow highly complex problems such as this one to be tackled more rigorously. Although there have been some recent forays into measuring the effects of CCIs on gross domestic product (GDP) per capita (Rafael Boix-Domènech et al., 2022), the potential of more advanced techniques has yet to be exploited. This thesis is also, in fact, one of the first applications of advanced ML methods to the study of the regional impacts of CCIs.

Our research faces three major challenges or difficulties: (1) obtaining indicators to accurately measure regional well-being, (2) properly defining the causal pathways through which CCIs affect the well-being of the regions, and (3) calculating the impacts of CCIs on the well-being of the regions. The first challenge is resolved by resorting to indicators developed by international organisations, in particular the Organisation for Economic Co-operation and Development (OECD), which provides feasible solutions from a satisfactory approach. The second challenge is the most complex of the thesis. Much of the complexity lies in the fact that we are working with multiple different dimensions of well-being, which makes it difficult to refine causal explanations for each of them. Thus, some operational simplifications are taken and checks are made on these, although there will be room for further improvement. Finally, the third challenge is overcome by using new and more powerful analytical tools than the traditional ones, specifically by applying machine learning techniques for causal inference.

The thesis is structured as follows. It consists of eight chapters grouped into three parts. The first one, on theoretical foundations, and the other two on empirical analysis. Part I, the theoretical framework, is made up of the first three chapters. Chapters 1 and 2 attempt to define and lay the foundations of the main concepts of this research: cultural and creative industries and well-being, respectively, after reviewing the main theories and contributions in the literature. Chapter 3 relates the two previously defined concepts and theorises, on the basis of the existing theoretical and empirical literature, how and why CCIs affect well-being. This is then tested empirically. Part II, on methodology, consists of three further chapters. The first of these, Chapter 4, describes the data used and carries out a first exploration. Chapter 5 summarises the process of obtaining the causal models, specifying in each case which other variables are involved and why. Chapter 6 outlines the techniques used to estimate the impacts and the reasons for their choice. Moving on to Part III, on results and implications, Chapter 7 sets out the results overall and for each dimension of well-being in detail. Finally, Chapter 8 highlights some of the implications and main insights that can be drawn from the results and outlines recommendations for public policy based on them (Figure 1).

Figure 1. *Thesis layout*



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Part I

Theoretical Framework

CHAPTER 1

Defining Cultural and Creative Industries

1.1. A historical overview

What agriculture, manufacturing or mining are, i.e. some of the conventional classifications of economic activities, does not generate much debate. We can also easily define more specific sectors such as the automotive industry or the pharmaceutical industry based on their technical processes. However, answering the question of what CCIs are is not such an easy task. What characterises them? What goods and services do they produce? They are made up of such immaterial adjectives as “cultural” and “creative”, concepts that are largely transversal to human nature and whose attempts at definition have caused rivers of ink to flow. The definition of CCIs has been no less.

Attention to CCIs is relatively recent, with some early debates beginning after the Second World War and a growing interest that started to become more vigorous from the late 1990s and in the last two decades. What is meant by CCI, as will become clear below, is an inconclusive debate still under discussion. There is no consensus either on its conceptual definition or on the economic activities it groups together. Nor even as regards its naming. It has changed over time, although not in a linear evolution, but a dialectical one. Each term carries a different understanding and has different implications, which has given rise to important debates and unresolved controversies.

In the following, we will briefly review the different formulations that have been made of CCIs (and their assimilable terms) and the main criticisms that have been made of them. Subsequently, we will try to find common ground and adopt our own framework based on our understanding of CCIs.

1.1.1. Culture Industry

The first term coined was “Culture Industry” by Theodor Adorno and Max Horkheimer (1944). These authors are framed within the Marxist-inspired critical theory of the Frankfurt School. The term “industry” is adopted in a provocative way, pointing to the apparent contradiction and even antagonism between culture and industry. From a pessimistic point of view, they criticise that culture in capitalism is subsumed to the logics of commodification and Taylorist production schemes. According to the authors, this market orientation sacrifices creativity and artistic talent for the sake of the standardisation of production and consumption, causing the alienation of the worker (the cultural producer). Moreover, culture as a commodity for the masses (not to be confused with “mass culture” (Ieva Moore, 2014)) is produced from the top down and negates any hint of spontaneous creativity and genuine popular culture arising from the masses.

Although this view is often incorrectly lumped together with mass society theory (Justin O’connor, 2011), it is actually opposed to it (Nicholas Garnham, 2005). Mass society theorists focused on the content and meanings of cultural goods. On the one hand, they argued that elites inculcate their ideology through mass cultural consumption in order to preserve their interests. On the other hand, they believed that this mass consumption vulgarises “true” culture, as the masses do not have the educational capital to decode “higher” forms of culture. Theodor Adorno and Max Horkheimer (1944), on the contrary, focused not so much on content as on the form, i.e. the insertion of culture within the capitalist dynamics of production, distribution and consumption. They were not talking about the manipulative use of culture as a tool of ideological propaganda, but about the increasing commodification and concentration of cultural production in large corporations, and how this changes the relationship between artists or cultural producers (alienated from the fruits of their labour for a wage) and consumers (who receive standardised culture as entertainment and distraction to restore their labour power) (Nicholas Garnham, 2005; Justin O’connor, 2011).

However, other authors criticised this point of view for also taking a pessimistic and elitist view of culture, since it idealises traditional forms of artisanal culture (which used to be the focus of cultural policy) as opposed to mass forms of cultural production. But it is these new forms of production that allow for a more democratic access to culture (Augustin Girard, 1982; Terry Flew, 2002; Nicholas Garnham, 2005).

Other authors also point out, from a more optimistic point of view, that culture has not been defeated by capitalism, but that it can be a sphere of struggle and subversive contestation of the capitalist system (Bernard Miège, 1989; Toby Miller, 2009; Lily Kong, 2014). All these criticisms led to a new approach that addresses these industries in a more positive sense.

1.1.2. Cultural Industries

Since the late 1970s and especially the 1980s, there was a paradigm shift, moving from the “culture industry” to the “cultural industries”. This apparently minor change aims to recognise the diversity, complex connections and interactions of the different activities that make up cultural production (Lily Kong, 2014).

Under this approach, the concept of industry abandons its negative connotation and is understood simply as the material mode of production of culture. The increasingly widespread mass consumption of cultural goods (like mass consumption in general at the time) is also no longer seen in a negative light. It is instead perceived as a democratisation of access to culture. As Justin O'Connor (2011) points out, most cultural consumption takes place through the commercial sectors that produce reproducible goods. Therefore, keeping on reducing *real* culture to live artistic expressions, affected by William Baumol and William Bowen's (1965) cost disease and unable to respond to mass demand (e.g. opera versus television), would be an elitist conception and unrepresentative of contemporary reality.

Authors who fall within this approach highlight as the defining feature of cultural industries the production of goods with a high symbolic content, transmitting social meanings that are embedded in the way of understanding the world and society, i.e. goods whose main value is cultural value (Justin O'Connor, 2000; David Hesmondhalgh & Andy C. Pratt, 2005; Susan Galloway & Stewart Dunlop, 2007). Some authors add to the definition that they “employ the characteristic modes of production and organization of industrial corporations” (Nicholas Garnham, 1987, p. 25). Therefore, if cultural industries are considered to entail mass production methods, the traditional creative arts are excluded from the core (David Hesmondhalgh, 2003; Ruth Towse, 2003).

However, other authors do not consider the method of production as a distinguishing factor (David Throsby, 2001), and Susan Galloway and Stewart Dunlop (2007) argue that it should not be a sufficient criterion to delimit which sectors generate cultural outputs, given that these can be obtained by both industrial and artisanal methods. The latter view makes more sense in our view since the symbolic component necessarily originates in a process of human creativity that by definition cannot be automated. Industrial production and dissemination is then incorporated or not depending on the reproducibility of the product.

This new approach does not remain a superficial economic analysis shielded by the rejection of economism, but deals more exhaustively with the investigation of the forms of production, distribution and consumption of cultural goods. In particular, much attention is paid to the particular forms of market failures that affect these industries and justify public intervention. All of this without a single defined orientation, with authors from different schools ranging from Marxist tendencies (with more elaborate analyses than the previous ones) to the more mainstream ones (Nicholas Garnham, 2005).

Even if economic analysis is applied to cultural industries, the focus under this approach remains on the contribution to culture, to the democratisation of its access and its intrinsic values, and not on the contribution to the economy as it would be later under the creative industries perspective (Justin O'connor, 2011).

There are also some disagreements with this approach. Daniel Mato (2007) argues that we cannot properly speak of cultural industries because all industries are cultural. He claims that all goods have a certain cultural (symbolic) content associated with them, which becomes part of the collective imaginary, even if its use is fully functional (e.g. a car). This view focuses on consumption as a defining feature of industries, but does not take into account the creative process that must necessarily be introduced as an input. However, we must consider that the industries that create and incorporate most of this cultural content are not the producers of the non-cultural goods themselves (the car industry, following the example) but other ancillary industries that should certainly be considered cultural, such as design or advertising. Toby Miller (2009) also criticises Daniel Mato's essay and argues that the term cultural industries is still valid, and that it makes no sense to expand it as much as he claims. There are industries that generate more symbolic content than others, i.e. primarily cultural industries.

1.1.3. Creative Industries

A further substantial shift came in the late 1990s when the term “creative industries” emerged with the publications of the Australian Department of Communication and the Arts (DCA, 1994) and, especially, the UK’s Department for Digital, Culture, Media & Sport (DCMS, 1998). The latter came shortly after Tony Blair's ascendancy as British prime minister, and reflected the shift in the political orientation of “New Labour”.

The creative industries, and the creative economy by extension, are a concept based on the arising knowledge economy. What defines the creative industries according to this perspective is the application of individual talent and creativity, which can be converted into intellectual property for potential economic gain. New sectors beyond those historically considered are introduced, particularly those linked to the new digital economy such as software publishing. But surely the main change is in the discourse. Arguments for public support for culture on the basis of values that the market fails to address are abandoned, fleeing the prejudice of subsidised arts. Instead, the creative industries are placed now as a growth driver in the economic agenda (e.g. Jason Potts, 2011).

Some international organisations such as the United Nations Conference on Trade and Development (UNCTAD, 2008, 2022) have adopted this approach, under the umbrella of the creative economy. In the rest of Europe (apart from the United Kingdom), however, this definition did not catch on, and most countries adopt a more culturally focused approach in their policies.

This approach has not been without criticism. Some authors believe that the economic effect of the creative industries is inflated by the inclusion of the high-tech sectors (Nicholas Garnham, 2005; Susan Galloway & Stewart Dunlop, 2007). Others criticise that sectors that clearly qualify as cultural and creative, such as heritage, are arbitrarily excluded (Stuart Cunningham, 2002; David Hesmondhalgh, 2003), being seen as a possible case of cherry picking to fit the desired narrative. In this vein, Jonathan Gross (2020) warns that, despite its strong impact, this was a report produced ad hoc for the new Labour government's policy shift and that its process of defining the creative industries was far from systematic. Caution should therefore be exercised in the conclusions attributed to it.

Nicholas Garnham (2005) argues that this paradigm shift is not neutral, but is actually the result of a coalition of interests. The cultural and artistic sectors are allied with the information and communications technology (ICT) sectors and are taking advantage of the connotations of the term “creativity” in the framework of the information economy. In reality, however, it is the latter that are responsible for the economic pull. For its part, the inclusion of the software sector within the new framework was a push to increase copyright protection policy.

A number of authors have expressed concern that this new reading subordinates art and culture to market objectives and dilutes cultural policy in the economic policy agenda (Susan Galloway & Stewart Dunlop, 2007; David Hesmondhalgh, 2008; Justin O’Connor, 2009; Mark Banks & Justin O’Connor, 2009; Terry Flew & Stuart Cunningham, 2010). Consequently, some authors favour a clear distinction between cultural industries and creative industries, and a narrower, more strategic definition rather than an overly broad one (Stuart Cunningham, 2002). Lily Kong (2014) directly advocates a return to the cultural industries paradigm, seeing the creative industries as a theoretical throwback with conceptual inconsistencies.

1.1.4. Cultural and Creative Industries (or Sectors)

While the first term, “culture industry”, was superseded and soon fell into disuse in favour of its plural version, the emergence of the creative industries paradigm should not be considered a full replacement of cultural industries. The strong controversy generated, the main criticisms of which have been briefly outlined above, has meant that both approaches have continued to develop in parallel. Authors who spoke of cultural industries tended to highlight traditional artistic expressions and cultural heritage, while those who referred to creative industries tended to focus on the economic exploitation of creativity, innovation and intellectual property (UNESCO, 2007). In other cases, both terms have even been used interchangeably, but it is important to note which activities we are referring to, as the implications will be different in each case (ESSnet-Culture, 2012).

However, over the last two decades, a consensus path has been gradually consolidated under the name of Cultural and Creative Industries. This approach recognises the complementarity of both concepts: culture as an expression of symbolic content and creativity as the necessary input to generate it. And in turn, cultural value acts as a fuel for creativity, in a synergistic relationship (Robert DeFillippi et al., 2007; Marta Peris-Ortiz et al., 2019). A symbiosis is created between industries that, although heterogeneous, share common features and are part of the same network. Other labels have also emerged to refer to these economic activities, such as the “orange economy” (Felipe Buitrago & Iván Duque, 2013).

In recent years, the field of study of CCIs has also been expanding, considering their relationship with their environment, not only economic, but also social, political or territorial. For example, with studies on their role in urban renewal processes or in local development. A bibliometric analysis by Rico Cho et al. (2018) revealed that studies on CCIs are mainly concentrated in the area of Business and Economics (28.6%) but also in Geography (27.6%), Environmental Sciences Ecology (14.9%), Urban Studies (14.1%) and Sociology (11.7%), while fields that had traditionally dealt with them such as Cultural Studies or Communication play a more modest role (8.5% and 9% respectively)[1].

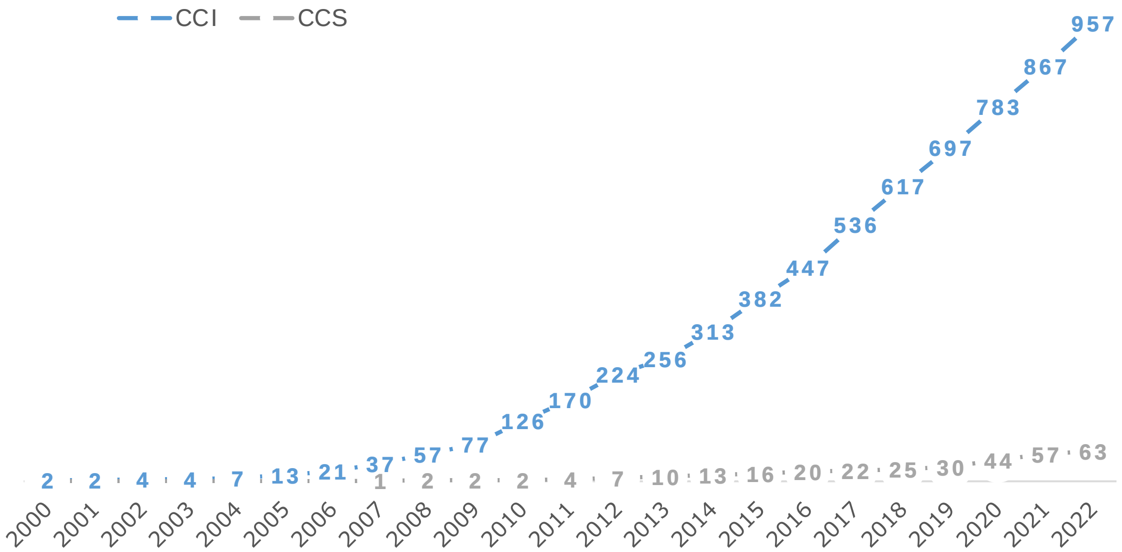
New trends in the field of the CCIs are also being addressed, such as their involvement in the digital revolution (Luciana Lazzeretti, 2022) or what Pier Luigi Sacco et al. (2018) coin as "Culture 3.0". The authors argue that the transition from Culture 1.0 (pre-industrial and patronage-based) to Culture 2.0 occurred with the mass production of a large part of cultural goods and the consequent democratisation of access. Even so, production was still quite concentrated and there were significant barriers to entry. With the latest technological developments, easily accessible to the general public (streaming platforms, editing software, etc.), this has been diluted (cf. the infrastructure required for a television network compared to that of a streamer on Twitch or YouTube). This disruptive change gives way to the new Culture 3.0, in which the production of widely distributed cultural content is democratised and decentralised. To such an extent that the boundary between the role of cultural producer and that of cultural consumer is blurred.

Another issue to note, which is not a change in approach per se but a matter of nuance, is the disagreement over the use of Industries or Sectors. Some authors have reservations with the term "industries" as they consider that it may have ideological connotations and that it focuses attention on market-oriented as opposed to non-market activities (Manuel Vilares et al., 2022). In contrast, they consider "sectors" to be a more neutral label, and it is in fact the name chosen by the European Commission or the OECD (Manuel Vilares et al., 2022; OECD, 2022).

[1] Note that the percentages (together with others that are omitted) add up to more than 100% because there are papers that fall into more than one field.

However, in the academic literature, CCI is clearly the most widely used and commonly accepted term, and is therefore the most consistent standard terminology to date (Figure 2). It will also be the name adopted in this thesis, as can be deduced from the title. The word “industry” should be understood in this context as a collective and socially organised material process of production and distribution of cultural goods and services, regardless of whether or not economic profit is sought. A public television station is part of the audio-visual industry, and so is an independent cooperative that produces activist documentaries.

Figure 2. *Cumulative number of publications with “Cultural and Creative Industries” or “Cultural and Creative Sectors” in the title*



Source: Google Scholar

The evolution of the different approaches reviewed is summarised in Table 1. But irrespective of the name, and even if we place them under the same umbrella as the CCIs, there is still no consistency on their boundaries. Even if they are called by the same name, the conceptual definition may be different. This leads, as a result, to different selections of the specific economic sectors involved in these industries. This is addressed in the following sections.

Table 1. *Evolving approaches to CCIs and their preceding designations*

Term	Origins	Selected publications	Key points
Culture Industry	1940s	Theodor Adorno & Max Horkheimer (1944)	Criticism of commodification and standardisation of culture, concentration in large corporations and alienation of cultural producers.
Cultural Industries	1980s	UNESCO (1982) Nicholas Garnham (1987) David Throsby (2001, 2008b) David Hesmondhalgh (2003)	Democratisation of access to culture and cultural rights of citizens. Economic analysis of cultural goods, market failures and justifications for public intervention.
Creative Industries	1990s	DCA (1994) DCMS (1998) UNCTAD (2008) Hasan Bakhshi, Ian Hargreaves, et al. (2013)	Focus on individual creativity in the form of intellectual property, and its economic contribution. Broadening of the sectors considered (including ICT-related activities).
Cultural & Creative Industries (or Sectors)	2000s	Felipe Buitrago & Iván Duque (2013) Manuel Vilares et al. (2022)	Merge of both components: the creative input and the cultural output. Analysis of CCIs' interactions with their broad environment.

Source: Own elaboration

1.2. Towards a theoretical and operational definition

1.2.1. What makes an industry cultural and creative?

As we have seen, throughout the academic development of CCIs, there has been no clear consensus on how to address them, or even to name them. This leaves open a key question that we need to answer in order to move forward: what do the different authors, and we ourselves, understand a CCI to be? What makes a certain activity to be considered cultural and creative?

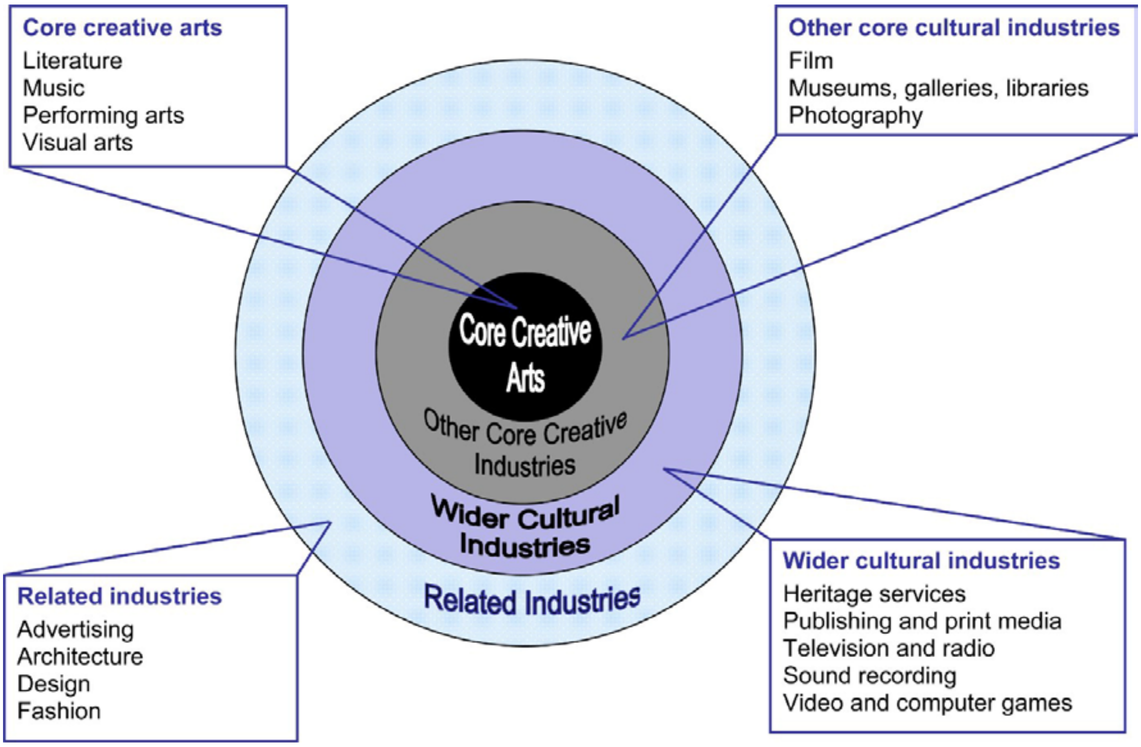
The list of definitions in the literature is extensive. It is not our aim to reproduce it in full, but to select some of the most relevant and the most representative of different approaches. This allows us to point out commonalities and main divergences. Nor do we seek to formulate a new definition, as there is no point in extending the list further, other than to propose a disruptive change of paradigm whose main features are not already covered in some way by previous definitions. This would go beyond the scope of our research. But we do intend to take some general features from the review in order to obtain a conceptualisation that is both theoretically consistent and at the same time practical and widely accepted.

We start from the paradigm of the cultural industries, which is the first to develop a serious sectoral analysis. The authors of this current generally conceptualise cultural industries as those institutions (for-profit, non-profit or governmental) engaged in the production and communication of some type of symbolic meaning and messages, thereby contributing to the intellectual and artistic development of people (Susan Galloway & Stewart Dunlop, 2007; Lily Kong, 2014). Cultural products are thus valued for their meaning, not for their utility. As Thomas Lawrence and Nelson Phillips (2002, p. 431) state, they "are consumed in an act of interpretation rather than being used in some practical way to solve some practical problem". Indeed, some authors (e.g. Justin O'Connor, 2000) distinguish between those activities that produce goods and services whose "first use" is the communication of ideas (e.g. books, films, music), as opposed to others that include symbolic content but have a different main functionality (e.g. fashion design, advertising, architecture), excluding them from the cultural industries.

David Throsby (2001, 2008a, 2008b), in addition to the generation and communication of symbolic meaning, adds two more items to the definition of cultural industries: that their production involves some creativity as input and that the output can potentially be embodied in some form of intellectual property. This also connects with the approach of the creative industries, which puts a special focus on these issues. Indeed, UNCTAD adopts this very definition of "cultural products" verbatim (UNCTAD, 2008, 2010). Based on these criteria, David Throsby proposes a concentric circles model (David Throsby, 2001, 2008b). He considers that cultural goods and services (i.e.

those produced by cultural industries) have two types of value: cultural and economic. Depending on which of the two predominates, industries are placed in the core (mainly cultural value) or towards the periphery (mainly economic value). He argues that at the core are the activities that primarily originate ideas from artistic creativity (Figure 3). It is worth noting that it is this model that has been the main inspiration for the European Commission's approach to CCS (KEA European Affairs, 2006).

Figure 3. *The concentric circles model of cultural industries*



Source: David Throsby (2008b)

Not all authors belonging to what we have been calling the cultural industries approach share the view that these activities are placed at the core. The symbolic texts model (David Hesmondhalgh, 2003) places popular culture activities (as opposed to high culture) at the core. These includes activities related to film, advertising or media. The creative arts, on the other hand, would be placed on the periphery (David Throsby, 2008a; UNCTAD, 2008, 2010).

Another influential model of cultural industries was proposed by the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

UNESCO defines cultural industries as those that produce goods and services that "embody or convey cultural expressions, irrespective of the commercial value they may have" (UNESCO, 2005, p. 14). In its 2009 Framework for Cultural Statistics, UNESCO (2009) classifies the sectors within seven cultural domains: cultural and natural heritage; performance and celebration; visual arts and crafts; books and press; audio-visual and interactive media; design and creative services; and intangible cultural heritage as a transversal domain. These, in turn, are crossed by three cross-cutting functions: education and training; archiving and preservation; and equipment and supporting material. This model subsequently inspired the European framework for cultural statistics (ESSnet-Culture, 2012). It is a kind of European adaptation from a European perspective to the UNESCO framework, but with some differences. A new division into ten domains (heritage, archives, libraries, books and press, visual arts, performing arts, audio-visual and multimedia, architecture, advertising, and art crafts) and six functions (creation, production/publishing, dissemination/trade, preservation, education, and management/regulation) is established. It should be noted, however, that UNESCO did not remain attached to its 2009 conceptual proposal of a cultural economy. In later developments, it has come to use the CCI designation (UNESCO, 2015), as will be discussed below.

Turning to the term creative industries, an important change in conceptualisation comes with the definition of the DCMS (1998). This states that the creative industries are those activities which "have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the exploitation of their intellectual property". From this definition, which abandons any reference to culture or symbolic meanings to focus only on creativity, a more individualistic, instrumentalist (creativity as a tool for economic growth), intellectual property-centred and market-oriented approach emerges. As seen in the previous section, some critics argue that it is aligned with a neoliberal ideological orientation (see Terry Flew & Stuart Cunningham, 2010). Subsequently, NESTA refined the practical approach to this definition and its selection of sectors, initially criticised as arbitrary, by taking creative intensity as a criterion. That is, the proportion of creative workers in each industry (Hasan Bakhshi, Alan Freeman, et al., 2013; Hasan Bakhshi, Ian Hargreaves, et al., 2013). It further distinguished between four groups of creative industries: service providers (architecture, design, web-development), content producers (publishing, broadcasting, games, films, recorded music), experience providers (museums, galleries, heritage, live music, performing arts) and originals producers (visual art, crafts, antiques) (NESTA, 2006).

One model with a particular focus on the generation of intellectual property is that of the World Intellectual Property Organisation (WIPO). It focuses on industries that transform creativity into copyrighted products. Industries are classified into those that directly create intellectual property (core copyright industries), those that are involved in getting it to consumers (interdependent copyright industries) and partial copyright industries, the latter including intellectual property but as a minor component. A fourth group of non-dedicated support activities (sales, transport, internet and telephone services) is also listed (WIPO, 2003, 2015). This model excludes important cultural sectors such as those linked to heritage.

However, among those who use the term creative industries, culture and the arts are not always left out of the definition. Starting with the “European version” of the copyright model itself, drawn up by the European Union Intellectual Property Office (EUIPO). It defines creative industries as those industries that are “concerned with the generation and exploitation of knowledge, information and culture” (EUIPO, 2019, p. 7). It groups them into eight domains: cultural heritage, archives and libraries; books and press; visual arts; performing arts; audio-visual and multimedia; architecture; advertising; and software and web portals.

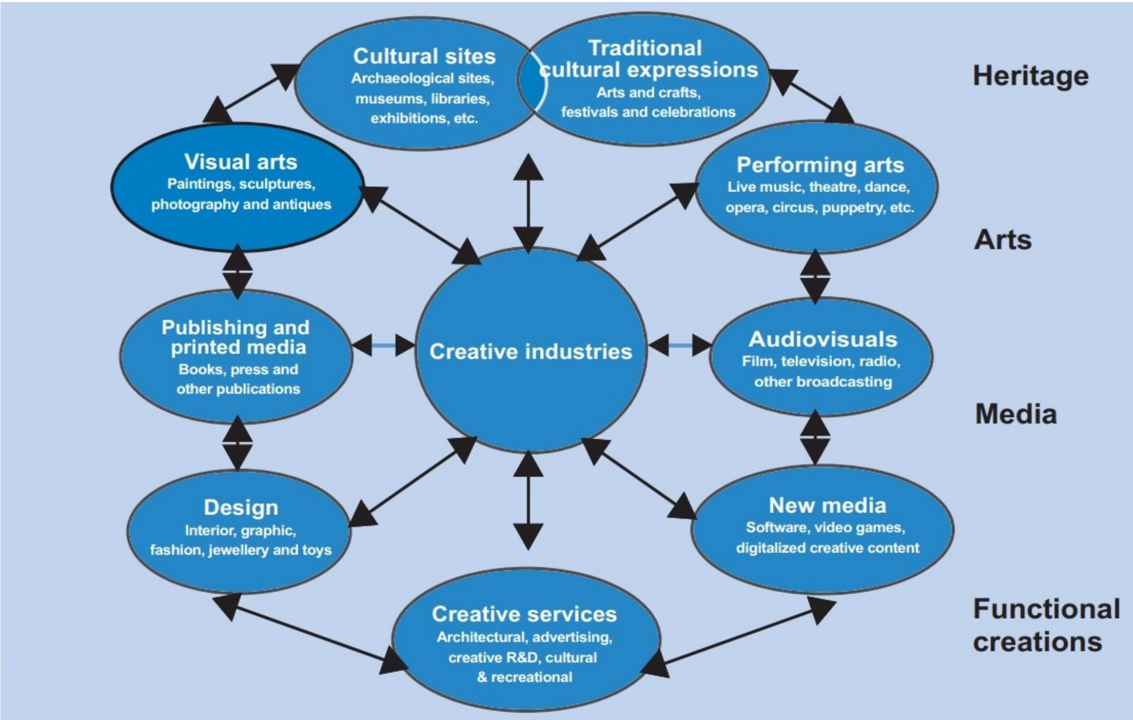
In turn, UNCTAD's approach builds to some extent on the concentric circles model, but aims to extend the concept of creativity not only to artistic activities but also to “ any economic activity producing symbolic products with a heavy reliance on intellectual property and for as wide a market as possible” (UNCTAD, 2004). Note the emphasis on intellectual property and market orientation, but also that it does not abandon the notion of symbolic content.

UNCTAD (2008) states that creative industries use creativity and intellectual capital as primary inputs, and adds that they are knowledge-based activities “focused on but not limited to arts” (p. 13). At the same time, notions such as having the potential to generate “revenues from trade and intellectual property rights” or having “economic value and market objectives” are added. In other words, the arts remain at the core, but the scope is expanded and economic profit criteria are incorporated.

This taxonomy distinguishes four groups of industries with distinctive characteristics, integrating nine sub-groups within them (Figure 4). These are, starting from the one they identify as “the origin of all forms of arts and the soul” of CCIs: heritage (including traditional cultural expressions and cultural sites), arts (visual arts and performing arts), media (publishing and printed media and audio-visuals) and functional creations (design, new media and creative services). The latter group consists of industries that generate goods and services with symbolic content but whose main purpose is functional, and includes activities such as software, architecture or research and development.

Richard Caves (2000), while not providing a precise definition of creative industries (i.e. those that supply “goods and services that we broadly associate with cultural, artistic, or simply entertainment value”, p. 1), lists a number of characteristics that they generally fulfil. He does so from a microeconomic and industrial organisation perspective and by applying contract theory. These are: demand is uncertain, creative workers care about their product, some products require diverse skills, both products and skills are differentiated, time is of the essence, and products and rents are durable. He argues that these features are in the nature of the creative industries and differentiate them from other economic activities. While pointing out these characteristics is relevant and important for analysing the behaviour of these industries (e.g. in the emergence of market failures), they do not help us to find a definition of why a certain industry is cultural and creative. An inductive reasoning follows from the observation of a number of industries that are assumed to be creative but it is not clear why they are so. Moreover, these features may be generally applicable but are neither a necessary nor a sufficient condition for the inclusion of an activity in the creative industries. For example, a music record, a painting or a book are durable goods, but a theatre play or a concert are not. Conversely, a road is also a durable good, without anyone finding it creative. The same objection can be levelled at Jason Potts et al. (2008) with their definition of CCIs as a “set of agents in a market characterized by the adoption of novel ideas within social networks for production and consumption” (p. 171). While they describe an interesting nature and behaviour of these industries as “social network markets” and is worth taking into account in the analysis of its relations with society, it is unclear and tricky to delineate the industries on the basis of this criterion.

Figure 4. *UNCTAD classification of creative industries*



Source: UNCTAD (2008)

Having opened the CCIs' turn, the European Commission defined them in 2010 as those which “use culture as an input and have a cultural dimension, even if their production is mainly functional” (European Commission, 2010, p. 6). This is in line with the criteria of other classifications such as UNCTAD's or the broader concentric circles model, as it includes sectors such as design, architecture or advertising, which introduce creative processes in the production of goods whose main value is not symbolic. The notion of using culture as an input, however, may be diffuse.

Currently, the official EU definition of these industries, under the name of CCS, is even formally regulated (Art. 2 Regulation (EU) 2021/818) and is much more concrete. These are sectors whose activities "are based on cultural values and artistic and other individual or collective creative expressions". They also "include the development, the creation, the production, the dissemination and the preservation of goods and services which embody cultural, artistic or other creative expressions, as well as related functions such as education or management" (European Parliament & European Council, 2021). It mentions that many of these activities have the potential to generate intellectual property and, with it, innovation and jobs, but does not constrain them to do so. It is also made explicit that both market-oriented and non-market oriented activities can be CCS, regardless of the type of structure in which they are constituted (e.g. association, company, cooperative, etc.) and their funding (i.e. public or private).

UNESCO, for its part, has also reformulated its definition in some recent reports. UNESCO (2015) conceptualises CCIs as activities "whose principal purpose is production or reproduction, promotion, distribution or commercialization of goods, services and activities of a cultural, artistic or heritage-related nature" (p. 11). The notion of what is meant by a "cultural nature" is left to free interpretation, nor is there any reference to creativity in the definition, although it is introduced in the naming. This framework distinguishes a range of eleven sectors across which CCIs are distributed. Namely: advertising, architecture, books, gaming, music, movie, newspapers and magazines, performing arts, radio, television, and visual arts. Surprisingly, they leave heritage out of the list, despite including it in the definition and being a cornerstone in UNESCO's official statistical framework (UNESCO, 2009).

Finally, there are also other concepts identifiable with CCIs such as the term "Orange Economy". This was coined by Felipe Buitrago and Iván Duque

(2013), consultants of the Ibero-American Development Bank (IDB). This concept has been most influential, as might be expected given its origin, especially in Ibero-America. To illustrate this, downloads of the report from the IBD website are six times higher in Spanish than in English. Orange economy, according to these authors, is constituted by a “group of linked activities through which ideas are transformed into cultural goods and services whose value is determined by intellectual property” (p. 40). The authors distinguish within the orange economy a “Cultural Economy” and a “Creative Industries” strand. In turn, they formulate four sector groupings. “Arts and heritage” is placed in the Cultural Economy; “Functional creations, new media and software” is placed in the Creative Industries; and both “conventional cultural industries” and “creativity supporting activities” fall between the two categories.

Wrapping up, and without claiming to establish a canonical definition that would join the long list of definitions proposed to date, we can summarise the main attributes of CCIs on the basis of what we have seen so far. The “least common multiple” between the different understandings is, in our view, as follows:

i. CCIs produce outputs with an important symbolic content (i.e. they convey messages and meanings) which we can call cultural goods and services; and
ii. their productive process requires a significant input of human creativity.

We leave aside in this definition some aspects that have been pointed out so far. These are detailed below:

We consider whether or not the products generated take the form of commodities to be irrelevant. As Nicholas Garnham puts it, cultural industries “produce and disseminate symbols in the form of cultural goods and services, generally, *although not exclusively*, as commodities” (1987, p. 25, italics added). For example, a public museum with free admission is as much a part of the CCI as a private museum even if it is not market-oriented.

We also do not take into account whether the production processes are artisanal or produced on a large scale. As long as a strong creative component is present in the process and the symbolic meaning in the product, the automation of production depends on the nature of the good and its reproducibility, but does not condition its ascription to CCIs (see "Cultural Industries" in section 1.1).

Nor do we make it a condition whether or not intellectual property is generated. This is one of the aspects emphasised by the creative industries approach, and also pointed out by David Throsby when defining cultural goods as those that "contain, *at least potentially*, some intellectual property" (2008a, p. 219, italics added). However, this is a consequence of the two primary features: symbolic content resulting from human creativity. This often takes the form of intellectual property, but it is not a defining feature of the activity itself, but responds to a specific way of regulating its protection and incentives.

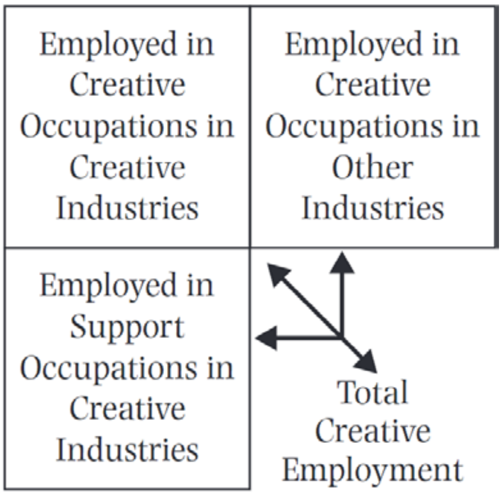
Finally, we also do not restrict the definition to the activity having "a potential for wealth and job creation" (DCMS, 1998). We consider that CCIs are not defined by this but that it is one of their possible effects. Establishing it as a criterion is a way of cherry picking those activities that generate the desired benefits, leaving aside industries that are conceptually cultural and creative but do not meet our expectations (for example, because they are mature sectors in decline). This could lead to a self-fulfilling prophecy with misleading conclusions.

In addition, a couple of qualifications to the definition are in order. It should be noted that there are some industries that are not strictly speaking dedicated to generating predominantly cultural goods and services, but which are nevertheless responsible for providing other industries with the symbolic content of their products through creative processes (e.g. design and advertising). These should also be considered as CCIs since it is the symbolic content that they produce, even if it is incorporated into goods that have mainly a functional use value. In our view, what is important is the generation of cultural content, regardless of whether the industry directly produces a product for final consumption or cultural content that is incorporated into other products.

Another consideration to bear in mind is that we adopt an industry-based approach (as organisations and processes capable of generating these goods), and not an occupation one. This means that there may be creative workers in other industries, and non-creative workers within CCIs. In this respect, for example, ESSnet-Culture (2012) defines not only a list of economic activities but also a list of cultural occupations based on International Standard Classification of Occupations (ISCO) codes.

Other approaches combine both dimensions. This is the case of the "Creative Trident" (Peter Higgs & Stuart Cunningham, 2008; Stuart Cunningham, 2011; Max Nathan et al., 2015). This approach considers the total creative workforce as the sum of all workers in CCIs, both those in creative ("creative specialists") and non-creative ("support workers") occupations, plus those workers in creative occupations outside CCIs ("embedded creatives"), as depicted in Figure 5.

Figure 5. *The "Creative Trident" approach*



Source: Peter Higgs & Stuart Cunningham (2008)

But this is not our focus since we do not focus on the creative workforce, but on CCIs as activities producing cultural and creative goods and services. Therefore, in some cases we should also consider as part of these industries those activities that form an essential part of the value chain of cultural goods and services, even if they are not necessarily the ones in charge of providing the most creative part. Because, without these industries, these cultural goods and services would not be available. A couple of examples could be printing or auxiliary audio-visual services.

1.2.2. Shaping CCIs: proposals for sectoral classifications

Once the criteria for CCIs have been reviewed, the next step is to specify which sectors should be included within them. Depending on the approach, the list of included sectors differs, not surprisingly. Naturally, classifications of activities have been updated over time and have introduced more appropriate criteria for their delimitation. Among the various proposals made to date, there is a fairly high degree of consensus on the inclusion of certain industries but not on others that are more controversial.

The use of standardised lists allows for international comparisons, which is essential in our work. Thus, it is necessary to rely on statistical classifications of economic activities that are widely applied around the world. In Europe, NACE codes are generally used. It is the Statistical Classification of Economic Activities in the European Community, whose acronym refers to the French term *Nomenclature statistique des Activités économiques dans la Communauté Européenne*. This, in turn, has a close alignment with the International Standard Industrial Classification (ISIC) developed by the United Nations, as it is its implementation adapted to European economies. Indeed, the high correspondence between the European NACE codes and the international ISIC at the most disaggregated levels (compared to other countries' classifications) leads Eurostat's CCS classification to be used for international comparisons also beyond Europe (OECD, 2022, p. 27). NACE Rev. 2 and ISIC Rev. 4, both of 2008, are the versions currently in force.

The key issue for the identification of CCIs is that there is no recognition as such in the standard classifications of economic activities. In other words, there are no specific codes grouping these activities together. They are spread across a multitude of sectors classified on the basis of other criteria, making it challenging to identify and isolate the industries that meet the required features from among the existing classifications. Often, within the same code we can find cultural and creative activities alongside others that are not.

In the last two decades, and especially since the generalisation of the CCI framework as a joint reality (and not only cultural or creative), a growing agreement has arisen on the sectors that should be included, reaching a consensus for a fairly broad group of industries (Terry Flew & Stuart Cunningham, 2010). Without going over the main approaches again, the most significant differences between the sectors covered can be compared in Table 2. The main classifications are consistent in including publishing, performing arts, music, visual arts, crafts, audio-visuals, broadcasting, advertising, design, interactive media and architecture. The most strictly creative visions exclude heritage. In contrast, all except the concentric circles model and the European statistical framework include software content development to some extent. On the other hand, cultural education is included in the European, UNESCO and IDB models. The UNCTAD and IDB models also include research and development. Whereas WIPO is alone in including hardware and electronic equipment. We have made some groupings by type of sector, so there may be some minor differences within sectors.

In general, and beyond the taxonomies of international organisations, there are still some open lines of debate. The more restrictive approaches that prioritise the core of artistic creation activities are reluctant to include sectors linked to software development or information and communication technologies. Peter Campbell et al. (2019) argue that these industries, and ICT-related industries in general, should not be included in CCIs on the grounds that the cultural consumption patterns of their workers are generally lower. However, it should be noted that the consideration or not of an industry as cultural and creative is not based on the characteristics of its workers, but on the processes and outputs of the industry itself.

Table 2. *Comparison of industries covered by different approaches*

	Concentric circles	ESSnet-Culture	UNESCO cultural economy	DCMS creative industries	UNCTAD creative economy	WIPO copyright industries	IDB orange economy
Heritage (museums, galleries, libraries, archives)	X	X	X		X		X
Publishing (books and press)	X	X	X	X	X	X	X
Performing arts	X	X	X	X	X	X	X
Music	X	X	X	X	X	X	X
Visual arts and crafts	X	X	X	X	X	X	X
Audio-visuals (film, video, photography)	X	X	X	X	X	X	X
Broadcasting (television and radio)	X	X	X	X	X	X	X
Advertising	X	X	X	X	X	X	X
Design	X	X	X	X	X	X	X
Interactive media (web, computer games)	X	X	X	X	X	X	X
Architecture	X	X	X	X	X	X	X
Cultural education		X	X				X
Software			X	X	X	X	X
Research & Development					X		X
Electronic equipment and hardware						X	

Source: Own elaboration from David Throsby (2008b), ESSnet-Culture (2012), UNESCO (2009), DCMS (1998), UNCTAD (2008), WIPO (2003) and Felipe Buitrago and Iván Duque (2013)

Some more rigid approaches even oppose the inclusion of sectors such as advertising, design or architecture, as they consider that the products generated are not strictly cultural but have a primary use value beyond the symbolic content (Stuart Cunningham, 2002; Susan Galloway & Stewart Dunlop, 2007; Justin O'Connor, 2009). As already explained, it is important to include these sectors because they are generators of symbolic value through creative processes. On the other hand, those who focus on the generation of intellectual property and market-oriented activity tend to neglect heritage-related sectors such as museums or libraries. Another group under discussion is creative manufacturing. Its inclusion is controversial, as these are mostly production rather than creation activities, so that their impacts and their relationship with the rest of the economy and society are considerably different from those generated by cultural and creative services (Rafael Boix-Domènech et al., 2013; Rafael Boix-Domènech & Vicent Soler-i-Marco, 2017).

Rather than in the broad classification (although this is also the case), the main differences between models are usually in which activities fall within what we might call the "core" (David Throsby, 2008a). The core is logically much more sensitive to the conceptual definition adopted and its central pillars. Therefore, by adopting broad perspectives rather than just the narrower scope, we reduce the differences between different approaches.

Moreover, since we analyse impacts on well-being in a broad and multidimensional sense (see chapters 2 and 3), the most logical approach is to consider CCIs in their entirety. Although the borderline between the two concepts is blurred (and can even be considered two sides of the same coin), industries that are usually considered "creative" may have important effects on productivity, income, employment, etc. while more "cultural" industries are likely to affect dimensions such as community support or civic participation to a greater extent. We are interested in all of them.

Whatever the case, it should be borne in mind that the choice of a definition and grouping of sectors within CCIs is neither neutral nor aseptic. The adoption of one or the other conditions the observed effects and will have different implications for policy recommendations (Stuart Cunningham, 2002; David Throsby, 2008a; ESSnet-Culture, 2012).

1.3. Reaching a convergence framework

The most up-to-date framework that best fits our approach is the one recently proposed by the "Measuring Cultural and Creative Sectors in the EU" project (Manuel Vilares et al., 2022)[2]. This project is aimed to develop a new statistical framework for measuring the CCS in the European Union, and updates the scope and boundaries of these sectors from the previous framework (ESSnet-Culture, 2012), building on it but with some relevant changes in approach.

The "Measuring CCS" project involved experts, representatives of Eurostat and the statistical offices of the EU member states and stakeholders from the CCIs. The classification of sectors is not only based on a theoretical basis, but also adopts a very pragmatic prism as it is intended to be applicable in European official statistics. Therefore, data availability, consensus between countries and convergence towards international standards that allow comparability have been determining factors. The latter has led to a rapprochement from the traditional European approach, historically more focused on the strictly cultural aspect, towards other perspectives based on "creative intensity" (Hasan Bakhshi, Ian Hargreaves, et al., 2013).

An interesting point of this categorisation is that it follows a modular structure. This allows to range from the most restrictive views (even focusing only on a small group of activities) to much broader perspectives, but building on a common framework and a common classification.

What is defined as Cultural and Creative Sectors (CCS), which becomes the official grouping proposed for EU countries, is composed of three groups of sectors. In turn, these groups contain some subgroups that resemble (but do not entirely correspond to) the ten cultural domains of the European

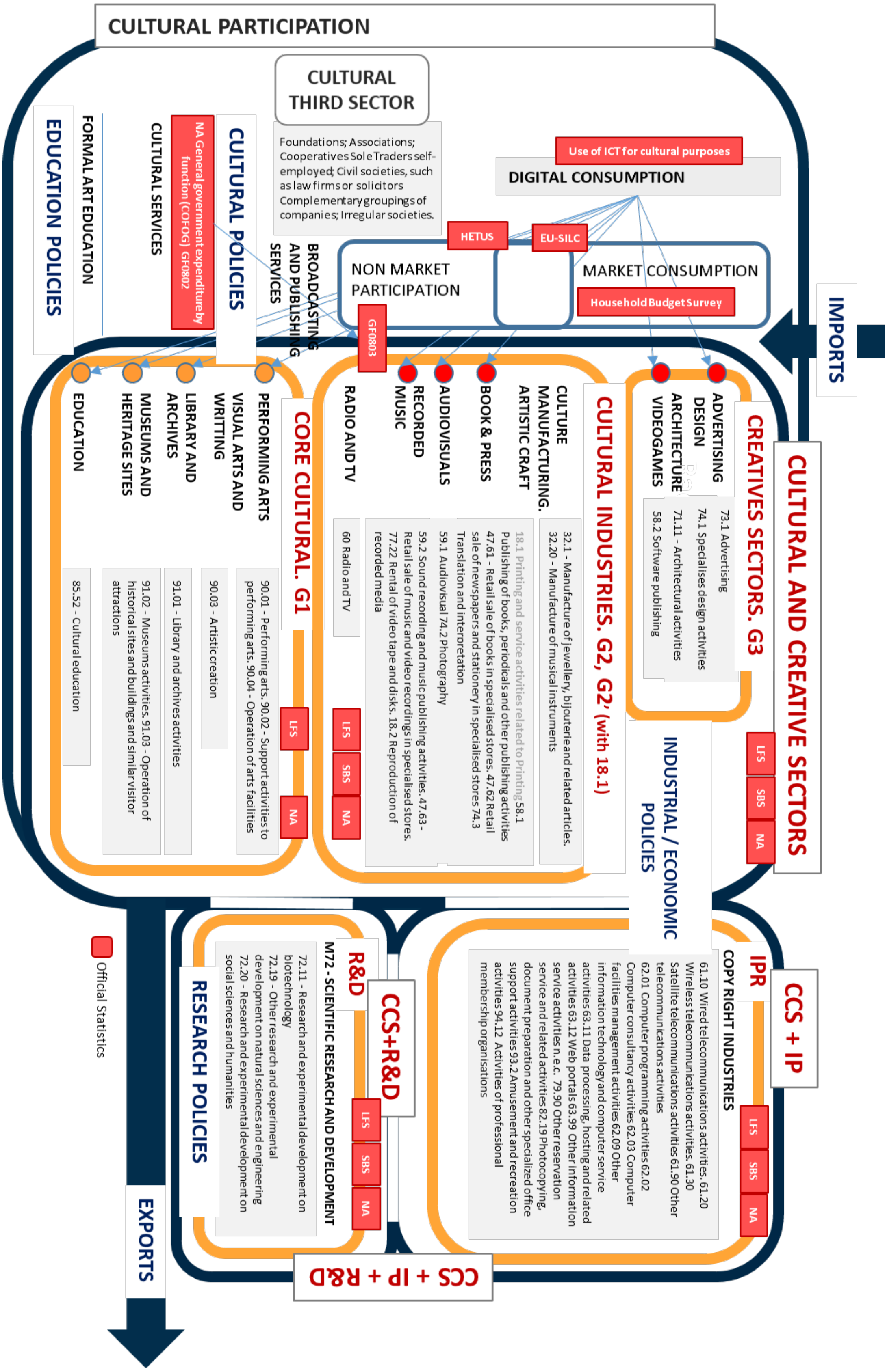
[2] Both the author of this thesis and the two co-directors have actively contributed to this project.

framework for cultural statistics (ESSnet-Culture, 2012; Eurostat, 2018, 2019).

The first group (G1) is labelled “Core cultural sectors”. It is made up of those activities that are direct creators of cultural experiences, generally produced and consumed simultaneously, and usually not very technology-intensive. The second group (G2, or G2’ if including printing), “Cultural industries”, consists of generally more technology-intensive and market-oriented industries that transform creative expression into reproducible cultural goods. Finally, “Creative services” (G3) groups together economic activities involving intensive creative processes that are embedded in the value chains of non-cultural goods and services. Broadly speaking, it could be summarised that G1 deals with primary artistic creation and the preservation of cultural legacy; G2 with the production and dissemination of reproducible cultural goods; and G3 with creativity applied to functional creations beyond strictly cultural goods.

Although the strict definition adopted by the “Measuring CCS” project only includes the so-called CCS, and stops there, the framework proposed also considers that CCS are closely interlinked with two other groups that are part of the cultural and creative ecosystem: intellectual property (IP) related industries, and research and development (R&D) (Figure 6). The first is a group of industries that make intensive use of copyright and other forms of IP that protect the authorship of creative works, and which are not included in the previous classifications. Here, creativity is generally more focused on technological innovation. R&D activities, in turn, involve by definition highly creative and imaginative work, which besides generates new knowledge that is incorporated into the cultural substratum of the community.

Figure 6. *Outline of the cultural and creative ecosystem with the classification of economic activities*



Source: Manuel Vilares et al. (2022)

CHAPTER 2

Defining well-being

2.1. What do we mean by well-being?

If adopting a definition for the Cultural and Creative Industries is complex, it is no less so to delimit what we mean by *well-being*. Well-being is determined by the so-called quality of life through the satisfaction of human needs, capabilities and achievements. Given that human beings are social and complex beings, these needs are not only limited to the most basic physiological requirements for life, or access to certain resources and material conditions, but also involve social needs, security, affection, personal dignity, self-fulfilment, etc., which are essential for being *well* (see Abraham Maslow (1943) or Manfred A. Max-Neef et al. (1986), among others, for a more in-depth discussion).

Indeed, as will have escaped no one, the word *well-being* is literally made up of being *well*. It may seem trivial, but this necessarily implies a personal perception. What does it mean to be *well*? What does each of us need to be *well*? What do we value most in order to consider that we are *well*? There is not just one answer.

Well-being therefore entails an individual perspective. This means that needs, and the relative importance attached to them, vary for each person. People usually differ in their assessment of whether they are *well* or not according to different issues that they do not value in the same way. Some may prefer to have free time for hobbies, an intense social life or to spend more time with the family than to own a bigger house. Some may prefer to find fulfilment in a stimulating job, while others may prefer a higher salary or flexible working hours. But there will be those who value good health or feeling loved over anything else.

However, when an aggregate perspective is adopted (in this case, a regional one), proxies must be sought that define general levels of well-being for the population living in a territory. This leads to the need to establish a common and measurable framework that reasonably captures the main components of well-being.

2.1.1. A review of existing approaches

To do so, we must begin by reviewing the approaches to well-being embraced by the different authors to date to deal with it. Only a summary of the main characteristics, similarities and differences is given here, but for a more extensive review see, for example, Eugenio Actis Di Pasquale (2008, 2015) or Marc Fleurbaey (2009).

2.1.1.1. Welfare Economics

The origins of economics of well-being can be traced back to the early development of economics as a discipline. The classical economists such as Adam Smith and the fathers of utilitarianism Jeremy Bentham and John Stuart Mill recognised the importance of human well-being and happiness as a central concern of economics.

However, it was not until the 20th century that the economics of well-being became a distinct field of study. The rise of welfare economics, which sought to assess economic policies in terms of their impact on individual well-being, was a key development in this regard. In particular, the work of economists such as Arthur Pigou, John Hicks, Vilfredo Pareto or Francis Edgeworth laid the theoretical foundations for welfare economics. One of the most representative and pioneering works to explicitly deal with welfare as an object of study in economics is "The Economics of Welfare" (Arthur C. Pigou, 1920).

Welfare economics falls within the prism of neoclassical economics. It adopts a Benthamian utilitarian perspective (Jeremy Bentham, 1789) with a hedonistic conception of well-being, i.e. it identifies with the pleasure or happiness (i.e. utility) that comes from satisfying desires and making choices.

Criteria of justice are not explicitly embraced: that which maximises total utility is considered good.

From an utilitarian point of view, social utility is derived from the aggregation of individual utilities, which poses a problem and a structural weakness of the approach because, according to Arrow's paradox or impossibility theorem, it is not possible to obtain consistent collective preferences from the sum of individual ones (Kenneth J. Arrow, 1950). Even though there are authors who claim to have solved Arrow's paradox (Eric S. Maskin, 2022). Given that the aim is to maximise utility, this translates into maximising income, since it is considered that each individual will allocate that income to that which brings him the greatest utility. According to this approach, therefore, increasing well-being would mainly boil down to promoting income growth (Eugenio Actis Di Pasquale, 2015).

Finally, in terms of efficiency and distribution, two criteria can be distinguished within the approach. On the one hand, that of the Paretian optimum, which considers that a situation is already efficient if in order to improve someone's utility it is necessary to worsen that of a single individual (which blocks any possibility of redistribution and preserves the existing inequality, theoretically arising legitimately through voluntary exchanges in the market guided by individual preferences). On the other hand, Arthur Pigou does envisage a certain redistribution guided solely by a criterion of efficiency, since the law of diminishing marginal utility implies that total utility will be greater when income is more evenly distributed.

2.1.1.2. Egalitarian Liberalism

The initiator of this approach is John Rawls (1971). In his work “A Theory of Justice” criticises the utilitarian view and proposes an alternative guided by principles of distributive justice, so that the objective is not simply to maximise utility but to be fair. According to this approach, there are five *primary goods* that all human beings need from a political conception, in order to be able to act as full citizens of a society, and independently of their individual preferences: basic rights and liberties; freedom of movement and free choice of occupation; powers and prerogatives of offices and positions of authority and responsibility; income and wealth; and the social bases of self-respect (John Rawls, 2001, pp. 58–59). These primary goods should be distributed equally to all citizens, regardless of their individual preferences, to ensure a fair and egalitarian *original position*.

John Rawls uses this concept of *original position* to take the social contract theory, previously formulated by Thomas Hobbes (1651), John Locke (1690), Jean-Jacques Rousseau (1762) and Immanuel Kant (1793), one step further through the assumption of a *veil of ignorance*. That is to say, imagining that no one could know what position they will occupy in a society or what capacities they will have, we would agree to improve the position of the most disadvantaged (given the possibility of being oneself), this veil of ignorance being necessary to bring about a truly fair social contract that is not conditioned by the prior situation of each individual. From there, given equal freedom and equal opportunities, economic and social inequality are justified as long as they contribute to improving the prosperity of those in a worse position (*principle of difference*). This principle has been criticised by those who consider that freedom is made to prevail over equality by justifying and consolidating economic and social inequalities, but in the name of equality (Silvina Ribotta, 2021).

The main problem with this approach is quite obvious: it remains on a hypothetical, excessively virtual and abstract plane, impossible to transfer to the real world. Moreover, from a theoretical point of view, although it overcomes utilitarianism and introduces criteria of justice, it remains an essentially economistic conception of well-being.

2.1.1.3. Human needs approach

In contrast to the hitherto dominant approaches based on subjective utility or on resources and income, at the end of the 20th century other approaches began to emerge that addressed human well-being from broader perspectives. The term *human needs* came into use, and there was a proliferation of exercises that sought to identify them beyond the strictly economic (Paul Streeten et al., 1981; Manfred A. Max-Neef et al., 1986; Len Doyal & Ian Gough, 1991). Here, we will focus on explaining the theoretical model of Doyal and Gough.

Len Doyal and Ian Gough (1991) argue that human needs are those required to prevent serious harm, and are universal, while desires are due to individual preferences and cultural environment. Although human needs are common to all societies and cultures, the ways in which they are satisfied vary from one to another. They propose a hierarchical structure in which it is possible to summarise only two basic needs: physical health and individual autonomy. As for the second, they distinguish two levels: the competence to formulate objectives in accordance with one's interests and to implement strategies to achieve them, and a higher level called critical autonomy which implies the capacity for political participation (i.e. to participate in the very processes of shaping and transforming social norms).

They then list eleven intermediate needs, which are prerequisites for the basic ones. These intermediate needs would have some parallels with Max-Neff's concept of *satisfiers* (Manfred A. Max-Neef et al., 1986). Five of them are related to physical health (nutritional food and clean water, protective housing, a non-hazardous work environment, a non-hazardous physical environment and appropriate health care), four to autonomy (security in childhood, significant primary relationships, physical security and economic security) and two to both (appropriate education and safe birth control and child-bearing). The criterion for achieving well-being would be that all people satisfy at least the minimum of intermediate needs indispensable to satisfy the two basic ones, which they called the level of *minimum optimorum* (Len Doyal & Ian Gough, 1991, pp. 162–163).

While Doyal and Gough place particular emphasis on individual autonomy, this is not a purely individualistic approach, but incorporates a social dimension into the basic needs themselves. Individual needs, therefore, are per se social processes and cannot be met without recourse to the social environment (Eugenio Actis Di Pasquale, 2015, p. 12).

2.1.1.4. Capabilities approach

Finally, we must present the approach that has had a great boom from the end of the last century to the present day, inspiring various alternative ways of measuring well-being, as will be presented further on. It is referred to as the capabilities approach, and its main exponents are Nobel Prize-winning economist Amartya Sen and philosopher Martha Nussbaum (Amartya Sen, 1984, 1985, 1992, 2005; Martha Nussbaum & Amartya Sen, 1993; Martha Nussbaum, 2000, 2008).

According to this approach, development is a process of expanding people's opportunities, and not an increase in utility and economic satisfaction. Thus, the focus shifts from “commodities” to “capabilities”: it is not about *having* (access to resources in the form of income and assets that provide utility), but about *being* (happy, healthy, safe, educated…) and *doing* (participate in political decision, develop creativity, express one’s opinion, contribute to the community…). Well-being is understood as having the capabilities necessary to achieve a life worth living. In this sense, freedom and personal development become a central pillar as these capabilities can be used to achieve different *functionings,* assuming both the heterogeneity between individuals and the multidimensional nature of well-being.

Those are the two key concepts of this approach: capabilities and functionings. Functionings are all the possible achievements that can be attained (in the previously mentioned sense of *being* and *doing*) and that enhances individual and collective well-being. Capabilities, in turn, are those that allow the achievement of the functionings of one's choice. In other words, capabilities determine the opportunities to which one has access. The aim of human development must therefore be to increase these capability sets. In empirical developments, functionings are more commonly used as measurement indicators because they are more directly observable than capabilities, given that the latter imply potentialities that are not necessarily realised. Yet, it should be noted that the distinction between capabilities and functionings is not always obvious. Some functionings are themselves prerequisites for certain capabilities. For example, having good health or education are both capabilities and functionings (Afschin Gandjour, 2008).

In any case, resources, while they may facilitate capabilities, should not be directly the target of measurement. Following Amartya Sen's very illustrative example, it is not just a matter of having a bicycle, but of being able to use it and therefore to get around. To do this, one must be able to ride a bicycle and be in reasonably good health. But a paralysed person will need other means of transport to achieve the same goal (Amartya Sen, 1985, pp. 6–7). The criterion of distributive justice under this approach implies ensuring that everyone has the same capabilities, regardless of their use for different purposes. But on the premise of human heterogeneity, this does not imply that the allocation of resources should be equal. Returning to the example of the paralytic, more resources will probably have to be allocated to give him or her the same opportunities as the rest.

The capability approach uses a concept of positive freedom, as opposed to the negative freedom of liberal (utilitarian and egalitarian) approaches (Eugenio Actis Di Pasquale, 2015). This distinction between two concepts of freedom corresponds to Isaiah Berlin (1958), who postulated that *negative freedom* lies in the absence of coercion, obstacles and interference in individual choices, while *positive freedom* is based on the ability to be in control of one's life, to pursue and achieve goals and to self-fulfilment. Moreover, freedom of choice has an intrinsic value under the capabilities approach, not just an instrumental one to achieve certain goals. Thus, the emphasis is on the capability to achieve functionings, and not only on functionings themselves. In other words, it is not the same to arrive at a situation by choice (having the capability to choose alternative situations) as by having no other possibility, even if the final situation is the same. Choosing to live an austere life is not the same as suffering forced material deprivation; seeking contemplative solitude is not the same as suffering social isolation and unwanted loneliness; being a vegan by conviction is not the same as not being able to afford meat, etc.

Some authors have criticised that the approach is too individualistic, treating subjects in an atomised way and not as part of an interconnected society (e.g. Séverine Deneulin & Nicholas Townsend, 2007). However, other authors (Ingrid Robeyns, 2005) deny these claims and consider the criticism to be misguided. Ingrid Robeyns (2005) argues that the capabilities approach, while adopting an ethical individualism, is not based on ontological individualism[3]. She states that the approach incorporates the social dimension since it considers the influence of social factors both on the possibilities of converting resources into functionings, and on the decision-making processes themselves that lead to certain individual (but socially influenced) choices of functionings based on each person's capabilities. Thus, the framework does take into account social structures, the constraints they impose and the opportunities they offer for individual and collective capabilities.

Martha Nussbaum (2000) drew up a list of ten central capabilities from an inductive process, looking at different cultures and outlining basic lines of universal applicability. However, Amartya Sen (2005) does not agree with setting a closed list of capabilities. He believes that these should be subject to a constant process of public reasoning, leading to progress in social understanding (Amartya Sen, 2005). Despite this, he does distinguish between some elementary capabilities and functionings (avoiding mortality and morbidity, adequate nutrition, decent housing, mobility, being able to read and write, etc.) and more complex ones (being happy, self-respect, self-dignity, social inclusion, being able to appear in public without shyness, etc.), but avoiding a fixed, predetermined, canonical list. While Martha Nussbaum's list may lend conceptual precision to the approach (the lack of such a list was a criticism outlined by Len Doyal and Ian Gough (1991)), Amartya Sen favours leaving the framework more open and flexible as he considers this to

[3] Ethical individualism refers to the individual as the unit of moral concern, so that social matters are evaluated in terms of their effects on individuals. Ontological individualism, on the other hand, reduces the nature of human societies to the mere sum of individuals.

be part of its richness (Amartya Sen, 2005; Shelley Feldman & Paul Gellert, 2006).

Anyhow, the capability approach embraces a universalistic lens. That is, capabilities are considered to be universal and significant for all societies, but can be used in different ways in different cultures. However, capability deprivation implies poverty in any society.

Table 3. *Comparative analysis of well-being approaches*

Approach	Unit of Measurement	Distributive / Efficiency Criterion	Social Dimension
Welfare Economics	Utility (in its three meanings)	- Maximisation of total utility - Pareto optimality	Drawbacks for aggregating individual utilities
Egalitarian Liberalism (John Rawls)	Primary Goods	Difference Principle	Hypothetical Social Contract
Needs (Len Doyal and Ian Gough)	Critical and participatory optimum	*Minimum Optimorum*	YES, goal of social participation, and dependence on environment
Capabilities (Amartya Sen and Martha Nussbaum)	Capabilities, functionings	Equality of Capabilities	YES, through social factors and social capabilities

Source: Translated from Eugenio Actis Di Pasquale (2015)

Table 3 summarises the approaches discussed. Both the human needs and the capabilities approach can be seen as overcoming the previous ones, contemplating a multidimensional and holistic well-being far removed from utilitarian and economistic logic (Eugenio Actis Di Pasquale, 2015). Some parallels can be drawn between the two approaches. For example, between the concepts of needs and satisfiers, and those of functionings and capabilities. Also Len Doyal and Ian Gough’s list of intermediate needs has similarities with Martha Nussbaum's list of central capabilities. In fact, to some extent they can be complementary. For example, Eugenio Actis Di Pasquale (2015) points out that both have positive qualities, and builds on these to propose his own approach based on *social well-being achievements*. So do Narasimha Rao and Jihoon Min (2018), who use both “basic needs” (Len Doyal & Ian Gough, 1991) and “central capabilities” (Martha Nussbaum, 2000) to define the physical and social well-being that have their “decent living standards” as prerequisites.

Nonetheless, we believe that the capabilities approach is the most suitable. The human needs approach of Len Doyal and Ian Gough is more rigid, narrowing it down to only two basic needs which, although broad, leave out many other aspects that we believe are essential for human well-being. In contrast, the capability approach is more comprehensive, flexible and adaptive, open to amplifying conceptualisations of well-being as social understanding evolves. It should also be noted that the concept of needs is more passive than that of capability, as pointed out by Amartya Sen. He also argues that the concept of positive freedom is more closely applicable to capabilities (what someone can *do*) than to the satisfaction of needs (what can *be done* for someone) (Amartya Sen, 1984, p. 514).

Since its emergence, the capabilities approach has become increasingly popular and is now the dominant paradigm among well-being and human development studies. This has allowed it to acquire theoretical soundness. What is more, the approach has inspired many initiatives and projects for better measurement and monitoring of well-being in the last decades, as will be shown below. Measuring resources, which was the focus to date, differs greatly from measuring functionings, as the conversion of these resources into well-being is subject to all kinds of constraints and requires a range of capabilities. Although a material basis is certainly necessary to increase opportunities and is decisive for achieving certain living standards, the capabilities approach takes a broader view, valuing many more aspects of well-being. Thus, it shifts the focus from increasing resources (i.e. income) to increasing the capabilities that can activate them to achieve a good life; so that the core becomes freedom to achieve ends, rather than the means.

2.1.2. Objective or subjective well-being?

A final question to be addressed is whether it is more appropriate to adopt an objective or a subjective perspective on well-being. The objective dimension is linked to the idea of universality, as it considers that there is a common set of requirements (be they capabilities, needs or resources) for all people. Metrics of objective well-being try to directly measure these living conditions, whether they are material (e.g. income, access to housing, facilities, etc.) or non-material (e.g. life expectancy, years of schooling, crime rates, etc.). Subjective well-being, on the other hand, is based on the idea that there may be various factors that affect each person's well-being differently, but what matters is whether that person evaluates his or her own life as a good, happy and fulfilling life. The latter is measured on the basis of surveys, which ask either about satisfaction with life in general, satisfaction with different areas of life, or about the positive and negative emotions experienced by each person (e.g. Harold Dupuy, 1984).

Given that well-being, the sense of being well, implies an individual perception, it is reasonable to consider that each person's assessment of his or her life must be taken into account. Otherwise, no matter how much we consider that all the conditions for well-being are met, we will not be in a position to know whether the population is actually experiencing well-being.

However, reducing well-being to a subjective assessment alone is also problematic. It may hide objective inequalities, since people, even if they are deprived of essential resources or have living conditions that are manifestly inferior to those of their peers, are able to adapt to their circumstances and be happy anyway. But this does not mean that their state of poverty (or poor health, insecurity, lack of access to education, etc.) should be ignored (Marc Fleurbaey, 2009).

Moreover, there is evidence that, in the long run, subjective well-being is not really sensitive to objective conditions. Although the latter improve over time, subjective well-being does not necessarily do so, as individuals do not only evaluate their lives by comparing them with their previous experiences, but also with their social reference groups, whose standards of living also evolve. According to Nobel prize-winning economist Daniel Kahneman (1999), this long-term disconnection between evolving objective conditions and subjective perceptions may be due either to the fact that each person assess his or her situation according to adaptive aspirational levels that vary according to circumstances, or to a kind of hedonistic treadmill, in which repetitive stimuli generate less and less response in terms of satisfaction, so that they must necessarily be incremental in order to maintain it. Daniel Kahneman and Alan Krueger (2006) find further evidence for this second explanation.

From a philosophical point of view, taking subjective well-being as a measure of prosperity would mean a return to the framework of hedonistic utilitarianism, but from the opposite side of welfare economics. That is, instead of measuring income because it will be spent on whatever generates the most utility, we directly measure life satisfaction or happiness regardless of how it is obtained (each from whatever generates the most utility). Furthermore, being limited by the solely subjective criterion means giving up on establishing universal standards for a decent life (cf. Narasimha D. Rao & Jihoon Min, 2018).

Wolfgang Zapf (1986) and Wolfgang Zapf et al. (1987) argue that one can only properly speak of *well-being* when both objective living conditions and subjective perception are positive. If the objective conditions of well-being are good but people do not value it as such, we would speak of *dissonance*. If, on the contrary, despite insufficient objective well-being, the subjective perception of well-being is positive, there has been an *adaptation* to the adverse conditions. And finally, if neither objective nor subjective well-being is optimal, we would speak of a state of *deprivation* (Table 4).

Empirical studies suggest that objective indicators do indeed influence subjective well-being, but many more factors are at work. Mark Western and Wojtek Tomaszewski (2016) find, using data from Australia, that there are significant inequalities based on gender, ethnicity or social class after controlling for objective factors. For example, women tend to report higher levels of subjective well-being than men under the same objective conditions. This is probably because they adapt their expectations to a more unfavourable starting situation as women. If we were to ignore the observation of objective conditions, we would not appreciate this inequality, but would conclude that women achieve optimal levels of (subjective) well-being. Though they would actually do so by settling for lower standards of living. Furthermore, Karel Macků et al. (2020) also find, in a study for NUTS 2 regions in Europe, significant differences by territory in subjective well-being after controlling for objective determinants. For the same living standards, people in some regions experience higher life satisfaction than those in others. In research at regional level such as ours, this is something not to be neglected.

Table 4. *Combining objective and subjective dimensions of well-being*

		Perception and evaluation	
		good	bad
Objective life conditions	good	*Well-being*	*Dissonance*
	bad	*Adaptation*	*Deprivation*

Source: Wolfgang Zapf et al. (1987, p. 17)

Therefore, both elements, having adequate living conditions and actually valuing one's own situation as positive, are necessary to obtain a broad and complete perspective of well-being, as suggested by several authors (Joseph E. Stiglitz et al., 2010; Jon Hall & John F. Helliwell, 2014; Marisol Manfredi & Eugenio Actis Di Pasquale, 2017, 2020). They are complementary, both must be present, and both objective and subjective measures of well-being will be used here. This also ties in with the capabilities approach, in that achievements such as being happy, having self-respect, self-dignity, etc. are discussed. Martha Nussbaum (2000) also includes within the central capabilities some of a subjective nature (e.g. sense, imagination, and thought, emotions, practical reason, etc.).

2.1.3. Framing our understanding of well-being

Of course, capturing all this complexity in a single indicator is, if not impossible, extremely difficult. Nor is it easy to select a set of indicators, which will be the perspective adopted in this research. In any case, for these indicators to reflect the general well-being of a territory in a broad sense, they should take into consideration several aspects that have emerged in the literature review and which are summarised below.

Without attempting to delimit a closed list of capabilities (following Sen's reasoning (Amartya Sen, 2005; Shelley Feldman & Paul Gellert, 2006)), it is important to categorise what broad sets of capabilities are necessary to achieve well-being. Not as a closed paradigm, but as general groupings. Albeit it is true that categorisations of well-being can sometimes be somewhat arbitrary, depending on the level of breadth or concreteness sought or where the boundaries between often overlapping categorisations are drawn. For instance, Deepa Narayan et al. (2000) propose a grouping of well-being into five dimensions: material well-being, bodily well-being, social well-being, psychological well-being and freedom of choice. Narasimha Rao and Jihoon Min (2018), on the other hand, narrow it down to three: physical, social and psychological well-being.

In our case, avoiding overly complex schemes, we turn to the first human development report from the UN (UNDP, 1990), based on the capabilities approach and in which Amartya Sen was involved. The report notes that "the basic objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives". It later adds that "the end of development must be human well-being" (UNDP, 1990, pp. 9–10). In other words, the concepts of development and well-being are closely related, with development being a dynamic notion and well-being a static one. Development is therefore the process of increasing (capabilities for) well-being, which in turn is the aim of the former. That said, UNDP (1990) states that the most critical and essential conditions for achieving a wide range of choices for a life worth living are three:

i. to lead a long and healthy life;
ii. to be educated and acquire knowledge; and
iii. to have access to resources needed for a decent standard of living.

In addition to these three essential pillars, which will serve in the report as the basis for deriving the Human Development Index (HDI) indicators (to be explained later), the authors mention that there is a wide range of highly valued choices beyond them, giving plenty of examples. Here we summarise them in a category that would group together all those matters that have to do with social well-being and community relations (e.g. political participation, social inclusion, etc.). Following the interpretation of Marisol Manfredi and Eugenio Actis Di Pasquale (2020, p. 166), it can be labelled as:

iv. living in community.

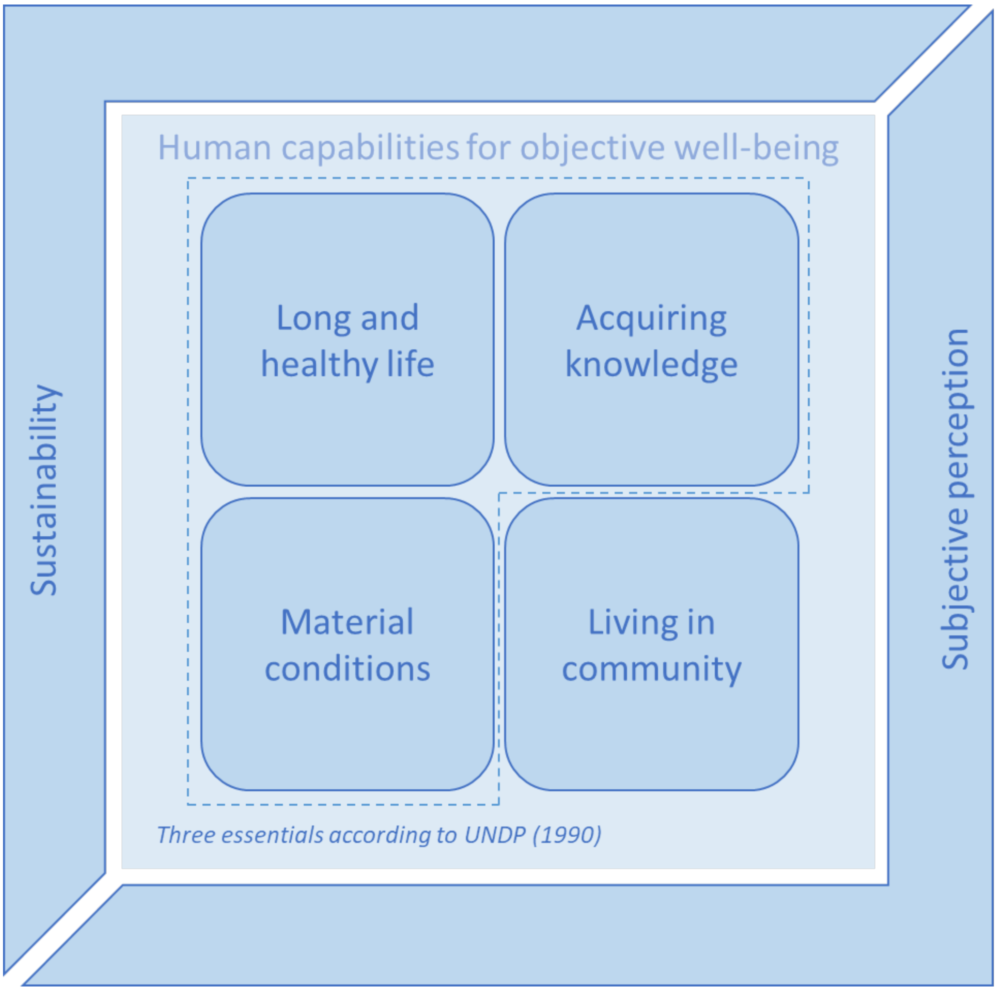
Finally, to these four (or three plus one) core sets of capabilities for objective well-being, a couple of cross-cutting items can be added:

v. subjective perception; and
vi. sustainability.

As argued above, introducing a subjective component is essential to obtain an accurate depiction of well-being (Wolfgang Zapf, 1986; Wolfgang Zapf et al., 1987; Joseph E. Stiglitz et al., 2010; Jon Hall & John F. Helliwell, 2014; Marisol Manfredi & Eugenio Actis Di Pasquale, 2017, 2020). It is not enough for people to have objective reasons to value their lives, but that they actually do so. And this could include aspects such as self-fulfilment, self-respect, the possibility of developing creativity and other subjective determinants of life satisfaction. On the other hand, sustainability cannot be left out of the model since present well-being cannot be based on eroding the basis and capabilities for future well-being, i.e. on the unwellness of future generations. It must be reproducible over time to be considered a desirable situation, otherwise it is just a loan paid for with the well-being of others (Joseph E. Stiglitz et al., 2010).

These last two categories are cross-cutting, so they are not placed on the same level as the other four since they are affected and must be present in all the others (Joseph E. Stiglitz et al., 2010). In other words, all the capabilities that make up objective well-being play a role in one's subjective assessment of them, and sustainability must refer to the long-term capacity to sustain the whole well-being model, so it also cross-cuts all its components. This framework can be represented graphically as follows in Figure 7.

Figure 7. *Conceptual framework of well-being*



Source: Own elaboration from UNDP (1990)

2.2. Facing the challenge of measuring well-being

The purpose of this thesis is not to stay at the level of theoretical conceptualisation, but to go down to the realm of application. Therefore, we need to find ways to measure this phenomenon despite its complexity, and this is certainly a challenge (Mariano Rojas, 2011). In order to do so, we must leave the theoretical field of neat and aseptic virtuality and look for ways to translate all this complexity into accessible data in the real world. This entails an exercise of reduction and abstraction while remaining faithful to the theoretical conceptualisation from which we start and which constitutes our understanding of what well-being is.

2.2.1. Income: an overly restrictive measure

Traditionally, income (i.e. GDP per capita) has been adopted as the most common measure of a territory's material well-being. As mentioned above, from the utilitarian perspective, it was assumed that maximising income maximised well-being since it could be spent on the options that generated the most utility (in terms of happiness and pleasure, desire satisfaction or choice) (Eugenio Actis Di Pasquale, 2015).

The use of GDP as an indicator of well-being has been heavily criticised (e.g. Joseph E. Stiglitz et al., 2010; Livia Bizikova et al., 2021; United Nations, 2021) for several reasons: GDP does not discount the damage generated by some economic activities (environmental deterioration, crime, etc.), it does not include well-being-generating activities that take place outside the market, it does not take inequality into account, it does not distinguish between its components (for example, between producing medicines or weapons), it does not look at the quality and durability of goods and services but only at what is paid for them, it does not consider many other factors that affect well-being besides income (such as health, education or social cohesion), etc.

The European Commission (Alessio Terzi, 2021) also highlights some of these limitations of GDP and points to the need to complement it with other indicators that help to get a better picture of a country's or region's well-being. This is part of the “Beyond GDP” initiative, which has been running since 2007 and aims to promote the implementation of metrics that incorporate social and environmental issues (European Commission, 2023). Among the arguments for questioning the validity of GDP per capita, Alessio

Terzi (2021) adds that its correlation with other well-being-related indicators has been declining over the years in OECD countries. This trend is illustrated in particular with life expectancy, intentional homicides, infant mortality or the pupil teacher ratio, which in developed countries are becoming less and less correlated with GDP per capita.

This phenomenon is also closely related to the so-called Easterlin paradox. Richard Easterlin (1974) stated that, although within a given country the income of each individual is a strong determinant of his or her happiness and subjective well-being, this is not necessarily true for a society as a whole. Once basic material needs are secured, an increase in the average income level does not lead to equivalent happiness gains. While other authors have tried to disprove this empirical regularity (Betsey Stevenson & Justin Wolfers, 2008), Richard Easterlin considers that the positive association between income growth and happiness only appears in the short term due to economic cycles (in expansionary periods happiness is higher than in recessions), but that the paradox is still true when changes are observed in the long term (Richard A. Easterlin et al., 2010; Richard A. Easterlin & Kelsey J. O'Connor, 2020).

The reason for this lies in social comparison. At the individual level, our happiness is influenced by the fact that we compare our income with those around us and perceive that we are relatively better or worse off than others. This effect does not occur over time because social standards change as the average income level evolves, apart from the short-term effect: e.g. in a recession we perceive that our income is comparatively worse than in the previous year and this has an influence on our subjective well-being, but we do not really appreciate a general increase in income compared to the previous decades. Thus, with basic material conditions covered, people's happiness and subjective well-being depend to a greater extent on internal inequality and other factors beyond income growth.

Moreover, the climate emergency and the exhaustion of the planet's physical limits are becoming increasingly evident. This highlights the inexcusable task of considering ways to generate prosperity beyond economic growth, through processes of degrowth (Tim Jackson, 2009; Vaclav Smil, 2019; Jason Hickel, 2020) or, at least, dematerialisation of growth (Noah Smith, 2021). Besides, it is more beneficial for GDP to produce products that are less durable and need to be consumed regularly than to produce quality products with a long shelf life, although this does not imply higher well-being. Thus, given that the finite resources of the planet cannot support an infinite growth of economic production, and could not even supply the current consumption levels of Western countries for the entire world population (e.g. 5.1 planets Earth would be needed if all the inhabitants of the planet were to live like the Americans, according to National Footprint and Biocapacity Accounts (York University Ecological Footprint Initiative & Global Footprint Network, 2023)), we can no longer identify well-being just with income.

Nonetheless, it must be acknowledged that GDP was not designed as a measure of well-being, nor was it intended to be one. Its own precursors never attributed such a function to it. GDP originated in the aftermath of the Great Depression. It was necessary to obtain metrics, albeit imperfect, with which to monitor the productive capacity of the economy and find out whether it was recovering or not. The ability to synthesise all this hitherto unknown information into a single number made its use popular throughout the world, especially after the Second World War (Robert Costanza et al., 2014). Even with its limitations, it is a really useful indicator for what it is intended to measure, but not beyond that. In fact, Simon Kuznets, the creator first of gross national product (GNP) and then of GDP, in the first report he presented to the USA Congress in 1934, already warned about the limited capacity of national income as an indicator for measuring people's well-being:

> *"Economic welfare cannot be adequately measured unless the personal distribution of income is known. And no income measurement undertakes to estimate the reverse side of income, that is, the intensity and unpleasantness of effort going into the earning of income. The welfare of a nation can, therefore, scarcely be inferred from a measurement of national income as defined above."* (Simon Kuznets, 1934, pp. 6–7)

The problem, therefore, has been that many economists and policy makers have for many years placed GDP growth as the central policy objective, attributing to it a function it did not have and mistakenly confusing the means (income) with the ends (education, health and other aspects that confer a higher quality of life). As Simon Kuznets himself wrote years later in reference to the need to distinguish between quantity and quality of growth, “goals for ‘more’ growth should specify more growth of what and for what” (Simon Kuznets, 1962, p. 29).

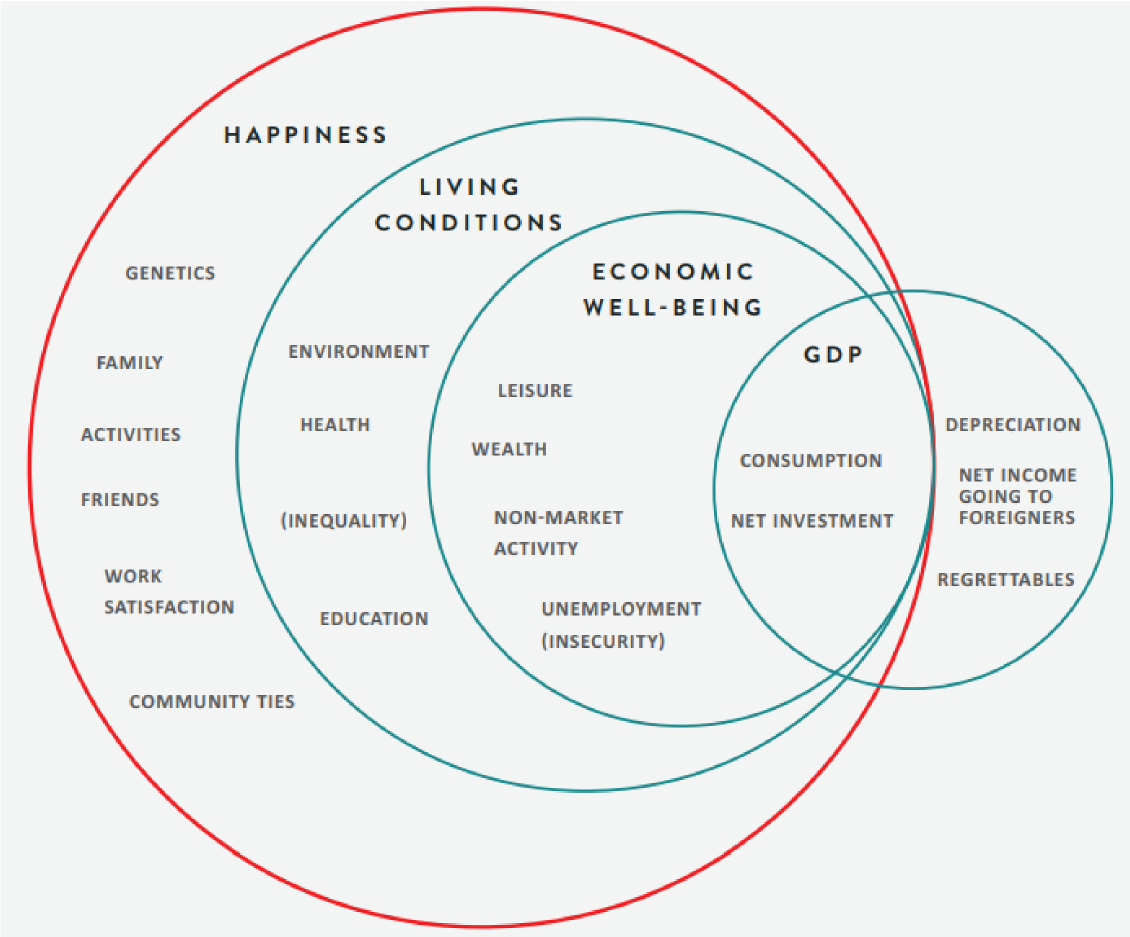
Other more recent Nobel Prize-winning economists, in addition to the aforementioned Amartya Sen, Joseph Stiglitz and even Simon Kuznets, have also been critical in this respect. Such is the case of Abhijit V. Banerjee and Esther Duflo (2019):

> *“Economists have a tendency to adopt a notion of well-being that is often too narrow, some version of income or material consumption. And yet all of us need much more than that to have a fulfilling life: the respect of the community, the comforts of family and friends, dignity, lightness, pleasure. The focus on income alone is not just a convenient shortcut. It is a distorting lens that often has led the smartest economists down the wrong path, policy makers to the wrong decisions, and all too many of us to the wrong obsessions.”* (p. 19)

All this reasoning is graphically reflected in Figure 8. GDP includes only a part of economic well-being, but also includes other aspects that do not contribute to or even worsen it. Economic well-being is in turn only one part of living conditions which, together with many other social, personal and relational factors, determine our happiness and life satisfaction. GDP therefore provides a too narrow perspective for comprehending well-being.

Having agreed on the need to look for other well-being indicators beyond GDP, it remains to review the existing alternatives developed to date. This will allow us to see which one is more in line with what we understand as well-being and with the nature of this thesis (i.e. the European context).

Figure 8. *Some of the many elements of happiness and well-being as opposed to GDP*



Note: Brackets indicate negative impact. *Source:* Lew Daly and Stephen Posner (2011) based on Stephan Bergheim (2006).

2.2.2. In search of alternative indicators

While it is true that GDP has usually been the leading metric for determining (misleadingly) the economic progress and material well-being of countries and regions, the abundant criticism it has aroused has been accompanied by the development of many other alternative indicators.

Some of the first initiatives emerged as a “correction” to GDP, trying to overcome some of its main limitations. William D. Nordhaus and James Tobin (1972) constructed a first primitive indicator that was called Measure of Economic Welfare (MEW). It consisted of adjusting Gross National Income (GNI) by reclassifying its final expenditures; imputing for capital services, leisure and non-market work; and correcting for some of the disamenities of urbanisation.

From the perspective of ecological economics, and building on the insights of William D. Nordhaus and James Tobin (1972), Herman Daly and John Cobb (1989) developed the Index of Sustainable Economic Welfare (ISEW). The ISEW starts by adding, like GDP (for a closed economy), private consumption, public expenditure and gross capital formation. But it also adds the value of services produced and consumed within the household, and subtracts security and military expenditure, both private and public, as well as the cost of environmental degradation and the depreciation of natural capital. Both metrics consequently introduce some improvements over GDP, such as taking into account the contributions of domestic labour and environmental degradation.

Following a very similar logic, the Genuine Progress Indicator (GPI) was developed a few years later (Clifford Cobb et al., 1995). The GPI is broadly analogous to the ISEW, but adds some additional refinements. For example, it adjusts personal consumption by income inequality (so that greater inequality reduces the utility contributed by consumption –given the law of diminishing marginal utility–), takes into account the international trade balance and subtracts the cost of unemployment, underemployment and overwork. Taking all these issues into account, it is noted that while GDP in the USA has been growing steadily up to the present day, the GPI stagnated and even declined slightly from the 1970s onwards, so that the gap between the two indicators has been growing ever wider (Lew Daly & Stephen Posner, 2011; Robert Costanza et al., 2014).

These indicators, however, are susceptible to several criticisms if they are intended to be used as measures of well-being. Ultimately, they still adopt an economistic and utilitarian perspective (adding other sources of utility and deducting disutilities) and are expressed only in monetary units. This implies grouping together elements that are not directly comparable with the same unit, resulting in a single indicator to express a great complexity of intertwined phenomena that it either does not take into account or does not adequately represent just in monetary terms. Besides, from a more practical point of view, although several studies have been conducted using these indicators and the GPI is even officially used in two US states (Maryland and Vermont), they are not calculated systematically for a large sample of countries and years, so data availability is limited.

Another index, which is actually calculated for a broad set of countries, is the Inclusive Wealth Index (IWI) (UNU-IHDP & UNEP, 2012). It was started in 2012, at the initiative of the UN. The IWI measures what they call *inclusive wealth* from the assets of produced capital, human capital and natural capital, making it possible to disaggregate them and observe the evolution of each of the assets and their relative contribution to the inclusive wealth of a country. However, no measures of social capital are included, according to their authors, partly because of their intangibility and partly because of the very nature of these assets, since "they enable other capital assets to function to yield well-being (Partha Dasgupta, 2015)" (Shunsuke Managi & Pushpam Kumar, 2018, p. 48). This index is again expressed exclusively in monetary units.

Since the emergence and widening spread of the capabilities approach, however, many indices have been developed following this perspective and moving away from more economistic frameworks. The pioneer and most relevant due to its worldwide use is the Human Development Index (HDI), elaborated by the United Nations (UNDP, 1990). It takes into account three dimensions: health (life expectancy at birth), education (mean years of schooling and expected years of schooling) and a decent standard of living (GNI per capita in Purchasing Power Parity –PPP–). The indicators of the three dimensions, which were modified in 2010 (those in brackets are the current ones), form a single composite index from 0 to 1, with the most developed countries being closer to 1.

Subsequently, more sophisticated versions of the HDI have been developed, adjusting for inequality (Inequality-adjusted Human Development Index –IHDI-), gender inequality (Gender Development Index –GDI-) and sustainability criteria (Sustainable Development Index –SDI-). The IHDI corrects the HDI so that countries with greater inequality in each of the three dimensions see their scores decline relative to those with more equal distributions at the same average value. The GDI, on the other hand, is a gender-sensitive version of the HDI, penalising countries with gender gaps in any of the dimensions. Whereas the SDI values development outcomes (i.e. HDI) against the material footprint and CO_2 emissions required by each country to achieve them, and is therefore a measure of the eco-efficiency of human development.

Even so, HDI has also been criticised for being strongly correlated with per capita income as one of its three dimensions, a fact for which it carries all the above-mentioned criticisms. This is particularly significant for the more developed countries (such as those to be studied in this thesis), where the health and education components vary very little after reaching optimal values, so that the evolution of the HDI basically tracks income growth. Further, the original version does not take into account the distribution of development (although the IHDI does), taking only the mean values. Nor does it take environmental sustainability into account. Lastly, it has also been criticised for being too reductionist, given that it starts from such a broad conceptual framework (the capabilities approach) that should encompass a multitude of well-being components but in the end it is limited to income, health and education, a very small part of its intended scope (Jon Hall & John F. Helliwell, 2014).

In any case, it was one of the first attempts to put a hitherto theoretical approach into practice, and it was successful. It is quite simple, which is a great advantage for the availability of data in all countries, and it has become widely used and accepted throughout the world. Indeed, the intellectual authors of the HDI have always acknowledged its limitations. Amartya Sen himself pointed out that the purpose they were given was to produce an easy-to-interpret indicator, with a single number, that would be “as vulgar as GNP except it is better” (Laura Wallace, 2004).

Some extensions with additional indicators to the original HDI have been proposed, such as Patricio Sánchez-Fernández and Albino Prada-Blanco

(2015), proposing the Social Development Index with 5 dimensions and 17 indicators, or Marisol Manfredi and Eugenio Actis Di Pasquale (2020), with an HDI that combines objective indicators with others of subjective perception in each of the dimensions. However, these proposals have little scope in terms of global implementation and generalised access to data, beyond occasional scientific studies. There are in fact plenty of proposals in this regard in the academic field, making it to some extent unmanageable. But we are more interested in those metrics that transcend strictly academic research and are supported by international institutions for widespread dissemination, allowing territorial comparisons between countries and access to time series.

It should be clarified at this point that this is not intended to be an exhaustive review of all existing social indices and indicators based on the capabilities approach, only those that seek to measure well-being as such or other analogous concepts. For instance, there are many indicators focused on measuring poverty not in monetary terms but in terms of capabilities and opportunities (taking into account material poverty but also deprivations in health, education and others), such as the Multidimensional Poverty Index (MPI) or the Human Poverty Index (HPI). Other indicators focus on women's capabilities (e.g. Gender Empowerment Measure –GEM–, Gender Inequality Index –GII– and Global Gender Gap Index), on ecological sustainability, etc. But here we will leave them aside if they do not also include other aspects that make it possible to capture well-being as a whole.

Sen's capabilities approach also inspired the Basic Capabilities Index (BCI), developed by Social Watch in 2005 on the basis of the previous indices Quality of Life Index and Capability Poverty Measure. This index only takes into account child mortality, maternal health and education, without incorporating income (Ian Percy, 2014). It may be interesting for underdeveloped countries, but not for countries such as those in Europe where the index is already very high and little difference can be observed. In addition, the last edition of the index was released in 2011 and has not been recalculated to our knowledge.

The Happy Planet Index (HPI, created in 2006 by the New Economics Foundation), on the other hand, is more focused on ecological sustainability, as it is based on relative efficiency in the transformation of natural resources into a “long and happy” life for citizens without jeopardising that well-being in other countries or in the future. It does so on the basis of three dimensions: life expectancy, life satisfaction and ecological footprint, adjusting the first two for inequality (Wellbeing Economy Alliance, 2021).

There is also the Prosperity Index (PI), developed by the Legatum Institute. It is published on an annual basis, although the definition of prosperity and the indicators that make up the index have been changing since its inception in 2007. Prosperity is now considered to be driven by three domains: inclusive societies, open economies and empowered people. The domains comprise twelve pillars: safety and security, personal freedom, governance, social capital, investment environment, enterprise conditions, infrastructure and market access, economic quality, living conditions, health, education and natural environment. In turn, these twelve pillars contain sixty-seven elements that are measured through three hundred indicators (Legatum Institute, 2023). As can be seen, it is an index that gives a rather prominent role to the business environment and market opportunities, which occupy one third of the pillars (those included in the “Open Economies” domain). Yet it does not necessarily lead to higher levels of well-being, or at least not automatically. The index is calculated by giving equal importance to all twelve dimensions, but they can also be weighted.

In 2013, another highly interesting proposal was launched at the initiative of the global non-profit organisation Social Progress Imperative and produced annually, is the Social Progress Index (SPI). It excludes from the outset any economic indicator as a proxy, taking only social and environmental indicators to directly measure social progress, looking at outcomes and not inputs. It also adopts a holistic view of social progress, valid for any country, and seeks to measure issues that can be addressed by public policy (Michael Green et al., 2022). The index is made up of 53 indicators, structured into 12 components, which are further grouped into three pillars. The first pillar, *Basic Human Needs*, includes nutrition and basic medical care; water and sanitation; shelter; and personal safety. In the second one, *Foundations of Well-being*, we find access to basic knowledge; access to information and communications; health and wellness; and environmental quality. And lastly, under Opportunity, there are personal rights; personal freedom and choice; inclusiveness; and access to advanced education. There is also a regional version of the SPI for European countries (EU-SPI) with data at NUTS 2 level. It is the result of a cooperation agreement between the European Commission and the Social Progress Imperative, although this is not produced annually but every four years (2016 and 2020 for the time being) (Paola Annoni & Paolo Bolsi, 2020).

In turn, the international foundation World Economic Forum created the Inclusive Development Index (IDI) in 2017 (World Economic Forum, 2018). IDI is structured around three pillars (Growth and development; Inclusion; and Intergenerational equity and sustainability), each containing four Key Performance Indicators (KPIs). The KPIs are mostly focused on strictly material issues (though including distribution), with only a few KPIs on health (healthy life expectancy) and environment (carbon intensity of GDP). It therefore falls a little short on issues related to education, community relations or subjective well-being, for instance. Nor is the IDI for advanced economies and developing countries directly comparable, as the definition of poverty (one of the KPIs) differs. But the main disadvantage of this index is that, despite its claim to be annual, only the 2017 and 2018 reports have been published.

Another well-known indicator, although not based on the capabilities approach, is Gross National Happiness (GNH) (Centre for Bhutan Studies & GNH Research, 2016). The concept emerged in Bhutan in 1972, when King Jigme Singye Wangchuck ascended the throne, and the index was developed years later, in 2008. GNH is now the main guideline for public policy in Bhutan. It consists of nine domains that place greater emphasis on subjective issues and social relations, while the role of consumption is relegated to the background. In recent years, it has become particularly famous all over the world for its purported intention to replace GDP with the pursuit of happiness.

However, it has also attracted much criticism. From a philosophical point of view, Martha Nussbaum (2008) and others have contested the notion that well-being is about maximising happiness. Regarding the GNH in particular, it should be noted that the underlying values are Buddhist and very specific to Bhutanese culture (e.g. level of spirituality, time spent praying, Driglam Namzha –Bhutanese Code of Conduct and Etiquette–, values, etc.). It is therefore not applicable to other cultural contexts or even to practitioners of other religions (or none) in the country. Although its promoters argue that the index should adapt its form in each country according to the local culture, this leads to problems of international comparability. Finally, its instrumentalisation in favour of the Bhutanese monarchical regime has been questioned. Some NGOs denounce the fact that indicators of material conditions are barely included, which may be an excuse to camouflage the poverty of the population by adopting other parameters. Moreover, the GNH is used for propaganda purposes abroad, but human rights are not respected in the country, and has even served as a justification (under the pretext of "cultural preservation") for ethnic cleansing by expelling the Nepalese and Hindu minority, as they do not follow Buddhist codes (see Human Rights Watch, 2023).

However, there is also a secular version developed by the International Institute of Management in 2005, but inspired by the original spirit of the GNH, which is called Gross National Happiness / Well-being (GNH/GNW). It is made up of seven dimensions of well-being (economic, environmental, physical, mental, work, social and political), most of them including both objective and subjective indicators (Med Jones, 2005).

Moving towards official statistics at European level, Eurostat has also promoted some initiatives in this field. Since 2013 it has been producing the Quality of life indicators (Eurostat, 2015), a panel of indicators that initially comprised nine dimensions and is currently eleven (material living conditions, housing conditions, employment, time use, education, health, social interactions, safety, governance, environment and overall life satisfaction (Eurostat, 2022)). In each of them, in addition to objective indicators, subjective indicators of satisfaction are included. However, these subjective indicators come from ad hoc surveys with multiannual periodicity, and so far there have only been modules for 2013 and 2018. Eurostat also produces annually the European Statistics on Income and Living Conditions (EU-SILC), although only including material conditions. In parallel, Eurofound conducts the European Quality of Life Survey (EQLS), which assesses a series of items on the quality of life, the quality of society and public services (Eurofound, 2017). It is published every four years, although the latest edition is still from 2016 (there is data for 2003, 2007, 2012 and 2016).

As can be seen, many initiatives have emerged to look for new ways of measuring well-being (Table 5) beyond the reductionist GDP approach. Foremost, it is evidence of the growing interest in recent decades in the measurement of well-being, the overcoming of metrics that, while useful for other purposes, are not conceived for that aim, and the consequent focus of public policies on improving the well-being of the population. Some of them manage to solve many of the problems raised above, while others have several limitations and do not offer entirely satisfactory solutions. After review, we consider that the Better Life Index (BLI) developed by the OECD is the one that best fits our approach to well-being (summarised for illustrative purposes in Figure 7) and the theoretical and practical requirements of this research. The reasons for this are explained below.

Table 5. *Selection of metrics intended to measure well-being*

Index name	Components	Promoters	Start	Measure
Measure of Economic Welfare (MEW)	GNI with corrections: final expenditures, capital services, leisure and non-market work, disamenities of urbanisation	William D. Nordhaus & James Tobin	1972	Monetary units
Index of Sustainable Economic Welfare (ISEW)	GDP plus household-produced and consumed services minus security and military expenditure, environmental degradation and depreciation of natural capital	Herman Daly & John Cobb	1989	Monetary units
Human Development Index (HDI)	Health, education, decent standard of living	UNDP	1990	Score
Genuine Progress Indicator (GPI)	ISEW adjusted for inequality, trade balance, unemployment, underemployment and overwork	Clifford Cobb, Ted Halstead & Jonathan Rowe	1995	Monetary units
Basic Capabilities Index (BCI)	Child mortality, maternal health, education	Social Watch	2005	Score
Gross National Happiness / Well-being (GNH /GNW)	Economic, environmental, physical, mental, work, social and political wellness	International Institute of Management	2005	Score
Happy Planet Index (HPI)	Life satisfaction, life expectancy, ecological footprint	New Economics Foundation	2006	Score
Gross National Happiness (GNH)	Psychological well-being, health, education, time use, cultural diversity and resilience, good governance, community vitality, ecological diversity and resilience, living standards	Centre for Bhutan Studies & Oxford University	2008	Score
Better Life Index (BLI)	Civic engagement, community, education, environment, health, housing, income, jobs, life satisfaction, safety, work-life balance	OECD	2011	Scoreboard

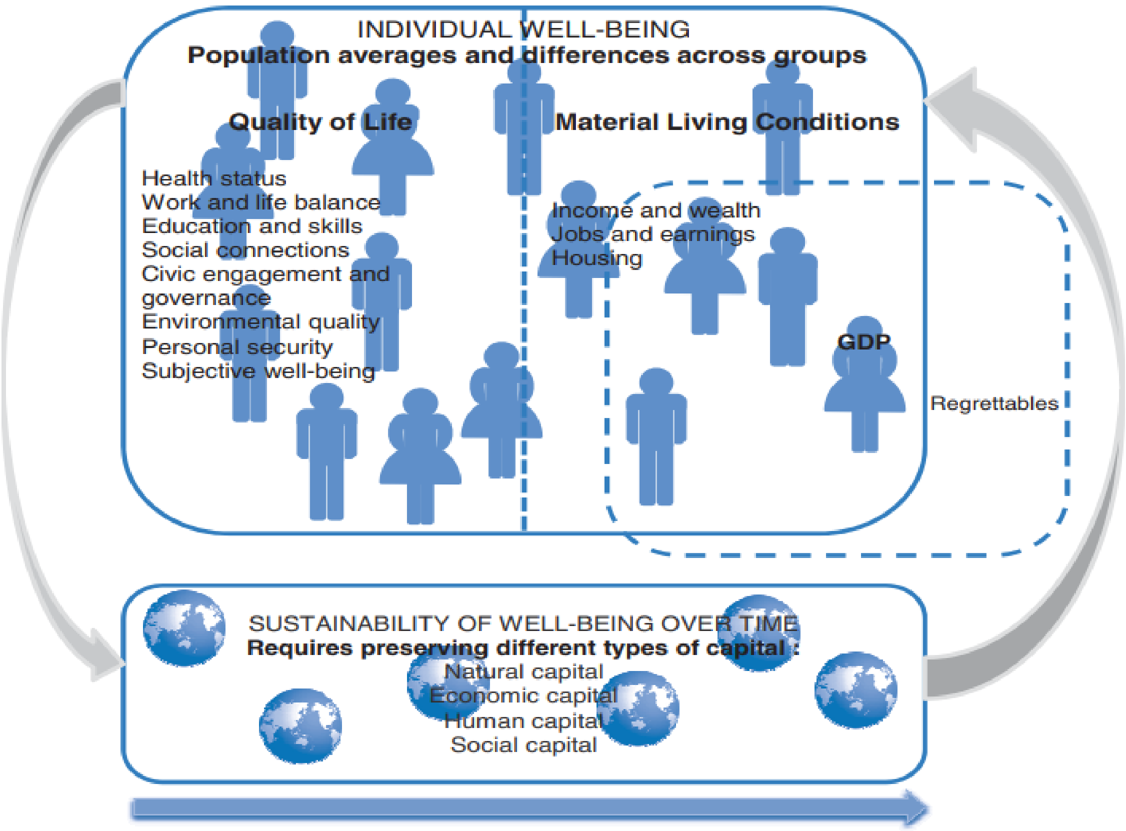
Index name	Components	Promoters	Start	Measure
Inclusive Wealth Index (IWI)	Produced capital, human capital, natural capital	UNU-IHDP & UNEP	2012	Monetary units
Social Progress Index (SPI)	Basic Human Needs (nutrition and basic medical care, shelter, personal safety), Foundations of Well-being (access to basic knowledge, access to information and communications, health and wellness, environmental quality), Opportunity (personal rights, personal freedom and choice, inclusiveness, access to advanced education)	Social Progress Imperative	2013	Score
Quality of life indicators	Overall life satisfaction, material living conditions, housing conditions, employment, time use, education, health, social relations, safety, governance, environment	Eurostat	2013	Panel of indicators
Inclusive Development Index (IDI)	Growth and development, inclusion, intergenerational equity and sustainability	World Economic Forum	2017	Score
Prosperity Index (PI)	Inclusive societies (safety and security, personal freedom, governance, social capital), Open economies (investment environment, enterprise conditions, infrastructure & market access, economic quality), Empowered people (living conditions, health, education, natural environment)	Legatum Institute	2018	Score

Source: Own elaboration

2.2.3. Better Life Index: a fairly comprehensive solution

The choice of the Better Life Index (BLI) is motivated by a number of reasons of both a theoretical and technical nature. It was created by the OECD in 2011 through the *Better Life Initiative* (OECD, 2011), and has been updated regularly since then. BLI is based on the capabilities approach, seeking to make it measurable and operational on the basis of the reflections formulated by the Commission on the Measurement of Economic Performance and Social Progress, chaired by Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi (Joseph E. Stiglitz et al., 2010). It combines material aspects with others on quality of life and the environment, while taking into account sustainability and the reproduction of future well-being (Figure 9). Moreover, as it is designed for OECD countries with a medium-high or high level of development, it is probably the one that best fits the European reality (although there have also been proposals to adapt it and expand it to other countries, such as that of Joseph Kangmennaang and Susan J. Elliot (2019)). As of today, the BLI is already a well-known and established well-being index, with growing interest in academia (see Glaucia Da Costa Azevedo et al., 2020). However, the determining factor for having chosen these data are the criteria used to select the dimensions and indicators, which will be briefly explained below.

Figure 9. *Conceptual framework of well-being proposed by the OECD, as opposed to GDP*



Source: OECD (2011).

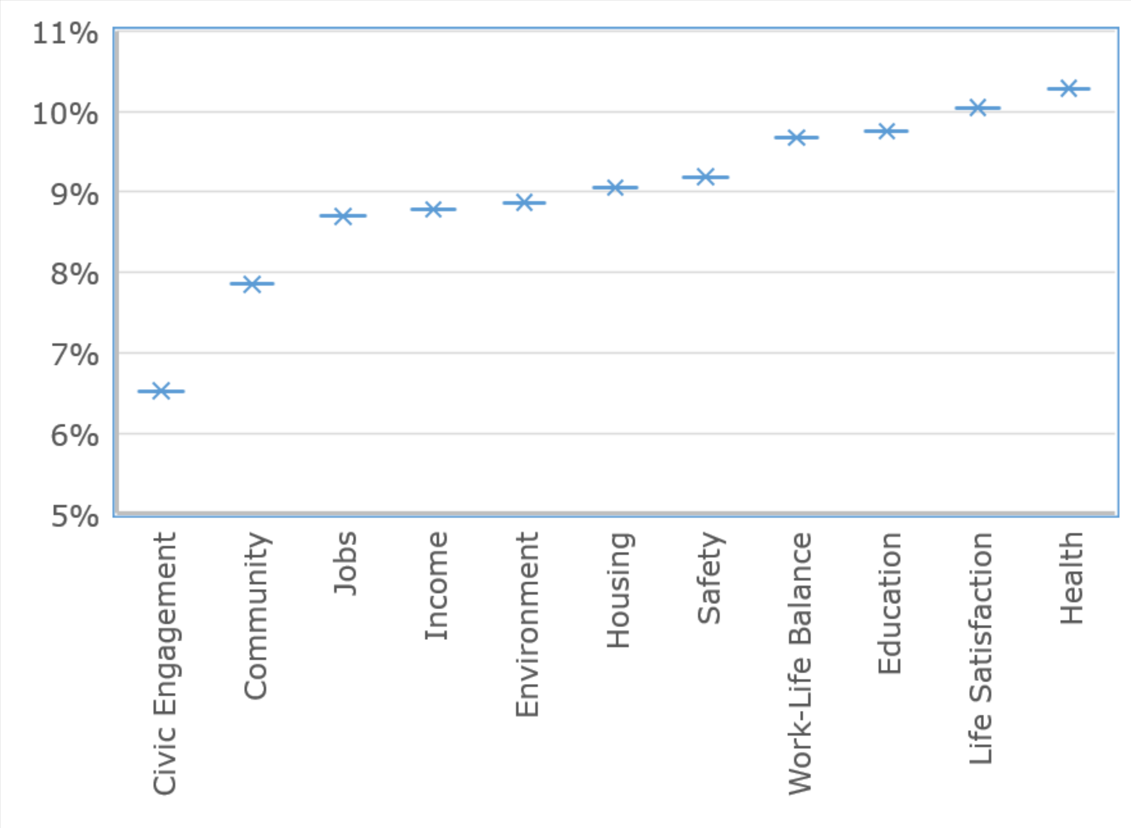
The Better Life Index, despite its name, is not an index as such, but a dashboard of indicators. Some authors criticise that it does not allow for a single aggregate measure that captures the overall level of well-being (Luis César Herrero-Prieto et al., 2019). Consequently, several composite indicators have been developed based on BLI data (e.g. Hideyuki Mizobuchi, 2014; Jan Lorenz et al., 2017; Jesús Peiró-Palomino & Andrés J. Picazo-Tadeo, 2018), using a variety of weighting approaches ranging from multivariate techniques for data reduction such as factor analysis or principal component analysis (PCA), endogenous mathematical methods such as data envelopment analysis (DEA), to exogenous approaches based on expert opinion or surveys, among others (see Glaucia Da Costa Azevedo et al., 2020 for a more exhaustive review).

However, capturing multidimensional phenomena through composite or synthetic indicators has also been widely criticised for the loss of information and the arbitrariness of the weighting to be applied to the different elements that make it up (Marc Fleurbaey, 2009; Joseph E. Stiglitz et al., 2010). In fact, the relative importance given by each society and each individual to the different dimensions of well-being is different, and varies substantially from one region to another. Figure 10 presents the priorities expressed by users of the BLI platform[4]. However, there are significant importance by country, by gender, by age, etc. Moreover, even a survey-based weighting method does not accurately represent the real preferences of citizens (Clemens Hetschko et al., 2019). Therefore, in our work we will not treat well-being as a single unified concept, but rather we will assess each and every one of the elements that make it up in order to observe the effects sought separately. Indeed, the most frequent criticism of the BLI (Glaucia Da Costa Azevedo et al., 2020) is precisely that, although it does not group the dimensions into an index, in those dimensions that contain several indicators, the score is

[4] The OECD allows users to rank their well-being preferences and register them through the BLI website. At the time of data extraction for Figure 10, there were responses from 197,071 users.

obtained from the simple arithmetic mean of these, which means applying an arbitrary weighting[5].

Figure 10. *Well-being priorities among BLI users (%)*



Source: OECD (2023a)

Furthermore, Marc Fleurbaey (2015) proposes to follow four criteria for adopting well-being metrics: they should be comprehensive, correlation sensitive, preference based and fairness based. In his analysis of different proposals, he considers that the capabilities approach fulfils all conditions satisfactorily except that of being based on the preferences of the subjects, with which he is more sceptical. He believes that the approach fails to pay attention to individual preferences, and that they should be incorporated into the model at least once basic capabilities have been secured. In his view, this is a weakness of the approach, which would not overcome this criterion in its current conception (Marc Fleurbaey, 2015). In the case of the BLI, however,

[5] Given that we resort directly to the indicators without starting from any aggregation, this criticism does not apply to this research.

in addition to meeting the other three criteria, it would overcome the limitation posed by Marc Fleurbaey. By not aggregating the different dimensions and not adopting a predefined weighting but leaving it open to personal preferences, it should also be considered a *preference-based* measure.

As for the main features of the BLI and its components, although the technical issues will be elaborated in more detail in chapter 4, it is worthwhile to give a general overview here. The BLI defines 11 dimensions of well-being and 24 indicators. Additionally, the OECD also offers a regional version of the index. However, when we go down to the regional level, the availability of reliable, homogenised and comparable statistics between countries means that some of these indicators are not available. For a regional analysis, there are still 11 dimensions (life-work balance disappears, but access to services is incorporated) but with 13 indicators (Table 6), which are the ones that will be used in our study.

The elements considered in the BLI are based on four principles (Martine Durand, 2015):

1. They are focused on the population (individuals or households), and not on aggregate macroeconomic variables. For example, income is not measured by GDP per capita but by household net disposable income.

2. They focus on outcomes, and not on outputs, and even less on the inputs that are *supposed* to lead to higher well-being.

3. They are likely to take account of the distribution of results over the population and different social groups, so that they can be potentially disaggregated (e.g. the BLI platform allows scores to be differentiated by gender, and Koen Decancq (Koen Decancq, 2017) designed and implemented a distribution-sensitive BLI that penalises multidimensional well-being inequality).

4. They consider not only objective measures, but are complemented by subjective measures arising from the experience of individuals themselves.

In addition, the indicators meet a number of technical characteristics suitable for our research: they are easy to interpret; they are commonly accepted and used as measures of well-being by the academic and statistical community; they are susceptible to being altered by public interventions; they are based, in most cases, on official data that are regularly updated; and they can be compared in a fairly harmonised framework across OECD countries (Martine Durand, 2015).

The indicators that make up the regional Better Life Index, however, have some constraints, imposed by the very nature of the data. It is not easy to produce standardised statistics at the regional level for a large number of countries, where different statistical offices are involved. The indicators are therefore those that *can be*, and have limitations that have to be taken into account when interpreting the results. Nevertheless, the data offer many possibilities and information of great interest can be extracted to better understand the phenomenon under study. Besides, despite growing academic interest in the BLI, studies using regional data are still scarce and fairly recent (Jörg Döpke et al., 2017; Jesús Peiró-Palomino, 2019; Mehmet Pinar, 2019; Jesús Peiró-Palomino et al., 2020; Paolo Liberati & Giuliano Resce, 2022).

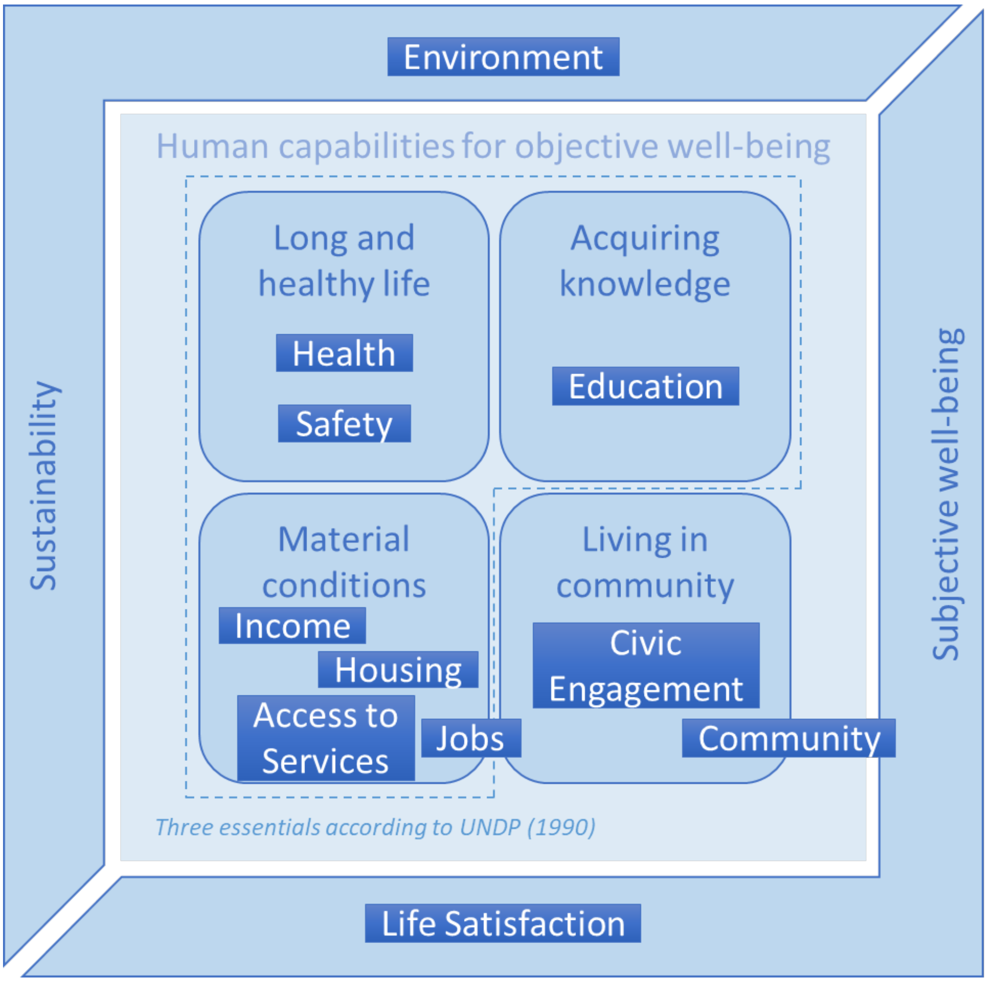
But the most relevant criterion that the BLI must meet in order to be adopted as a vehicle for measuring well-being is wether it reflects our comprehensive conception of well-being. Indeed, if we start from the model illustrated in Figure 7, each dimension of the regional BLI falls into one of the well-being domains defined: long and healthy life, acquiring knowledge, material conditions, living in community, subjecte perception and sustainability. In turn, all of them have at least one indicator that contributes to their measurement, as can be seen in Figure 11. The BLI is therefore suitable for the conceptual framework of the research.

Table 6. *Dimensions and indicators that make up the Better Life Index*

Dimension	National indicators	Regional indicators
Housing	Housing expenditure Dwellings without basic facilities Number of rooms per person	n.a. n.a. Number of rooms per person
Income	Household net financial wealth Household net adjusted disposable income	n.a. Household disposable income
Jobs	Job tenure Average annual earnings per employees Long-term unemployment rate Employment rate	n.a. n.a. ≈ Unemployment rate Employment rate
Community	Social network support	Social network support
Education	Years in education Students cognitive skills (PISA) Educational attainment	n.a. n.a. Educational attainment
Environment	Satisfaction with water quality Air quality	n.a. Air quality
Civic engagement	Consultation on rule making Voter turnout	n.a. Voter turnout
Health	Self-reported health status Life expectancy at birth n.a.	n.a. Life expectancy at birth Age adjusted mortality rate
Life Satisfaction	Life satisfaction	Life satisfaction
Safety	Homicide rate Self-reported victimisation	Homicide rate n.a.
Work-life balance	Time devoted to leisure Employees working very long hours	n.a. n.a.
Access to services	n.a.	Broadband connection

Source: OECD (2018b). *Note:* n.a. stands for not available.

Figure 11. *Dimensions of regional BLI within our well-being framework*



Source: Own elaboration

It can be seen that there are two dimensions of the BLI that partly fall between two domains of the conceptual framework: Community and Jobs. In the first case, it is an indicator of perceived social network support that is answered on the basis of a survey (i.e. share of people who believe they can rely on their friends in case of need). Obviously, it is a measure related to living in community. But it is also a measure of subjective perception, and thus falls between the two.

In the case of Jobs, it is included in the material conditions since it is the source of income and subsistence for the majority of the population. But it must also be seen as part of living in a community, as work constitutes an important mechanism for social inclusion. Especially in contemporary capitalist societies, which are the focus of this study. Moreover, if we adopt a social perspective and avoid purely individualistic reasoning, individual capabilities not only bring well-being to the individual (e.g. through wages in this case), but also increase collective capabilities and allow for greater social achievements (or *functionings*). In other words, the fruit of labour, insofar as it creates value, not only generates an income for those who perform it, but also makes a contribution to the well-being of the community. A train driver's work not only brings him a salary, or the ability to integrate into society, but also allows people to travel to meet their relatives, brings cohesion to the territory, reduces the emission of noxious gases, etc.

Having defined what we mean by CCIs and well-being, it remains to answer the big question of how CCIs relate to well-being.

CHAPTER 3

Decoding the relationship between CCIs and well-being

3.1. A first survey of some background insights

As no one will be unaware, the relationship between CCIs and well-being is a matter of extreme complexity. Great authors such as Adam Smith, William Stanley Jevons, Alfred Marshall, John Maynard Keynes or Lionel Robbins, dealt with the issue of cultural goods and services as part of the economic and social structure, often without understanding their role as value generators. But even so, they all agreed that access to culture is essential for the development of a good society (see Luis F. Aguado et al., 2017 for a more detailed discussion).

The first thing to point out is that, far beyond the instrumental value of culture to pursue other ends (such as economic development, health, a more cohesive society, or ultimately well-being), culture has value in itself. Cultural engagement generates pleasure, arouses emotions and modulates consciences. It meets aesthetic, cognitive, expressive and self-realisation needs. Those that Abraham Maslow (1943) placed at the top of the pyramid of needs, regardless of the contributions culture may also make to the needs of lower levels. That is, whether or not culture can strengthen economic activity, social connections or environmental sustainability, it has intrinsic value. Culture makes us live better lives, lives worth living. It does not need other higher purposes to exist because cultural expression is already an end in itself (Victoria Ateca-Amestoy, 2021), *art for art's sake*. But it may also have other areas of influence. The explanation for this lies not in its intrinsic value but in its instrumental value, i.e. its capacity to achieve other ends *through* culture, or rather, CCIs.

John Holden (2009) distinguishes, in addition to intrinsic and instrumental value (the latter implying economic or social benefits), institutional value. This is produced in everything that culture brings in the form of public goods, such as public knowledge or an active civil society. In turn, the Warwick Commission (2015) stated that CCIs generate cultural value, economic value and social value (Stuart Cunningham & Terry Flew, 2019). The first is equivalent to intrinsic value, while the other two can be considered different forms of instrumental value, depending on the nature of their effects. Also in John Holden's (2009) classification we can consider institutional value as a form of instrumental value. But in this case the benefits produced are of a collective, rather than a privative, nature. However, there are also authors who believe that this value distinction is actually a false dichotomy that should be overcome (Arjo Klamer, 2016; Geoffrey Crossick & Patrycja Kaszynska, 2016).

While acknowledging that the value of culture and creativity, hence of CCIs, goes far beyond their instrumental value in achieving other ends, we will focus here on measuring the latter, since it is the purpose of this research. But we will consider a broad sphere of effects, i.e. multidimensional well-being, which to some extent indirectly captures the intrinsic value of culture through subjective well-being and life satisfaction. That said, we must move on to conceptualise the relationship of CCIs to the dimensions of well-being.

A partial approach to the link between CCIs and well-being starts from the connection between CCIs and the economy, i.e. the material conditions of well-being. Quite a lot has been written about this. Jason Potts and Stuart Cunningham (2008) conceptualise four possible models of the relationship between CCIs and the economy. These are the welfare model, the competition model, the growth model and the innovation model.

The first considers that the contribution of CCIs to productivity growth is negative. This is based on the cost disease proposed by William Baumol and William Bowen (1965), which is not without its critics (see Tyler Cowen (1996), who considers productivity to be a misleading indicator for CCIs). However, CCIs would provide other types of values that would make them be considered as “merit goods”. This interpretation would justify subsidies to the industry to sustain it for its goodness (i.e. to promote welfare) but to the detriment of economic growth.

The competitive model instead considers CCIs as "just another industry", with similar effects on both economic growth and utility generation. They would therefore require to be treated in the same way as other industries in public policy.

The third model, or growth model, places CCIs as a driver of economic growth. CCIs generate new ideas that are transferred to other industries, making them a strategic industry to promote.

Finally, the innovation model considers that CCIs are not really an industry *per se*, but a key gear in the innovative system of the economy. They play a structural role, as do education, science and technology. CCIs are ultimately facilitators of evolutionary processes of change. In fact, Jason Potts (2009) renames this model the “evolutionary model”, since CCIs are embedded within the Schumpeterian model of economic evolution.

Rafael Boix-Domènech and Pau Rausell-Köster (2018) review these four models and suggest that a fifth scenario could theoretically be envisaged. The four proposed models assume positive or neutral well-being impacts. Even the first model, despite the negative impact on productivity, assumes an intrinsic value of CCIs that deserves to be preserved through subsidies. But this should not necessarily be the case. The authors hypothesise that the effects could even be negative because of a crowding out effect of other activities that generate more value (assuming the cost disease), because of the abundant precariousness of labour in these industries (David Hesmondhalgh, 2010), and due to crippling alienation effects (see the notion of “Culture Industry” in section 1.1).

In any case, apart from hypothetical scenarios, the authors find evidence consistent with the growth model and with the innovation model, although contrasting the latter empirically is a much more complex task (Jason Potts & Stuart Cunningham, 2008). The positive relationship of CCIs with economic growth has been confirmed by a number of subsequent research (as discussed in section 3.2.2), although there have also been criticisms of positioning it as a policy goal (see Mark Banks, 2018).

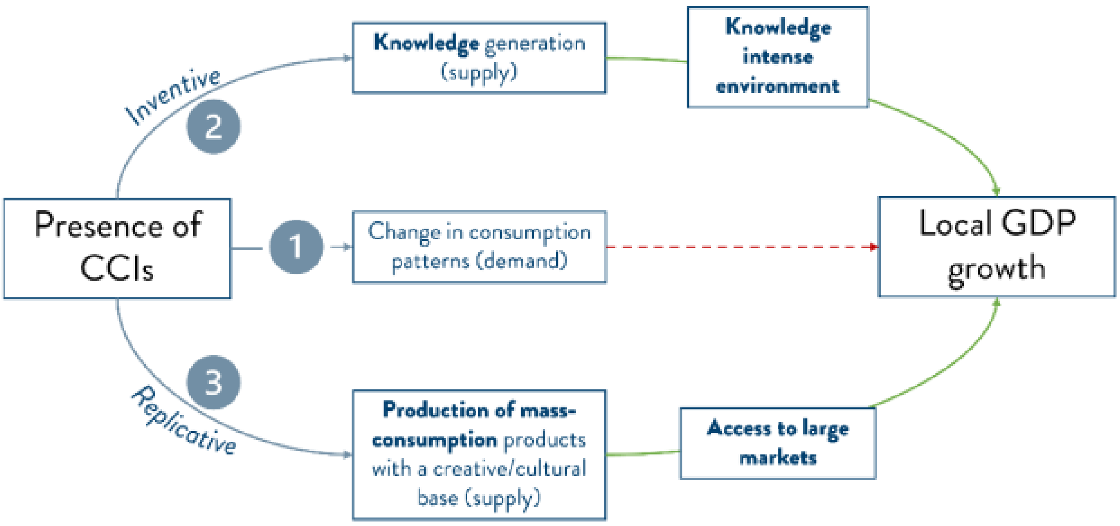
The underlying idea of the innovation model is precisely what has sparked interest in studying how CCIs affect the rest of the economy. It is heavily influenced by the Schumpeterian theory of long waves, which places innovation (and competition in innovation, rather than prices) as the main force of progress in capitalist economies (Joseph Schumpeter, 1934, 1939). The idea that culture and CCIs in particular are a systemic enabler of innovation has found considerable currency in the literature. It is argued that they are capable of leading endogenous development models in the territories (Pier Luigi Sacco & Giovanna Segre, 2009).

In the post-industrial era, in which the focus of development moves from physical capital to human capital and knowledge (Daniel Bell, 1973), there is a shift from the Marshallian concept of the industrial district. Pier Luigi Sacco et al. (2013) propose a new approach of system-wide cultural districts, in which culture plays the role of *system activator*. In these, the coordination of cultural actors and their complementarity within the multiple value chains to achieve strategic development objectives prevails.

Nevertheless, it is often questioned whether, within this grouping of diverse activities that are the CCIs, it is really those of a purely artistic and cultural nature that contribute to innovation and development. Although at first glance it might seem that innovation and productivity gains occur mostly in the more technology-intensive industries, some authors place arts and culture as an integrated part of the same value chain in terms of driving innovation (Blanca De-Miguel-Molina et al., 2014). Arts and culture trigger experimentation, which leads to the generation of knowledge, which in turn triggers the emergence of new methods and ideas. These are transmitted to the more peripheral or commercial-oriented CCIs, and to the wider economy (Metro-Dynamics, 2020). Along these lines, Bjørn Asheim (2007) and Bjørn Asheim et al. (2011) categorise three types of knowledge: analytical (science-based), synthetic (engineering-based) and symbolic (arts-based). It is in the latter that core cultural sectors make their greatest contribution. But it is in the cross-fertilisation between the different forms of knowledge, and building connections between complementary industries, that economic development is triggered.

According to Roberto Dellisanti (2022), however, not all CCIs are knowledge generators. He considers that there are inventive CCIs, which apply technological, symbolic and/or artistic creativity, and replicative CCIs, which produce mass consumer goods with a creative and cultural base. The former, as knowledge generators, benefit from knowledge-intensive environments, while the latter require access to large markets for their mass production. Both contribute differently to GDP growth on the supply side, and in turn all CCIs contribute on the demand side by changing consumption patterns (Figure 12).

Figure 12. *Impact pathways of CCIs on local economic growth*



Source: Roberto Dellisanti (2022)

The results of Roberto Dellisanti (2022) confirm that both groups of CCIs are engines of growth, each through different channels. Yet territorial characteristics are a relevant factor, as inventive CCIs have greater effects in urban regions, while replicative CCIs have greater effects in rural areas. Therefore, development strategies based on CCIs should follow a logic adapted to regional circumstances and potentials.

Another line of argument is that of Richard Florida (2002, 2008), who focuses on the concept of the “creative class” and the capacity of cities and territories to attract it. According to Richard Florida, creative and talented people are the ones who drive growth and create good jobs. In other words, it is not the people who look for the jobs but the jobs that follow the people. Creative people, specifically. The creative class seeks out attractive environments in which to develop that creativity. These are the ones where the three T's come together: technology, talent and tolerance. Cities' strategy for development should therefore be to create the conditions to attract and retain the creative class. This line of thought has given rise to several analyses of the conditions for making a city or region appealing, the determinants of the location of the creative class, or how the creative class enhances economic dynamism (e.g. Nick Clifton & Philip N. Cooke, 2009; Ron A. Boschma & Michael Fritsch, 2009).

However, this approach has also met with a great deal of criticism (see Jamie Peck, 2005). Richard Florida tries to answer the question of how one chooses where to live and work. This is closely linked to the mentality of the USA, with intense internal geographic mobility. But mobility between other places where there are greater cultural differences and where the sense of territorial rootedness is stronger, is much more limited (Toby Miller, 2009; Sako Musterd & Olga Gritsai, 2013). Moreover, basing development on attracting creative people may be beneficial for the region that succeeds, but it comes at the expense of the rest of the territories that lose their creative class. Overall, it would be a zero-sum game (Andy C. Pratt, 2008). Some authors also criticise that it is likely to confuse cause with consequence, i.e. whether it is the bohemian atmosphere and lifestyle that is the cause of economic growth or rather a symptom (Jamie Peck, 2005).

Most criticisms, however, focus on pointing out elitism, potential inequalities and negative externalities (such as gentrification) generated by this model of regional development. It reserves the role of creativity to a few: the leaders, the drivers of the economy, while the rest are mere passengers. The creative class abhors the mundane and time-consuming tasks of social reproduction, but someone has to do them. In the words of Jamie Peck (2005, p. 757), he does not answer to “who will launder the shirts in this creative paradise”. If the aim is to focus on attracting talent from outside, the question arises as to the place of “non-talented” local people. Critics argue that this creates a dual economy where “non-creatives” are left behind.

This approach implicitly conceives creativity as an innate ability possessed only by a select group of people. Since these skills are highly correlated with education and, by extension, income (Dave O’Brien et al., 2016), doing everything possible to please the “creative class” may carry a strong class bias. Indeed, even Richard Florida (2008), in a later development, concedes that this strategy generates economic polarisation and that the creative class is actually a privileged minority.

In view of all this, critics of Florida consider it preferable to devise an endogenous development process that also involves the local population and that, beyond attracting talent, generates it. In other words, it is not a question of attracting the “creative people” by finding out what they want, but of activating people's creative capacity.

It must be stressed that the role of creativity is becoming even more central in today's society and in the years to come. The boom in artificial intelligence (AI) automates and even perfects countless tasks that previously required human knowledge, and that algorithms can now learn without much effort (Luciana Lazzeretti, 2023). This means placing creativity at the forefront, as the more creative an activity is, the less likely it is to be automated (Hasan Bakhshi et al., 2015). And this is where humans can still play an essential role.

While AI is already capable of creating original images, songs and texts, i.e. traditionally handcrafted cultural goods, it is not capable of imagining alternative realities for now. That is, it only does so on the basis of what it has learned and the inputs it receives. Take, for example, image generation applications. The algorithm has been trained on millions of images. It has seen many images of donkeys to be able to identify what they look like, and many images of bicycles. If we ask it for an image of a donkey on a bicycle, it will have no trouble generating it, even if it has never seen anything like that before. However, the AI is not capable of imagining a donkey on a bicycle on its own. The idea, the creative input, must be provided by a human.

The ability to imagine, or in other words counterfactual thinking (Judea Pearl & Dana Mackenzie, 2018), is inherent to human reasoning and no algorithm capable of evoking it has yet been developed. In this context, what becomes more valuable is the ability to create new concepts and ideas, i.e. creativity. Therefore, CCIs play a strategic role in the digital revolution (Luciana Lazzeretti, 2022), as the creation of new ideas and meanings through processes of human creativity is placed at the core. Decades later, what the post-fordist theorists were already formulating is gaining momentum. That is, in an increasingly post-material society, the way to enhance the value of goods and services –be they material or immaterial– is to incorporate associated ideas (Ash Amin, 1994), i.e. the symbolic content produced by CCIs, as an input to other industries.

In any case, the creativity processes inherent in CCIs do not only play a central role in the economy. Innovation, catalysed through these industries, can be applied to much broader spheres. Creativity makes it possible to completely rethink the way we face societal challenges and find new, inclusive and sustainable solutions. This is pointed out by the European Commission and KEA European Affairs (2019), which highlight the potential contribution of CCIs to tackle issues as varied as the circular economy, promoting healthy lifestyles, societal resilience or energy transition.

Likewise, Christer Gustafsson and Elisabetta Lazzaro (2021) point to the contribution of CCIs to many societal challenges facing, in particular, Europe. They see their role to be crucial, because of their strong innovative capacity, in four pillars: creativity, cultural diversity and values; cohesion and identity; employment, economic resilience and smart growth; and external relations.

Indeed, there are many areas to which they can contribute. The European Union, in the framework of the previous European agenda for culture, categorised six spillover effects of CCIs on the rest of society and the economy, including innovation and productivity, education and lifelong learning, social innovation and well-being, tourism and branding, environmental sustainability and regional development (European Union, 2012). Tom Fleming Creative Consultancy (2015) identified through a literature review up to seventeen spillovers (four more were added in a later revision (Nicole McNeilly, 2018)), which were grouped into three categories: knowledge, industry and network spillovers. Many of them are directly related to the well-being targets set out here, i.e. those of the BLI, while others are of a cross-cutting nature and contribute to creating an open and creative atmosphere, conducive to the exchange of ideas and to driving change.

In the following, we will explore what is known about all these potential effects on well-being, i.e. what empirical evidence there is for them, beyond hypotheses. We will start with the effects of culture in a general sense (mainly cultural participation or consumption). Subsequently, we will focus on those works that specifically consider the role and effects of CCIs as part of the economic structure.

3.2. State of the art: mapping the evidence so far

3.2.1. Impacts of culture on well-being

For years, the need to measure the value of culture and creativity in a broader sense (and far beyond market value) has been pointed out (e.g. Hendrik van der Pol, 2008). Although internationally comparable statistical sources are still scarce, many studies have been carried out to date. This allows us to have evidence of their impacts in more and more spheres of life (Peter Taylor et al., 2015; OECD, 2022).

The pioneering study by François Matarasso (1997) found that the creative and open environment provided by the arts set the roots for social change. He identified a list with a diverse range of fifty social impacts, which he acknowledged was incomplete. A few years later, Joshua Guetzkow (Joshua Guetzkow, 2002) reviewed the then existing literature on the impacts of the arts. He grouped them into three claims: the arts increase social capital and community cohesion; the arts have a beneficial impact on the economy; and the arts are good for individuals. The latter results through improvements in health, psychological well-being, skills, cultural capital and creativity. He acknowledged, however, a number of theoretical and methodological limitations, challenges and contradictions. But fortunately, the analyses have become more sophisticated over time.

Health effects are probably one of the most studied dimensions. Daisy Fancourt and Saoirse Finn (2019) published an extensive review for the World Health Organisation (WHO) with almost a thousand references of studies demonstrating positive impacts of arts and culture on both physical and mental health. In a general framework, cultural participation involves a number of varied components that may include sensory activation, evocation of emotions, cognitive stimulation, social interaction, involvement of the imagination or physical activity. These generate psychological, physiological, social and behavioural responses that lead to outcomes in terms of prevention, health promotion, management and treatment of a wide range of diseases. Also Richard Ings and John McMahon (2018), for Arts Council England, and Peter Taylor et al. (2015) compiled multiple pieces of evidence in this regard.

In the same vein, there is a new, more up-to-date study review report resulting from the European project *CultureForHealth* (Rarita Zbranca et al., 2022). It includes not only studies on culture and health, but also culture and subjective well-being (with identified effects on personal fulfilment and engagement, personal orientation, experiences of emotions and personal evaluations of life), culture and community well-being (including effects on social inclusion, school- and work-related well-being, quality of built environment and well-being, and community development), and culture and Covid-19, although the latter field is beyond our scope.

Pier Luigi Sacco (2017) points out some macro-level implications that this relationship between culture and health might entail. He argues for a greater involvement of arts and culture with the traditional pillars of welfare policies, namely the health and social care system, in a "cultural welfare" policy paradigm. Especially in view of the challenge of ageing that particularly affects European countries. Along these lines, Rhea Young et al. (2016) review several studies showing the potential of arts interventions to improve the lives of dementia patients, slowing cognitive decline, reducing loneliness and thus enabling healthy ageing. It is worth noting that not only are there small controlled experiments on certain cultural interventions in small groups, but there are even longitudinal studies showing lower mortality caused by greater cultural engagement (Daisy Fancourt & Andrew Steptoe, 2019).

Another well-studied effect is that of culture on individual subjective well-being, revealing positive impacts (Enzo Grossi et al., 2011, 2012; Dorota Węziak-Białowolska et al., 2019), which tend to be higher especially in contexts of high socio-economic development (Giorgio Tavano Blessi et al., 2016). Daniel Wheatley and Craig Bickerton (2019) provide evidence that participation in different cultural activities increases overall life satisfaction, but also satisfaction with health and with leisure. Chris Hand (2018) further finds that the impact on happiness is stronger among those at low levels of happiness.

Similarly, greater perceived well-being and lower stress levels (measured by the amount of cortisol in saliva) were found after visiting a historic heritage site (Enzo Grossi et al., 2019). Victoria Ateca-Amestoy et al. (2021) also observe positive effects on life satisfaction of various forms of engagement with cultural heritage. In fact, when compared to other daily actions, Alex Bryson and George MacKerron (2017) find that engaging in various cultural activities (such as attending performing arts or heritage sites) are among the activities that bring individuals the most happiness throughout the day. It should be noted, though, that according to Urszula Tymoszuk et al. (2020), in a study with older adults, the effects on well-being are only significant if cultural participation is sustained over time, rather than one-off.

The effects of culture on education have also attracted much interest. Ellen Winner et al. (2013), for the OECD, conduct an extensive review of how different forms of arts education (in and out of school) improve students' performance in non-arts subjects. In particular, the effect of musical activities on students' skills and academic achievement has been extensively studied (Steven J. Holochwost et al., 2017; Martin Guhn et al., 2020; Michael C. Knaus, 2021).

Studies have also been conducted on at-risk youth, i.e. with a low socio-economic status, showing that those more involved with the arts achieved higher levels of success (James S. Catterall et al., 2012), thus contributing to narrowing the educational gap with their peers.

Moving away from the individual analytical prism and focusing on the general educational level of the population of a territory, Alessandro Crociata et al. (2020) relate cultural capital to human capital, and find positive effects of cultural participation on tertiary education and lifelong learning. We also find studies influenced by the rationale of Richard Florida (2002). For instance, a study in Sweden shows that cultural heritage is a determining factor in attracting highly skilled human capital (Mikaela Backman & Pia Nilsson, 2018).

Also in relation to the territory, culture as an integral part of urban regeneration strategies is very much present in the literature in recent decades (see Graeme Evans, 2005; Rokhsaneh Rahbarianyazd & Naciye Doratli, 2017), looking at a range of social and economic impacts on cities. Giorgio Tavano Blessi et al. (2012) argue that investing in culture as part of urban regeneration processes is a determinant of human and social capital accumulation. Pau Rausell-Köster et al. (2022) even consider and find evidence to suggest that the combination of a number of elements that form the so-called “cultural city” determine the economic performance of cities measured in productivity growth.

In terms of income, the most commonly studied relationship is the inverse: how income level influences access to different forms of culture (e.g. Martin Falk & Tally Katz-Gerro, 2016). Conversely, and at the aggregate level of city, region or country, it is argued that cultural engagement benefits economic growth mainly through two channels: as an enabler of innovation and indirectly through the educational benefits that enhance human capital (OECD, 2022).

However, excluding those works that refer specifically to CCIs (which we will discuss in the next section), there are not many other empirical studies on the relationship between culture and income. Although there is certainly a body of research that assesses the economic impact of specific tangible or intangible cultural assets or cultural events (e.g. Beatriz Plaza et al., 2015; Eva Parga Dans & Pablo Alonso González, 2018).

From a broader point of view, Silvia Cerisola (2019), for Italy, shows how the stock of cultural heritage has an indirect impact on the economic performance of regions, by inspiring both artistic and scientific creativity. There is also evidence, using data from Catalan municipalities, that a “creative milieu” (following the 3T theory of Richard Florida (2002)) attracts firm creation, both creative and non-creative (Eva Coll-Martínez & Josep Maria Arauzo-Carod, 2017; Eva Coll-Martínez, 2019). Following a similar logic, Oliver Falck et al. (2018) find that the concentration of cultural amenities strongly attracts high-skilled workers (as also shown by Mikaela Backman and Pia Nilsson (2018) for Sweden with cultural heritage), and that this has a positive impact on the income of all other workers.

As for employment, although it is indirectly deduced through economic growth (e.g. with the establishment of new companies (Eva Coll-Martínez & Josep Maria Arauzo-Carod, 2017)), it has not been directly studied to the best of our knowledge, beyond analyses of the specific impact of certain cultural events or venues on job creation. Excluding, once again, works specifically on CCIs.

Another line of work refers to a range of social and community impacts encompassing improved interpersonal relationships, social cohesion, inclusion, sense of belonging and community building. In this sense, culture acts in two main ways: as a transmitter of meanings and messages that change beliefs and behaviours and generate social awareness; and through the social connectivity that is generated in many forms of community cultural participation.

The documented effects are varied. Dick Stanley (2006) identified, through the discussion of a panel of experts, six social effects of culture, arts and heritage: enhancing understanding and capacity for action; creating and retaining identity; modifying values and preferences for collective choice; building social cohesion; contributing to community development; and fostering civic participation. Arts spaces have been reported to enhance community development (Carl Grodach, 2009), along with the build-up of social capital from arts festivals (Tristi Brownett, 2018) or the role of culture in promoting older people's social connections, inclusion and sense of community, among others (Elaine Moody & Alison Phinney, 2012; Barbra Teater & Mark Baldwin, 2014).

There is also evidence of how culture affects community building and sense of belonging. As an example, in the case of the European Capital of Culture in 2012 in Maribor, intangible impacts were found among the population such as a stronger sense of reputation and community pride (Suzana Žilič Fišer & Ines Kožuh, 2019).

On the other hand, Hanka Otte (2019) finds that arts and culture influence social cohesion but distinguishes two distinct effects. What she calls confirmative arts reinforce internal cohesion, based on common values, while challenging arts foster external cohesion, bridging differences.

With regard to the second typology of effects, the role of the arts as a facilitator of cooperative relationships and conflict resolution has been noted (April Hyoeun Bang, 2016), as well as an avenue for social inclusion for certain vulnerable groups (Andy Brader & Allan Luke, 2013). In addition, Mike Owen Benediktsson (2012) provides quantitative evidence that students who are more involved in arts and cultural activities tend to form more friendships with people from different cultures and ethnicities.

Recent research has also explored the connection of culture and the arts with civic engagement. Desirée Campagna et al. (2020) show that people who are more involved in cultural activities tend to be more engaged in civic life.

Related to the above-mentioned effects on inclusion and social cohesion or civic engagement, the relationship between cultural engagement and crime has also been written about. It is argued that cultural participation allows for occupying time in constructive activities, improving skills and self-esteem and building healthy social relationships, leading to more pro-social behaviour and reducing the likelihood of offending (Peter Taylor et al., 2015). Empirical studies are usually on cultural programmes applied to inmates, ex-offenders or populations at risk of committing crimes, and focus on rehabilitation and preventing recidivism.

By way of example, Bridget Keehan (2015) reviews a number of papers on the introduction of theatre practices in prisons and their potential to enhance the rehabilitation of offenders. Similar effects have been reported with music learning (Jennie Henley, 2015).

Peter Taylor et al. (2015), apply a systematic review of the literature on, among others, the relationship between arts and crime. They point out that studies often do not provide evidence on recidivism rates, as well as the need to fill a gap regarding the effects on offending at the community level, beyond the individual.

At the aggregate level, Margarida Azevedo (2016) studies the effects on crime of the European Capital of Culture in Guimarães (Portugal) in 2012. She sought to demonstrate that, through this event, the generation of a substratum of community cultural values and collective expression contributed to informal education processes that would result in more pro-social behaviour. She notes that there is indeed an effect but only on so-called “crimes against patrimony”. These include crimes against property, fraud, and crimes against cultural identity and personal integrity (i.e. discrimination on the basis of origin, ethnicity or religion). In contrast, she reports no effect on “crimes against persons” and “crimes against life in society". She attributes this to the fact that the former are those crimes most closely linked to the previously mentioned informal education processes.

References to environmental sustainability could not be missing either. The potential of cultural activities has also been pointed out with regard to greater environmental awareness and more committed behaviour towards the care and sustainability of the environment (Alessandro Crociata et al., 2015; Miriam Burke et al., 2018). Bo Li et al. (2022), assessing a pilot policy in Chinese cities, show that higher cultural consumption reduces SO_2 emissions and particulate matter ($PM_{2.5}$). Davide Quaglione et al. (2017, 2019) point to the positive effect of cultural participation on energy savings and sustainable mobility patterns, respectively. Both on concern and on actually turning it into behavioural changes. However, they note that the effect changes depending on the type of cultural activity. Indeed, attending opera and classical music concerts is negatively associated with energy savings, while visiting heritage sites, reading books or newspapers has the opposite effect (Davide Quaglione et al., 2017). Besides, Jermina Stanojev and Christer Gustafsson (2021) point out that the incorporation of culture, and particularly cultural heritage, in smart specialisation strategies for the circular economy in European regions still remains underdeveloped, despite its enormous potential.

Finally, reference should be made to the Horizon 2020 project for the European Commission MESOC (Measuring the social dimension of culture)[6]. Among its many outputs, a repository with hundreds of documents is included. These attest to impacts of each of the ten cultural domains identified in ESSnet-Culture (2012) on the three dimensions of the project: health and wellbeing; urban and territorial renovation; and people's engagement and participation (MESOC, 2023).

The evidence on the effects of culture on well-being is, as shown, abundant and increasingly solid. Yet, the studies seen so far discuss the impacts of culture in a general sense. Mainly, of cultural participation. They

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[6] MESOC project has been developed in parallel to this thesis and has been led by a team including both the author and the two supervisors of this thesis.

do not focus on the effects of CCIs as part of the productive structure of a territory. Both approaches are logically closely related, given that cultural participation and consumption are generally a result of the goods and services generated by CCIs, albeit with the not negligible exception of amateur cultural production. But transferring findings may not necessarily be automatic. Thus, in the following subsection we will focus on the evidence to date on the effects of CCIs in particular.

3.2.2. Getting more concrete: impacts of CCIs on well-being

Studies on the effects of CCIs have mainly focused on the economic perspective. Evidence on their impacts on other dimensions of well-being therefore remains largely unexplored territory, with some exceptions noted below.

On the economic front, several reports over the last two decades have pointed to their growing importance in terms of employment, value added or turnover, as well as their high capacity for productivity growth and job creation, with higher rates than many other industries (e.g. KEA European Affairs, 2006; Dominic Power, 2011; Hasan Bakhshi, Ian Hargreaves, et al., 2013; UNESCO, 2015). Their greater dynamism and resilience in the face of economic downturns has also been noted (Elsa Fontainha & Elisabetta Lazzaro, 2019).

But more relevant than their direct contributions is the role they play in the economy as a whole and how they affect other industries. Hasan Bakhshi et al. (2008), using input-output and econometric analysis, found that CCIs were much more innovation-prone than other sectors. Therefore, they considered that they were not just another part of the production structure but an essential part of the whole system, generating innovation beyond their own sector. Sławomir Olko (2017) comes to a similar conclusion. Based on a qualitative case study, he argues that CCIs play a horizontal role in regional economies, impacting all other sectors and promoting smart regional specialisations. The extent to which this translates into economic growth has been the subject of a handful of studies in recent years.

Rafael Boix-Domènech and Pau Rausell-Köster (2018) review the literature to date on the effects of CCIs on economic growth in the European Union. Among the studies collected there is evidence of the impact of CCIs on GDP per capita (Pau Rausell-Köster et al., 2011; Blanca De-Miguel-Molina et al., 2012; Rafael Boix-Domènech et al., 2013; Francisco Marco-Serrano et al., 2014), labour productivity (Francisco Marco-Serrano et al., 2014; Rafael Boix-Domènech & Jesús Peiró-Palomino, 2017; Rafael Boix-Domènech & Vicent Soler-i-Marco, 2017), total factor productivity (Jin Hong et al., 2014), per capita disposable household income (Francisco Marco-Serrano et al., 2014) or the hourly wage in non-creative activities (Neil Lee, 2014). Outside Europe, evidence of the impact of CCIs on income can also be found in the USA (Michael L. Dolfman et al., 2007) and in Australia (Jason Potts & Stuart Cunningham, 2008).

The first generation of these studies find that CCIs play a determining role in the wealth of a region (e.g. Blanca De-Miguel-Molina et al., 2012). Rafael Boix-Domènech et al. (2013) even point out that the effect of CCIs is larger than the overall effect of knowledge-intensive services. However, the early work was too optimistic about the size of the effect. Rafael Boix-Domènech and Vicent Soler-i-Marco (2017) moderate the results of the CCIs on productivity from previous studies with a better specification of the model grounded on the endogenous growth literature, after controlling for a number of elements not considered in previous studies (especially in relation to the capital stock). Even so, they find that the effects on productivity are as important as those of scientific research or highly qualified human capital. Most of the productivity effects are indirect: that is, not because these sectors are themselves more productive, but because they improve the productivity of other sectors. In short, they determine a region's capacity to innovate. Moreover, it is noted that CCIs generate indirect spillover effects also on neighbouring regions.

The isolation of the causal effect between CCI and income, and the direction of this effect, is usually called into question. This has been conveniently addressed by Pau Rausell-Köster et al. (2011) and Francisco

Marco-Serrano et al. (2014), who find a circular causal relationship between CCI employment and economic growth. Not only do CCIs cause higher income, but also wealthier regions tend to have more CCIs: their citizens demand more cultural goods and services (on the demand side), and in turn more cultural capital is accumulated through education, as well as more cultural infrastructures (on the supply side), among other factors. A virtuous circle is thus formed, fuelled by CCIs. The authors find that the effect of CCIs on economic growth is more immediate than the reverse. It is also noted that two factors are essential for the proliferation of CCIs, namely urban centres and higher education.

Subsequent studies have confirmed these positive results, with increasingly sophisticated and well-established models. Niccolò Innocenti and Luciana Lazzeretti (2019) qualify that, in order to generate growth, CCIs must be accompanied by other sectors with a high degree of proximity or relationship. In other words, sectors that can benefit from the generation of ideas and creativity. CCIs do not necessarily generate growth on their own but by contact with these sectors through cross-fertilisation. It is not the mere concentration of CCIs but the ability to exchange knowledge and ideas with other related sectors that makes the economy prosper. There are in fact some CCIs that are more related to external sectors than to other CCIs, such as architecture or design. This does not mean that they are less creative but that they are more likely to exploit their creativity in other non-creative industries.

In a similar vein, Andrés Rodríguez-Pose and Neil Lee (2020) find evidence that the presence of both scientific and creative activities, and their complementarity, are essential for innovation in cities, but not separately. The authors show that, while scientific activities have a greater impact, they do not achieve this on their own but need the creative component. Also Gabriele Santoro et al. (2020) show that collaboration (formal or informal) of CCIs with other sectors enhances innovation performance.

Another interesting approach is that developed by Rafael Boix-Domènech et al. (2022). They again adopt a semi-endogenous growth model adapted from Charles Jones (1995, 2001) and apply it to three samples of different territorial levels: countries, regions and municipalities. Positive causal effects on GDP per capita are confirmed. Although the effects may be heterogeneous between territories. Rafael Boix-Domènech et al. (2021) point out that, although the overall effect on regional productivity is positive, there are a few regions where it is not. This will depend on a number of enabling factors, as will be presented in the conceptual model in the next section.

The impact of the widely differing activities included in the CCIs is also expected to be heterogeneous, although the availability of data does not always allow this to be verified. One of the few forays in this direction is the input-output analysis conducted by Matthew Lyons (2022) in the Cardiff City-Region. It distinguishes between nine sub-sectors and observes notable differences in Gross Value Added (GVA) per Full-Time Equivalent (FTE) worker. The highest in design and the lowest in heritage-related activities (museums, galleries and libraries). Nevertheless, the different CCIs have significant co-location patterns, i.e. correlations between the presence of one creative activity and another (Rafael Boix-Domènech et al., 2013, 2015), and the joint effect is positive. Thus, especially in the absence of more disaggregated data, it makes sense to consider these industries grouped together as a whole. In fact, Roberto Dellisanti (2022) distinguishes between inventive and replicative CCIs, and finds positive effects on GDP growth from both. However, there is also evidence that the impacts of creative manufacturing on productivity (Rafael Boix-Domènech & Vicent Soler-i-Marco, 2017) and GDP per capita (Rafael Boix-Domènech et al., 2021) are not as positive as those of creative services, as noted in section 1.2.2. But manufacturing is often neglected when analysing CCIs since it is not considered to be a major creator of symbolic content.

As we have started by saying, the link between CCI and income has been the most investigated, and can be taken for granted. But many other dimensions of well-being remain largely unexplored. As Roberto Dellisanti (2022) argues, once the economic growth effect of CCIs has been demonstrated, further exploration should be made of the social impacts that are produced through the cultural component. Although research in this area is more scarce, we do find some pioneering incursions. All of them are very recent, which is an indication of the hotness and interest of the issue.

As regards employment, papers merely pointing out the size and growth trends of CCIs usually note their job-creating capacity. However, the possible effects on the labour market beyond employment in CCIs (i.e. on the overall level of employment or unemployment in a territory) have not been studied as much. The closest attempts are to be found in the UK. On the one hand, Diana Gutiérrez-Posada et al. (2021) find that, in UK cities, for every job in CCIs, almost two (1.96) additional jobs are generated outside them. On the other hand, the aforementioned input-output analysis performed by Matthew Lyons (2022) in the Cardiff City-Region also includes multiplier effects on employment, considering direct, indirect and induced effects.

A positive causal link has also recently been found between the level of employment in CCIs and the level of education in a region (Filippo Berti Mecocci et al., 2022). Taking a mainly supply-side approach, the authors consider several ways in which this phenomenon occurs, including that CCIs require creative professionals, generally highly qualified, and therefore provide an incentive to pursue these levels of studies. It could also be considered that offering greater opportunities for the professional development of creative and artistic profiles allows students skilled in these subjects to have greater motivation to continue their studies and possibilities to study what they really like and feel valued in, and thus avoid failure, frustration and dropping out of school.

Regarding subjective well-being, Daniel Fujiwara and Ricky Lawton (2016) tested whether happiness and life satisfaction were higher in creative occupations, focusing on the workers themselves. The results were mixed, being higher for some occupations but lower for others. The precariousness associated with some jobs or the frustration accentuated by the greater identification with the work product (a characteristic feature of these activities) could be some of the causes that may explain the latter.

Finally, despite the growing emergence of the issue, environmental sustainability is still largely unexplored in the field of CCIs. One of the few works is the qualitative study by Laima Gerlitz and Gunnar Klaus Prause (2021). They conclude that cross-sectoral cooperation involving CCIs activates the innovative capacity of SMEs in a way that enables them to adapt and make the sustainable transition whilst reducing their environmental impact.

To recapitulate, we have found that, while studies linking various cultural practices to multiple dimensions of well-being are abundant (albeit with some gaps), work on the impacts of CCIs is mostly concentrated on economic growth. It is only in recent years that some other dimensions have begun to be explored. In any case, these are always partial analyses that do not pretend to encompass well-being from a holistic understanding as defined in chapter 2.

Turning precisely to the dimensions to be explored here, those of the regional BLI, Table 7 summarises some of the most relevant and recent empirical contributions covering each of them. Either the impacts of culture in general (mainly cultural participation and consumption), or specifically the impacts of CCIs. It should be noted that the indicators used in the papers are not always the same as the BLI, but they can be assimilated to a certain extent to the dimension. Also, some studies focus only on some specific cultural activities, are applied in a very specific context, or have other specificities (e.g. Daniel Fujiwara and Ricky Lawton (2016) only consider the satisfaction of creative workers, not the whole population). Points made in the previous paragraph are clearly reflected in the table. Some dimensions have not been investigated to our knowledge. Partly because they are usually seen as effects that derive from economic growth (such as employment, housing or access to services), without considering that CCIs may have any other differential effect on them. In contrast, this thesis aims to provide new evidence and improve understanding regarding the impacts of cultural and creative industries on well-being and each of its dimensions, adopting a common analytical framework.

Table 7. *Evidence on the impacts of culture and CCIs on the dimensions of regional BLI (selected references)*

Dimension	Culture	Cultural and Creative Industries
Access to services	-	-
Civic engagement	Desirée Campagna et al. (2020)	-
Community	Elaine Moody & Alison Phinney (2012) Hanka Otte (2019)	-
Education	Alessandro Crociata et al. (2020)	Filippo Berti Mecocci et al. (2022)
Environment	Miriam Burke et al. (2018) Bo Li et al. (2022)	Laima Gerlitz & Gunnar Klaus Prause (2021)
Health	Daisy Fancourt & Saoirse Finn (2019) Rarita Zbranca et al. (2022)	-
Housing	-	-
Income	Silvia Cerisola (2019) Oliver Falck et al. (2018)	Rafael Boix-Domènech et al. (2022) Niccolò Innocenti & Luciana Lazzeretti (2019)
Jobs	-	Diana Gutiérrez-Posada et al. (2021) Matthew Lyons (2022)
Life satisfaction	Enzo Grossi et al. (2012) Daniel Wheatley & Craig Bickerton (2019)	Daniel Fujiwara & Ricky Lawton (2016)
Safety	Peter Taylor et al. (2015)	-

Source: Own elaboration

3.3. Drawing up our theoretical approach

On the basis of the theoretical background reviewed at the beginning of this chapter, and the empirical evidence we have to date, it is now time to outline a comprehensive framework that allows us to explain how CCIs affect well-being. We then attempt to unify the relationships that have emerged into a theoretical framework capable of explaining all of them in a coherent and holistic manner. After that, however, we will dedicate a brief section to qualify some of the possible counter-effects of CCIs, to avoid falling into the fallacy of considering them a miraculous solution to all problems.

3.3.1. Identifying impact transmission pathways

As stated at the beginning of the chapter, the issue at stake here is of enormous complexity. We try to explain how CCIs relate to well-being. Two concepts that are already extraordinarily complex on their own. CCIs bring together a multitude of heterogeneous activities with very different effects. Whereas well-being involves dimensions that are also very complex and interconnected. If all the possible effects that each CCI can have on each dimension of well-being are considered, and how any single change then has repercussions on other dimensions of well-being and on some of the CCIs, the result is an unfathomable map of relationships.

But such a complete scheme of relationships would be completely unravelling and would not allow us to identify and explain the chains of transmission of these effects. As Jorge Luis Borges (1960) aptly ironised, a full-scale map is of no use, no matter how detailed it is. We must therefore acquire a certain level of abstraction and look for patterns that allow us to classify the main effects in a single general framework.

We must start from the very nature of the CCIs that we established in chapter 1. That is, activities generating cultural goods and products (with a strong symbolic value content) through processes involving human creativity. Therefore, the process of creating and producing these goods is the primary role of CCIs. The effects will be brought either in the creative production process or at a later stage through consumption or cultural participation of the previously produced cultural outputs. We are aware that this process is rather more complex. This is a simplification for representative purposes. Indeed, UNESCO (1986, 2009) identifies five phases in what they call the cultural cycle. It consists of creation, production, dissemination, exhibition/reception/transmission and consumption/participation, related in a cyclical model. Transferring it to our approach, the first three would be included in the first phase of production and the last two in the second phase of consumption or participation.

Three phenomena occur within these two phases. First of all, a production and consumption that are intensive in symbolic content are undertaken. Secondly, this is carried out through processes of creativity, idea generation and experimentation. And third, cultural uptake takes place through the consumption of the cultural goods and services generated. This third phenomenon therefore occurs primarily in the second phase (consumption/participation). The other two, on the other hand, take place in both the production and consumption phases. As for the intensity of symbolic content, because it refers to both production and consumption, which are two sides of the same phenomenon. And as for the creative process, this occurs naturally during production, but it can also bring out ideas as a result of this process, in the phase of participation and consumption.

These three phenomena give rise to four lines or types of effects. On the one hand, production and consumption centred on symbolic and experiential value leads to a less intensive exploitation of material resources compared to other economic activities. This contributes to the dematerialisation of the economy, both in production and consumption. The ecological sustainability of the production system is therefore enhanced, as opposed to others that are more based on material values.

On the other hand, cultural uptake generates two types of effects. The experience of cultural participation itself, and the transmission of messages and meanings. The former generates a series of impacts on the participants or consumers of cultural goods and services. Pau Rausell-Köster & Sendy Ghirardi (2021) categorise them into four: cognitive, emotional, aesthetic and social impacts. Cognitive impacts include everything that is learned from cultural experience. For example, we watch a film inspired by a historical event in which we discover facts we were unaware of, or we rethink our view on a topic. Emotional impacts involve everything that the cultural experience has made us feel: from pleasure, amusement, sadness, fear, excitement, etc. Aesthetic impacts concern the sensory perception of artistic expression: the pleasure of contemplating the beauty of a monument, or a painting that puzzles us, or listening to a song that evokes memories. Although these are also emotional impacts, some psychologists argue that aesthetic emotions are a different type from the other emotions of everyday life (Patrik N. Juslin, 2013). Lastly, social impacts occur as cultural practices usually involve social interaction as well as the expression of collective identities. Margarida Azevedo (2016) proposes a theoretical model that explains the transformation of individual cultural experiences through a chain of propagations until community-level social impacts are achieved. It starts from an enlarged capacity for empathy, and continues promoting social connections, expressing communal meanings, building a sense of community, developing social capital, empowering capacity for collective action, and finally achieving community revitalisation.

In turn, the messages can be internalised and incorporated into the individual and collective imaginary. These can be quite varied. One only needs to think of the variety of typologies and themes that museums, books, music or films address. But they may include promotion of critical thinking, acceptance of diversity, sense of belonging to the community, self-acceptance, identity building, knowledge transfer, preservation of collective memory, etc.

Finally, processes of individual and collective creativity, experimentation and the generation of new ideas foster innovation throughout the economy and society. This is in line with the “innovation model” or “evolutionary model” proposed by Jason Potts and Stuart Cunningham (2008) and Jason Potts (2009), which also has empirical evidence supporting this thesis (Rafael Boix-Domènech & Vicent Soler-i-Marco, 2017; Rafael Boix-Domènech et al., 2022). Innovation driven by CCIs is not necessarily only of economic applicability and market-oriented. It can permeate the whole of society beyond the productive structure (Christer Gustafsson & Elisabetta Lazzaro, 2021). Innovation can also be social (original interventions to address social issues), political (applying novel public action responses) or urban (through the redefinition of public spaces and their uses), to name a few. Innovation should be understood as the ability to adapt to the changing reality, but also as the ability to proactively transform this reality. Ultimately, it strengthens resilience. To square the circle, we get *four* types of effects that occur as a result of *three* phenomena during *two* phases of *one* single process.

These impact-generating vectors logically affect the different components of well-being. But for this to happen, they must trigger changes that will depend on the existence of a set of enabling factors (e.g. supportive institutions, a strong associative network, or complementary economic sectors). These are what allow an innovative idea to materialise, or experiences and messages to trigger changes in people's behaviour. In other words, that the activity of the CCIs has resonance. For the sake of simplicity and because it is beyond the scope of this research, we will not go into these enabling factors in depth. But it should be borne in mind that they play their role, and that the expected effects of CCIs are not always achieved if there are not a series of factors that allow them to materialise in real changes.

Our assumption is that these effects have different positive impacts through which they enhance the components of well-being that we defined in section 2.1.3, i.e. on material conditions, on a long and healthy life, on acquiring knowledge, on living in community, on sustainability and on the subjective perception of well-being (Figure 7).

In turn, the different dimensions of well-being experience numerous and complex interactions with each other. This is not a linear and unidirectional relationship, but rather a feedback loop. On the one hand, the dimensions of well-being are interrelated. Education affects employment and income, this affects health and social relations, this affects life satisfaction, and so on. They are mutually reinforcing, so that an improvement in one of them can also lead to indirect improvements in other dimensions. These well-being improvements also logically affect the very enabling factors that allow the effects generated by CCIs to translate into real changes (e.g. through a more cohesive society or stronger institutions).

On the other hand, well-being also affects the possibilities for the development of CCIs, feeding back into them. Higher education shapes creative workers (Roberta Comunian et al., 2015) and is, in turn, a key determinant for higher cultural participation as it facilitates decoding symbolic value (Sara Suárez-Fernández et al., 2020) and thus higher demand for CCIs; higher income also provides a boost in this direction (Francisco Marco-Serrano et al., 2014), etc. In short, the components of well-being, fuelled by the CCIs, reinforce both themselves and the CCIs. This is represented in Figure 13 as a double loop, from well-being to self and from well-being to CCIs as a return arrow.

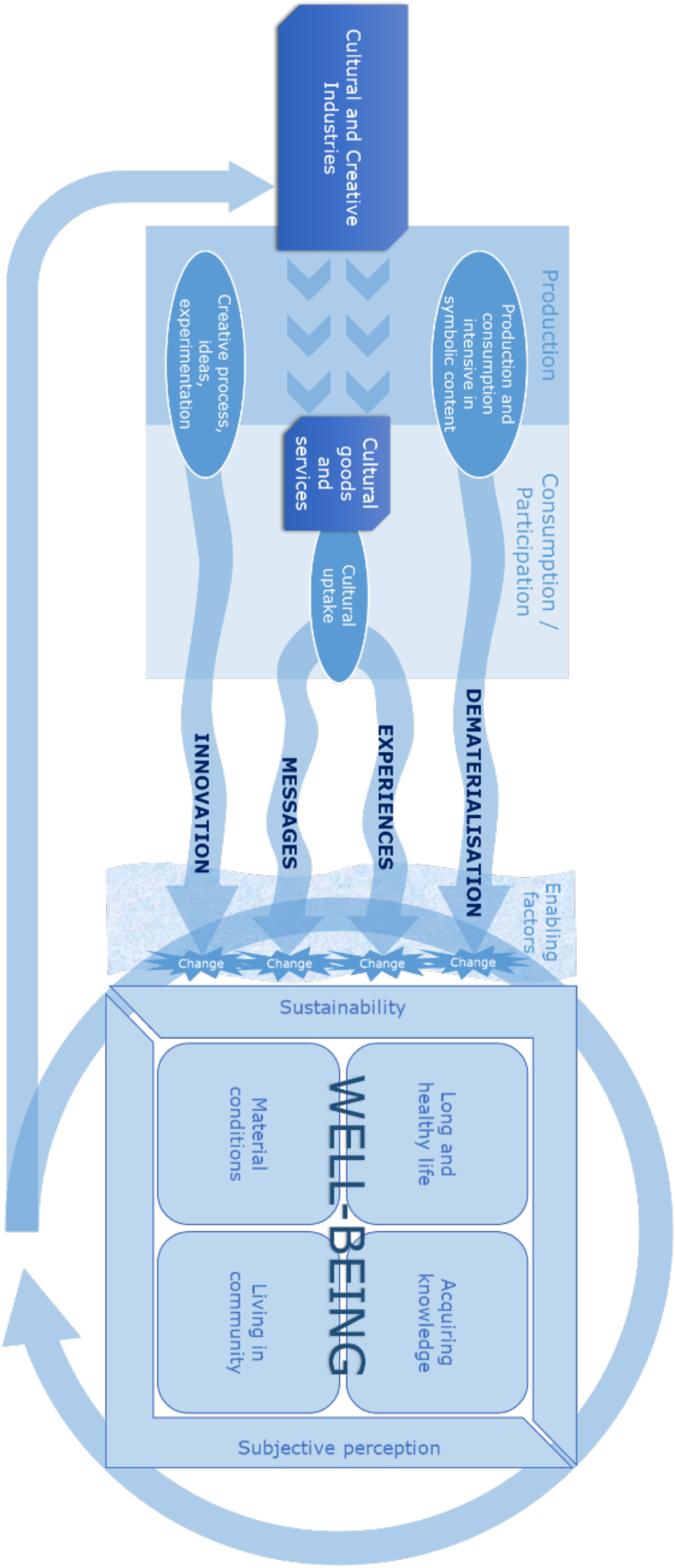
All in all, the underlying idea of this approach is that CCIs can activate a well-being-generating process, in each of its aspects, which enters into a virtuous circle with the capacity for self-reinforcement. CCIs would therefore be an economic activity with a high economic and social return in terms of well-being and, consequently, so would be the policies aimed at promoting them as a vector of specialisation.

3.3.2. Not all is rosy: possible counter-effects of CCIs

Notwithstanding the above, we should not make the mistake of thinking that all the effects of CCIs will be positive, nor that they will be the solution to all problems. Of course, CCIs can also generate pernicious effects. Following the proposed scheme: not all CCIs contribute to a less intensive use of material resources; cultural experiences may provoke discomfort; the messages and social meanings conveyed may be detrimental to well-being; and innovation may also have malicious applications, or provoke unintended adverse effects. The following are some examples that have been reported.

Starting with dematerialisation, in addition to the fact that not all industries that are part of CCIs comply with this general principle, some may actually act in the opposite direction. Through design and advertising, for instance, fashions can render obsolete durable goods that are still perfectly usable but are no longer trendy. This reinforces consumerism and unsustainable resource use.

Figure 13. *Relationship diagram between CCIs and well-being*



Source: Own elaboration

Moving on to the experiences, contemporary music concerts and festivals can be associated with excessive alcohol and drug use, thus with health hazards (Megan S.C. Lim et al., 2010; Foon Yin Lai et al., 2013; Caitlin H. Douglass et al., 2022).

In the same vein, spending too much time watching television or playing video game encourages sedentary lifestyles that are detrimental to health (Frank B. Hu et al., 2003; Juan Pablo Rey-López et al., 2008; Mira A. Kohorst et al., 2018). This overexposure can also lead to social isolation (Frida André et al., 2020).

The potential harmful effects are not only confined to consumers, but also to the producers themselves. Some CCI activities are characterised by an intense precariousness of employment and a predominance of multi-employment and freelance workers, with low and unstable incomes and low job security (David Hesmondhalgh, 2010; George Morgan et al., 2013; Magdalena Pasikowska-Schnass, 2019; Roberta Comunian & Lauren England, 2020). The vocation, the need for self-fulfilment and creative expression that these activities provide is precisely what drives them to accept these conditions to the detriment of their material quality of life. To such an extent that this “bohemian” lifestyle, full of uncertainty, comes to be considered consubstantial with artistic creation itself (Doris Ruth Eikhof & Axel Haunschild, 2006, 2007).

In addition to producers and consumers, cultural experiences can indirectly affect third parties. A clear example of a negative externality would be a concert hall disturbing the sleep of neighbours. Also, tourism attracted by CCIs (heritage in particular, but also festivals or other cultural events) can be problematic if it leads to tourism over-concentration. On the one hand, tourism-related activities generally generate less value added and have lower than average labour productivities. This makes overly tourism-dependent economies fragile, volatile, with precarious employment and limited development potential. Not forgetting the environmental impact of international travel, for example by plane or cruise ship (Juan Gabriel Brida & Sandra Zapata, 2010; Freya Higgins-Desbiolles et al., 2019).

Along these lines, the attraction of large volumes of tourism, brought about by the cultural offer, can turn cities into barely liveable theme parks. Overtourism can cause disruption to the daily lives of local residents (Lasse Steiner et al., 2015), and even exclude them from enjoying the cultural heritage of the place. Particular attention has been paid to the gentrification dynamics that this provokes (Iban Díaz-Parra & Jaime Jover, 2021; Jaime Jover & Ibán Díaz-Parra, 2022). Housing for permanent use, dragged down by more profitable tourist accommodation, becomes more expensive and pushes residents out to the suburbs (in turn causing longer commuting times, thus worsening urban mobility and air quality). This effect is not unique to tourism but occurs whenever a neighbourhood undergoes processes of change that attract a new, wealthier population to replace previous residents. It can also occur, for instance, with the attraction of the "creative class" proposed by Richard Florida (2002) or with culture-led urban renewal processes. The increasing centrality of art and culture within the urban economy has prompted much debate about their relationship to urban change, although its link to gentrification is not entirely clear (Mark J. Stern & Susan C. Seifert, 2010; Vanessa Mathews, 2010; Xabier Gainza, 2017; Andy Pratt, 2018). Yet this entails that artistic initiatives in run-down neighbourhoods are sometimes viewed with suspicion or outright hostility, despite fostering a more pleasant environment (Figure 14).

It is now the turn of messages and meanings conveyed by CCIs, which are not always to the benefit of well-being. Take advertising as an example. Advertising can generate a state of permanent dissatisfaction by inducing new needs that were not there before (Chloe Michel et al., 2019). It can even lead to distortions in the perception of one's own body due to the overexposure of idealised bodies (Howard Lavine et al., 1999; Anna Blond, 2008), as well as promote the consumption of unhealthy products (Emma J. Boyland & Jason C.G. Halford, 2013).

One criticism that arises in this sense is precisely the one pointed out by mass society theorists about capitalist ideological domination. The media, concentrated in most countries in the hands of a few business groups, have great power to condition public opinion and political debate to the benefit of the interests of a wealthy minority and to the detriment of the well-being of the social majority (Lucy Barnes & Timothy Hicks, 2018).

Figure 14. *Graffiti reading "Your street art raises my rent" on a mural by the artist Okuda in Madrid*

Source: Tweet by Gustau Pérez (*@gustau_perez*) on 6 July 2019

Also, the content of books, audio-visual products or performing arts can sometimes promote narratives that instil hatred, that stigmatise and exclude certain groups or that perpetuate discriminatory social roles. For example, Owen Jones (2011) exposes how the media, series and films have contributed to the "demonisation" of the working class by fuelling stereotypes, thus contributing to social dismemberment. Another paradigmatic case is the gender roles and romantic love myths that are reinforced and perpetuated in classic animated films (Julie C. Garlen & Jennifer A. Sandlin, 2017), or the sexist messages that abound in the lyrics of some songs (Edward G. Armstrong, 2001; Samson Uchenna Eze, 2020). Moreover, in the context of "Culture 3.0" (Pier Luigi Sacco et al., 2018) in which cultural production (especially audiovisual) is highly decentralised, the risk of spreading hate speech (e.g. through streaming platforms) becomes more significant.

Finally, we will not dwell on the possible adverse effects of innovation since it extends far beyond the sphere of action of the CCIs. CCIs act as facilitators of innovation not only in their strict field but in many others apparently unrelated to culture and creativity. Although innovation is generally positive because it allows adapting to changing circumstances and moving forward, it is not difficult to think of examples of innovations that have had a negative impact on well-being. One very clear one is innovation in the field of military industry, or the invention of the atomic bomb in particular. But not only in terms of technical innovation. The strategy of manipulation and control of the masses devised by Joseph Goebbels as Minister of Propaganda of the Third Reich can be considered, at the time, a perverse case of political and social communication innovation. These are extreme cases of innovation deliberately applied for destructive purposes or to subjugate the population. But well-intentioned innovation can also have unintended detrimental effects. For example, the development of the automobile was intended to improve transportation, and it has indeed increased the possibilities for travel and shortened distances considerably. However, it has also been accompanied by deadly traffic accidents, loss of space for pedestrians or children's play in cities, or an increase in emissions of gases that are harmful to the planet and to health. These effects were not intended, but were the result of innovation.

Nonetheless, the fact that culture may generate these or other problems does not mean that we should give up all that it brings: pleasure, identity, self-expression and so many other qualities that ultimately enhance well-being and make life worthwhile. On the contrary, policy makers should be aware of this and accompany the processes of cultural and creative development with public policies that avoid or mitigate these effects, while steering the processes towards socially desirable outcomes.

Let us illustrate this with the problem of gentrification. Gentrification harms the original neighbours by driving up housing prices and even driving them out. This definitely disrupts the social fabric of the place. But it does not mean that we should be resigned to letting the neighbourhood degrade. Policy makers should definitely not renounce regenerating spaces, providing them with green areas, cultural offerings, public services and, in short, making the neighbourhood more pleasant and improving the quality of life of the residents. But the improvement of neighbourhoods has to go hand in hand with the right of residents to stay (Montserrat Pareja-Eastaway & Montse Simó-Solsona, 2014). Or to put it another way, alleviating problems in one neighbourhood does not mean transferring those who suffer from them to continue suffering elsewhere, further away. To this end, urban regeneration policies must be accompanied by public housing policies, rent controls, regulation of tourist accommodation, etc. Similarly, the problems arising from advertising are combated with advertising regulation based on consumer protection. Likewise, campaigns to promote healthy habits and healthy eating can be carried out precisely through advertising. Just to cite a few examples.

All in all, if there is one thing that is absolutely clear, it is that the relationship between CCI and well-being is extremely complex. We are looking at very diverse sectors that generate multiple effects on the economy, society and the environment. These effects can be both positive and negative. However, we must bear in mind that our analysis is in aggregate terms at the regional level, not at the micro level. So we must abstract to some extent in order to disentangle such complex and interconnected relationships.

Without seeking by any means to oversimplify reality or deny the existence of one or other impacts, we set out to check which are the prevailing ones. Our hypothesis, as already made explicit, is that, overall, the positive effects of CCIs on well-being are stronger. Though it is possible that in some dimensions they may not be. Or they may not be for all regions or in all circumstances. To ascertain this, we must proceed with the empirical analysis.

Part II

Methodology

CHAPTER 4

Data: description and exploration

4.1. Data description, sources and processing

The data used in this research covers a 12-year period, from 2008 to 2019. The start in 2008 is due to the fact that this is when data with the NACE rev. 2 classification became available. Until 2007, the previous classification (NACE rev. 1) was used, so continuity in employment data in CCIs would not have been available for longer series. Furthermore, the NACE Rev. 1 series does not provide sufficient detail to be linked to NACE Rev. 2. On the other hand, it goes up to 2019 because that is as far as it allowed us to cover the different variables for all countries at the time of constructing the database, although it is subject to future updates.

In addition to reasons of data availability and continuity, this period covers both recession years (initial period) and economic expansion years (second period). Moreover, the distorting effect of Covid-19 is avoided. Differences in the effect of the pandemic, social distancing measures, their duration and employment policies (e.g. in some countries workers suspended due to inactivity of their company were still counted as active employees, at state expense, even if they were not in employment) make a reliable international comparison very difficult if not impossible.

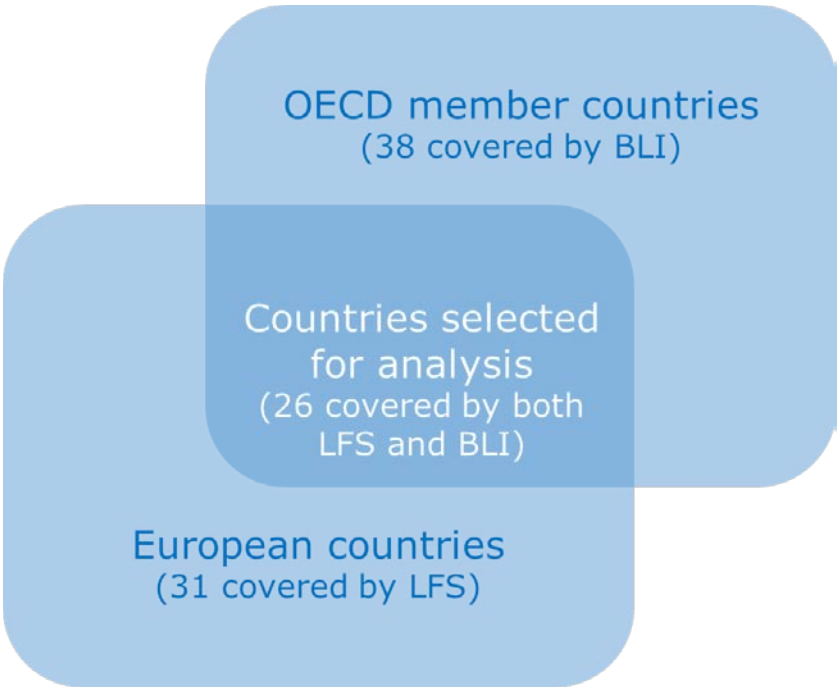
In the following we will review the data and describe the different variables, their sources and the processing that has been followed to complete and standardise the panel data. We start with the territorial scope covered, followed by the CCI employment data (our independent variable of interest), the well-being indicators (dependent variables) and ending with the rest of the independent variables that are introduced in the models.

4.1.1. Selected regions

In our analysis we include data for the regions of all European OECD countries. This territorial scope is the result of the two main data sources. On the one hand, CCI employment data come from the Labour Force Survey (LFS), produced by Eurostat, which provides standardised data for European countries. In particular, LFS data for scientific purposes are provided for the 27 EU countries, Iceland, Norway, Switzerland and the United Kingdom (until the third quarter of 2020, due to Brexit). The LFS provides a valid and reliable indicator of employment in CCIs with a satisfactory level of detail for sectoral delimitation, which is key. Information of this quality is not available for territories not covered by the LFS, or it cannot be standardised with the same criteria to compare it on an equal footing with data from European countries. The study must therefore be confined to European borders. On the other hand, the well-being indicators, as already seen, correspond to those of the BLI, produced by the OECD for the OECD countries (and a few others, although outside Europe). Consequently, although some indicators could be ascertained for other countries, it is only possible to obtain all of them for member countries. Therefore, the territorial scope results from the intersection between both territorial scopes: Europe and OECD member countries, i.e. European OECD countries (Figure 15).

This intersection allows for the construction of a database combining a consistent CCI employment variable and standardised indicators for all dimensions of well-being. But it naturally poses a selection problem, as the characteristics of the sample are rather more homogeneous than the general international context. The OECD member countries are countries with a high and medium-high level of development. And within them we are left with only the particular European context, which introduces a new bias. This limits the universality of the results and must be taken into account in their interpretation, which could be confined to this particular context of European and highly developed countries. On the other hand, extension to other non-European countries is constrained by the lack of disaggregated and homogeneous employment statistics. For the time being, it could only be considered for countries such as the USA, Canada or Mexico.

Figure 15. *Territorial coverage of the research*



Source: Own elaboration

For the regional division, the Nomenclature of territorial units for statistics (NUTS) is used. Specifically, the NUTS 2016 version. NUTS 2021 is currently in force, which introduces some important changes e.g. in Norway, but falls outside the period under study. From 2008 to 2019, however, there have been several different classifications: NUTS 2006, 2010, 2013 and 2016. Some of these have involved significant changes in territorial boundaries, so that the correspondences have had to be adjusted to ensure continuity (explained in more detail below). In any case, all the regions concerned, whether NUTS 2 or NUTS 1, correspond to a 2016 classification code, as can be seen in Annex I (Table 16). The initial intention was to stay at NUTS 2 level. However, in some countries this has had to be rephrased for the following reasons:

a) Changes within the time series

The classifications change over time, and some of them have taken place within the period under study (2008-2019), as mentioned above. Therefore, the approach is to keep the same reference region throughout the period.

If a NUTS 2 region has been split into two or more, they are all recoded at the most aggregated level. This is the case of some regions in Hungary, Lithuania, Poland and the United Kingdom. Similarly, if two or more NUTS 2 regions had merged, they would all be recoded at the most aggregated level, but this is not the case in any of the countries studied.

If there are new subdivisions not equivalent to any previous unit, they are all recoded at a higher NUTS level (NUTS 1). This is the case for Ireland.

b) Availability of regional data on well-being indicators

Regional BLI data are, for most countries, available for NUTS 2 level. However, there are some countries for which they are only available at NUTS 1 level. These countries are Belgium, Germany and the United Kingdom.

There are other countries where, for some of the regional BLI waves (2014, 2016 or 2018), the data are from NUTS 1 regions, but in the rest from NUTS 2. This is the case for France, Greece and the Netherlands. In these cases, the NUTS 2 regions have been maintained with the data available and an estimate of the disaggregation of the NUTS 1 data from the other waves.

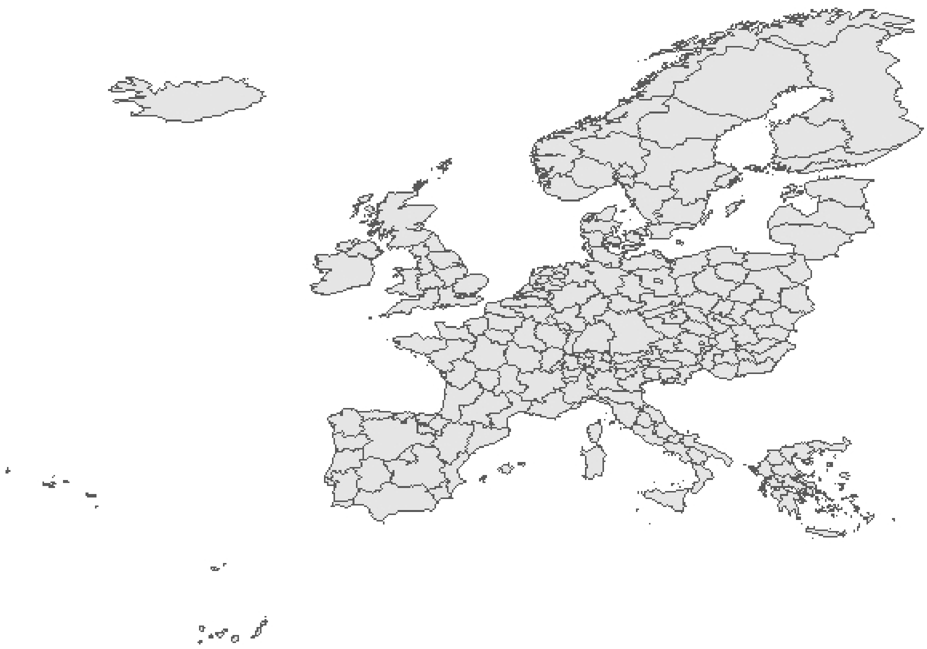
In contrast, there are other countries where the divisions are NUTS 3, or smaller than NUTS 2. In these cases, usually small countries, they are aggregated and the national indicator (which coincides with NUTS 2 or with the grouped region available) is taken. This is the case for Estonia, Iceland, Ireland, Latvia and Lithuania.

Finally, no data are available for the French overseas regions.

In summary, this results in the following countries and their corresponding regions: Austria (9), Belgium (3), Czech Republic (8), Denmark (5), Estonia (1), Finland (5), France (22), Germany (16), Greece (13), Hungary (7), Iceland (1), Ireland (1), Italy (21), Latvia (1), Lithuania

(1), Luxembourg (1), Netherlands (12), Norway (7), Poland (16), Portugal (7), Slovakia (4), Slovenia (2), Spain (19), Sweden (8), Switzerland (7), United Kingdom (12). That makes a total of 209 regions in 26 countries. The detailed list can be found in Annex I (Table 16) and is shown graphically in Figure 16.

Figure 16. *Map of regions covered by the research*



Source: Own elaboration

4.1.2. Employment in CCIs

The data on employment in the CCIs come from the Labour Force Survey (LFS). This is a survey produced by the official statistical offices of the different European states and collected and standardised by Eurostat. A specific extraction was requested to Eurostat.

We start from the broader and more comprehensive definition of CCIs stated in section 1.3. This is, based on the conceptual framework proposed by the "Measuring CCS" project (Manuel Vilares et al., 2022), the aggregate sum of all compartments of cultural and creative sectors, intellectual property and research and development: CCS + IP + R&D (see Figure 6 in section 1.3). This groups together both activities directly related to artistic expression and the generation of cultural signifiers, as well as other creative industries of a more technological nature and focused on innovation and intellectual property generation. They all meet the criteria set out above to be considered CCIs: they contribute in some way to conveying messages, meanings and symbolic content beyond the functional use value of their outputs, and require a significant degree of human creativity as input. From this definition, we apply further subdivisions for sensitivity analysis.

This broad notion of CCIs, with minor differences, is used in numerous empirical studies (e.g. Rafael Boix-Domènech et al., 2013, 2015, 2016, 2022; Francisco Marco-Serrano et al., 2014) and closely resembles classifications by international organisations such as UNCTAD (2008, 2010) or IDB (Felipe Buitrago & Iván Duque, 2013).

Some may argue that it is too broad a view that tries to be all-encompassing and then becomes abstract and mixes very different activities. However, they are all part of the cultural and creative milieu and contribute in different ways to the so-called creative economy. Certainly, this amalgam, while meeting a number of defining attributes, is very heterogeneous. Of course, they are not all in the same situation, nor do they follow the same trends (e.g. the declining print media sector or the booming software publishing sector), nor can they therefore be equally strategic. Also in terms of employment characteristics, since they bring together sectors that are highly precarious and others that require highly qualified staff and provide better working conditions. Consequently, their effects on different areas of well-being might also differ between them.

Due to issues of data availability and statistical representativeness, we cannot analyse each sub-sector in particular, nor small groupings, without incurring a large number of missing values. However, we can distinguish between two sub-groupings: the more conventional CCS as defined in Figure 6 (i.e. G1 + G2 + G3[7]) on the one hand, and the copyright, research and development industries (i.e. IP + R&D) on the other hand. In addition to testing the extent to which the analysis is sensitive to different definitions of

[7] G1 stands for “Core cultural”, G2 for “Cultural industries” and G3 for “Creative sectors”.

CCIs, this will allow us to further analyse whether or not the more canonical core sectors (focused on the human factor, artistic expression and symbolic values), versus more technological ones with creativity focused towards functional innovations, have equivalent effects on well-being. That is, we can determine whether they act in parallel, whether they reinforce each other, or whether they counteract each other's effects. But in either case we will proceed from the analysis of the CCIs as a whole.

In addition to the difficulties in establishing appropriate boundaries in the selection of sectors both in terms of academic consensus and statistical accuracy, there are other difficulties in measuring the CCI workforce. Our approach focuses on cultural and creative activities within the economic structure. It can therefore be criticised for adopting a market-oriented logic that does not take into account the full dimensionality of culture, which is acknowledged and not intended to be otherwise.

Employment statistics, however, do not only take into account private business activities but also public and third sector employment, which are particularly relevant within some CCIs. Self-employment is also captured, which is generally high in these industries, where freelancers abound. However, self-employment often combines a number of different activities simultaneously, which makes it difficult to capture them accurately[8].

Yet the main limitation is not that, but the absence of all the cultural and creative work that is carried out in a non-professional way, from the associative sphere or as an amateur practice. Nor is it that which, although paid, is not the main occupation and is combined with another job with a higher income. This is, again, a fairly frequent occurrence in some of the CCIs, which has generated important debates (David Hesmondhalgh, 2010). Because the very production of cultural and creative content responds to the needs for artistic expression and self-realisation of some people who are willing to do it for leisure without making a profit.

[8] For statistical purposes, only the main activity is considered.

The importance of this phenomenon may vary in each territory depending on how deeply rooted certain cultural practices are or on the possibilities offered by the productive structure to make a living from them, among other factors. In any case, it should be made clear that our analysis can only consider those cultural and creative activities that are carried out professionally, something that is indeed stressed in the noun *industries*.

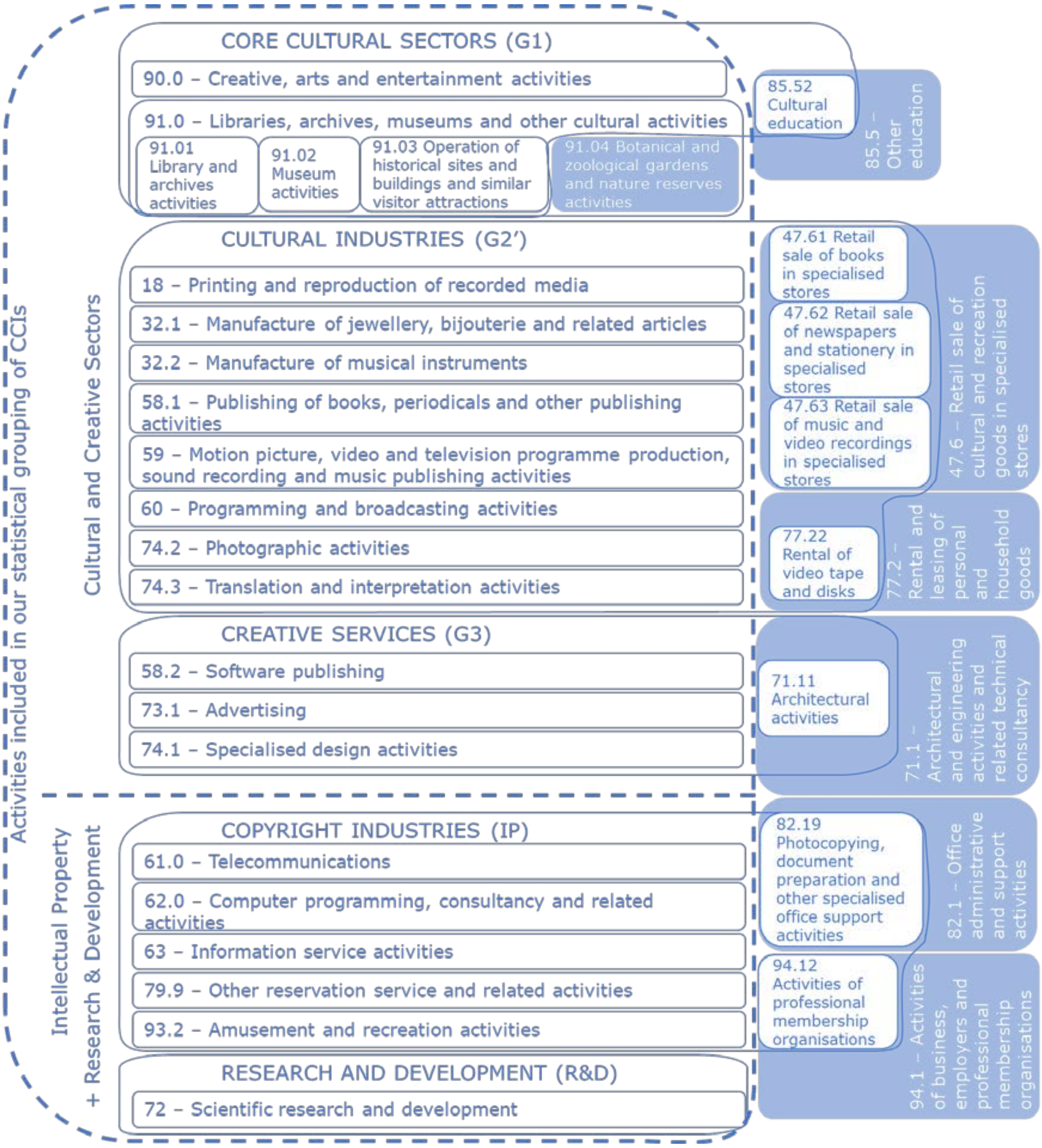
We are also forced to make some minor adaptations to the list of codes due to data availability. The LFS only provides economic activity up to three digits of the NACE codes. The classification from Manuel Vilares et al. (2022), however, is more detailed (up to 4 digits). Consequently, we will inevitably lose some detail. There are some 4-digit activities that are considered cultural and creative but are embedded in a 3-digit set that is mostly not. These adjustments and the final list of activities included in the CCIs and their two sub-classifications (CCS and IP+R&D) are summarised in Figure 17.

Faced with the decision of having to take the whole 3-digit activity or leave it out, it is decided to exclude it. Thus, we leave out of the classification cultural education (NACE 85.52), retail sale of books in specialised stores (NACE 47.61), retail sale of newspapers and stationery in specialised stores (NACE 47.62), retail sale of music and video recordings in specialised stores (NACE 47.63), rental of video tape and disks (NACE 77.22), architectural activities (NACE 71.11), photocopying, document preparation and other specialised office support activities (NACE 82.19) and activities of professional membership organisations (NACE 94.12) (Figure 17).

The opposite case also occurs, although only on one occasion: a 3-digit activity that is mostly cultural and creative but includes a 4-digit sub-sector that is not. In this case, given that the latter activity represents a minority part of the grouping, the entire 3-digit activity is included, even if it drags some noise. This is the case of libraries, archives, museums and other cultural activities (NACE 91.0), which also includes botanical and zoological gardens and nature reserves activities (NACE 91.04) without its exclusion being possible (Figure 17).

This is a rather conservative and cautious approach, as only a small 4-digit non-cultural and creative sub-sector is included and, when in doubt, it is decided to exclude any 3-digit sector that includes a considerable part of non-cultural and creative activities. At the same time, the criterion adopted by the "Measuring CCS" project (Manuel Vilares et al., 2022) is retained as far as possible and remains a faithful and close to optimal representation of the CCIs as a whole. Or at least, as far as the data allow.

Figure 17. *List of CCIs considered in the analysis, adapted to 3-digit NACE Rev. 2 codes*



Source: Own elaboration based on Manuel Vilares et al. (2022)

The possibility of disaggregating the data by female and male workers has also been explored in order to observe gender differences. However, the disaggregation of the data undermines its completeness and leads to a proliferation of empty data for reasons of statistical representativeness, especially in small regions. For this research, priority was given to preserving the overall quality of the data, so that disaggregation by gender was finally discarded. However, this avenue will be explored further in the future.

4.1.3. Well-being indicators

The well-being indicators are based on the regional BLI produced by the OECD. However, this does not provide time series. There are regional files published in 2014, 2016 and 2018, but each country's indicator for each variable refers to a specific year. Therefore, using only the OECD files, we do not have complete time series but only a few reference years for each variable and region. For this reason, the original sources are used to complete them. For some indicators, we can obtain complete data in this way. For others, however, there are gaps that must be estimated with in-filling processes, as some of the methods we will apply do not perform well in the presence of missing data.

There are some other operational decisions to be explained. In the two dimensions that have two indicators (health and jobs), only one will be used in the models. This decision is based on the fact that a single indicator is clearer, more transparent and easier to interpret than a normalised average of two different indicators. For health, we have decided to use life expectancy. And for jobs, the employment rate. On the one hand, because in this way we maintain a positive interpretation in all possible cases (only air pollution and the homicide rate would remain as negative indicators[9]). On the other hand, in the case of health, life expectancy is a more widespread indicator with a more intuitive interpretation (Hans Rosling et al., 2018). In the case of jobs, the employment rate is a more complete indicator and is less sensitive to the economic cycle than the unemployment rate, so it avoids some distortions.

[9] When reporting the results for these two dimensions, the signs are reversed to facilitate a straightforward positive interpretation.

The lack of job opportunities causes the long-term unemployed to become discouraged and therefore inactive, not captured by the unemployment rate but by the employment rate, which is calculated over the whole working-age population. In any case, the two indicators in both dimensions are described here in order to make the choice more transparent to the reader and because they will be used indirectly for the descriptive analysis in section 4.2.3. Moreover, unemployment rate will actually be used as an explanatory variable in one of the models, as will be explained in section 5.2.

On the other hand, it should be noted that the OECD provides both the original indicators and standardised min-max scores from 0 to 10. Data from the original indicators are used here to avoid losing information. These are listed in Table 8.

It is not lost on us that some of these indicators may be contested for not adequately (or at least not fully) representing the dimension they are intended to measure. It is questionable whether broadband connection is a good reflection of access to services, or the number of rooms per person of access to decent housing. Civic engagement or safety go far beyond voter turnout or the homicide ratio. The latter, moreover, may be more appropriate in heterogeneous samples, but shows very little variability in the European OECD context.

Ideally, we could consider replacing some of these indicators with others that provide more complete information and are a better reflection of a given dimension of well-being. Such as the percentage of household expenditure on housing instead of the number of rooms per person, or healthy life expectancy (HALE) at birth instead of gross life expectancy. It would also be very interesting to incorporate the work-life balance dimension, which is present in the national BLI but not in the regional one. However, the lack of data at regional level for all countries and with sufficient annual values is a major barrier that forces us to be pragmatic and to work with the data available. This is also what determines that the OECD uses these indicators, rather than potentially better ones, for the regional BLI.

Table 8. *Description of well-being indicators and their sources*

Dimension	Indicator	Source
Access to services	Percentage of households with broadband access	Eurostat
Civic engagement	Voter turnout in parliamentary (lower house) elections, except France (first round of presidential elections)	National official sources
Community	Percentage of people who believe they can rely on a friend in case of need	OECD estimates based on Gallup World Poll
Education	Percentage of population aged 25-64 with upper secondary education or higher (ISCED codes 3 to 8)	Eurostat
Environment	Average concentration of particulate matter ($PM_{2.5}$) in the air ($\mu g/m^3$)	OECD estimates based on Aaron van Donkelaar et al. (2015)
Health	(1) Age-adjusted mortality rate (per 1,000 inhabitants)	(1) Eurostat
	(2) Life expectancy at birth	(2) Eurostat
Housing	Average number of rooms per person in a dwelling	OECD
Income	Net disposable income per capita in Purchasing Power Standard (PPS)	Eurostat
Jobs	(1) Employment rate (employed population / total population) of 15-64 year olds	(1) Eurostat
	(2) Unemployment rate (unemployed persons actively seeking employment / active population)	(2) Eurostat
Life satisfaction	Average life satisfaction (or happiness) on a scale of 0 to 10	Estimates from the European Value Survey and the European Social Survey
Safety	Homicide rate (intentional homicides per 100,000 inhabitants)	Eurostat and OECD

Source: Own elaboration from OECD (2018b). *Note:* Further details on data processing can be found in Annex II

Logically, this is an important limitation, so that when interpreting the results, it must be borne in mind what exactly is being measured in each case. Yet in any case, these indicators, although imperfect, constitute for the time being some of the best possible proxies for quantifying multidimensional well-being.

4.1.4. Other variables

To correctly specify the models, it is necessary to add a number of other variables that act as confounders, in order to control for their effects on the dependent variable. The rationale for their selection can be found in chapter 5. In particular, the additional variables described in Table 9 are involved. All of them are based on theoretical and empirical literature, as will be detailed in that chapter. In the case of the variables in the income model, they are derived from a previous analytical model (Rafael Boix-Domènech & Vicent Soler-i-Marco, 2017). The variables presented below include indicators that reflect different aspects of the economic, socio-demographic, political and territorial structure. As can be seen, official statistical sources have been used whenever possible.

Table 9. *Description of the other variables and their sources*

Variable	Description	Source
AROPE	People at risk of poverty or social exclusion (AROPE rate, % of total population)	Eurostat
Capital per worker (*K*/*L*)	Net capital stock per worker (Euro 2015)	Estimated from ARDECO Gross Fixed Capital Formation (GFCF) data, and Eurostat employment data
Foreigners	Percentage of foreign-born among the population aged 15-64	OECD
Growth rate of ideas (g_A)	Average of the growth rate of patent applications to the European Patent Office (EPO) and the growth rate of European Union trade mark (EUTM) applications	Estimated from Eurostat
Industry	Percentage of Gross Added Value belonging to the industrial sector excluding construction (NACE codes B, C, D and E)	ARDECO database
Inequality	Gini coefficient at disposable income	Eurostat and OECD
Labour-to-population ratio (*L*/*P*)	Share of workers in the total population	Eurostat
Median age	Median age of the population	Eurostat
$n + g_A + d$	Construct composed of the growth rate of population aged 15 to 64 years (*n*), the growth rate of ideas –i.e. patents and trademarks– (g_A), and the capital depreciation rate (*d*)	Estimated from Eurostat (*n* and g_A) and AMECO (*d*) data
Objective well-being	Arithmetic mean of the standardised scores (on a 0-10 scale) of all dimensions of the BLI excluding satisfaction with life	Own elaboration from OECD

Variable	Description	Source
Perceived corruption	Corruption Perceptions Index (CPI)	Transparency international
Population density	Inhabitants per km^2	Eurostat
Rest of employment	Percentage of employees working neither in CCIs, nor in the primary sector (NACE code A) nor in construction (NACE code F)	Eurostat
Students	Students at upper secondary education or higher (ISCED 3-8) expressed as a percentage over population aged 15 to 24	Eurostat
Total employment (*L*)	Total number of people employed in the region	Eurostat
Tourist arrivals	Number of tourists who stayed at least one night in a tourist accommodation	Eurostat
Tourist overnights	Total nights in tourist accommodations	Eurostat
Urban	Share of population living in cities (DEGURBA 1)	Own estimate based on Degree of urbanisation classification (DEGURBA) from Eurostat and 2011 Census
Urban and semi-urban	Share of population living in cities (DEGURBA 1) or in towns and suburbs (DEGURBA 2)	Own estimate based on Degree of urbanisation classification (DEGURBA) from Eurostat and 2011 Census
Youth	Population aged 15 to 29 (% of total population)	Eurostat

Source: Own elaboration. *Note:* Further details on data processing can be found in Annex II

4.2. Data at a glance

4.2.1. A general overview

Overall, we get a panel database with 2,508 observations (209 regions for 12 years). The descriptive statistics of the variables included in the models are presented in Table 10.

Furthermore, the correlations between the variables to be used in the models can be seen in Figure 18. It is noted, for example, that the CCIs are quite positively associated with the degree of urbanisation of the regions, the presence of students and foreign population, income, employment rate, tourism, perceived corruption (higher index values being lower perceived corruption) and educational attainment, among others. Conversely, they are negatively associated with employment in the primary sector and construction, poverty and social exclusion, unemployment, industrial activity or median age (i.e. they are located in relatively younger regions). Most of these associations are to be expected.

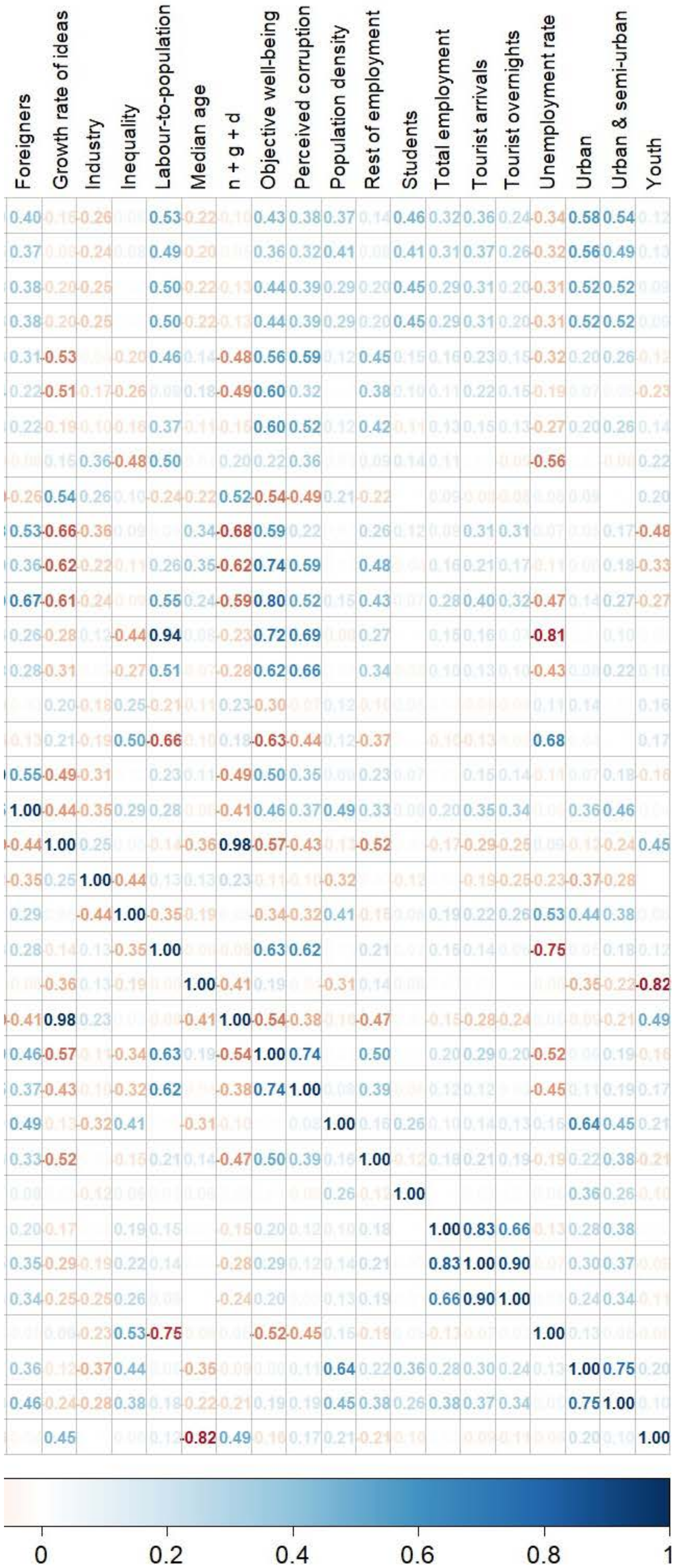
Table 10. *Descriptive statistics*

Variable	Avg.	SD	Min.	Max.
CCI employment (%)	4.67	2.47	0.58	16.10
CCS employment (%)	2.49	1.32	0.33	9.60
IP + R&D employment (%)	2.18	1.32	0.01	8.07
Well-being				
Households with broadband access (%)	72.59	16.67	13.00	100.00
Voter turnout (%)	69.69	11.76	35.50	92.62
Social network support (%)	90.86	5.07	64.01	100.00
Educational attainment (%)	74.66	14.72	18.00	97.60
Air pollution (µg/m^3 of $PM_{2.5}$)	13.66	5.30	3.73	37.38
Age adjusted mortality rate (per 1,000)	9.87	1.79	6.86	16.67
Life expectancy (years)	80.83	2.33	71.70	85.80
Rooms per person	1.71	0.36	0.89	2.50
Net disposable income per capita (PPS)	15,166	3,765	6,400	27,000
Employment rate (%)	66.10	8.65	38.90	86.60
Unemployment rate (%)	9.21	5.99	1.30	37.00
Life satisfaction (0-10)	7.35	0.63	4.80	8.93
Homicide rate (per 100,000)	1.02	0.85	0.00	9.49
Other variables				
AROPE rate (%)	22.47	8.44	7.10	56.90
Foreign population (%)	11.62	9.05	0.15	54.54
Growth rate of ideas (%)	10.70	7.94	0.01	62.68
Industry (% total GVA)	20.45	8.61	2.95	55.23
Inequality (Gini coefficient, 0-100)	28.85	3.41	21.74	42.63
Labour-to-population ratio (%)	43.92	6.27	19.42	59.58
Median age (years)	42.01	3.09	33.00	51.00
$n + g_A + d$ (%)	16.50	8.50	4.82	71.20
Net capital stock per worker (Euro 2015)	207	122	3	1,278
Objective well-being (0-10)	5.97	1.64	2.22	9.05
Perceived corruption (0-10)	6.68	1.58	3.40	9.40
Population density (inhabitants/km2)	357	917	3	7,527
Rest of employment (%)	82.78	4.90	58.26	94.98
Students (% over population aged 15-24)	74.39	20.52	32.00	199.13
Total employed persons (thousands)	1,026	1,141	14	8,809
Tourist arrivals (millions)	4.42	5.16	0.04	40.46
Tourist overnight stays (millions)	13.07	16.67	0.13	123.88
Urban population (%)	35.17	23.08	0.00	100.00
Urban and semi-urban population (%)	70.05	18.04	21.99	100.00
Youth (population aged 15 to 29, %)	17.85	2.29	11.60	25.92

Source: Own elaboration

Figure 18. *Correlation matrix*

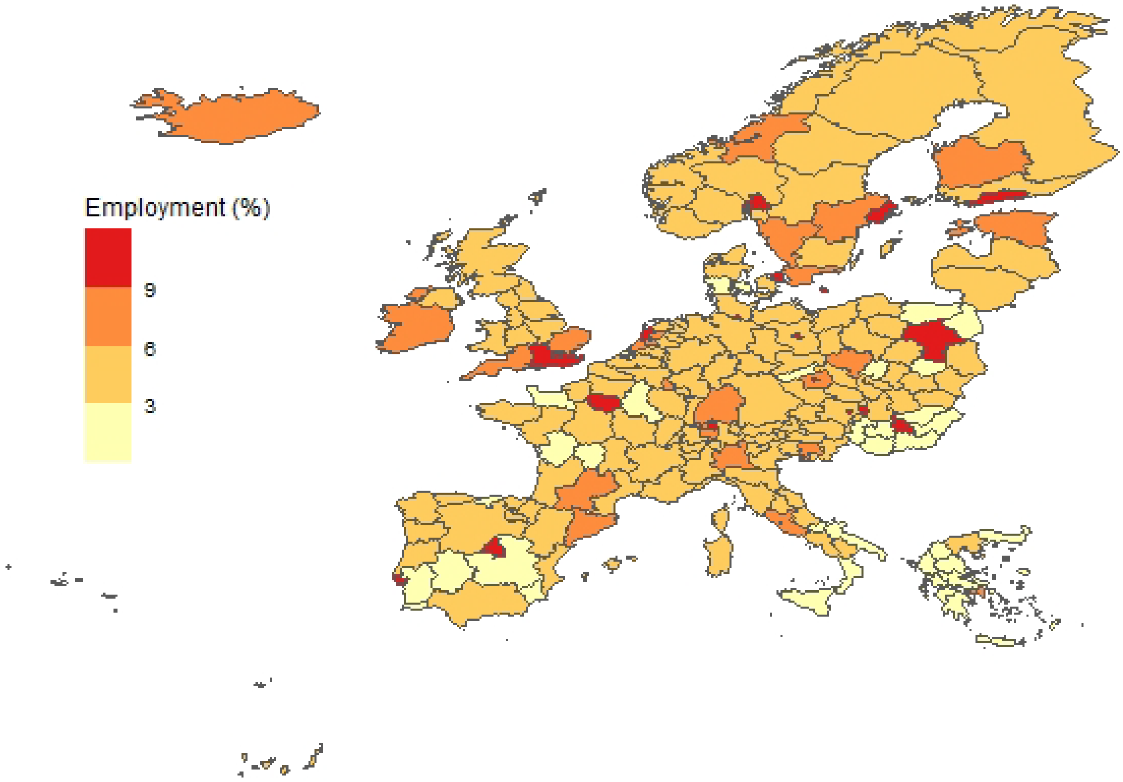
Source: Own elaboration


Foreigners
Growth rate of ideas
Industry
Inequality
Labour-to-population
Median age
n + g + d
Objective well-being
Perceived corruption
Population density
Rest of employment
Students
Total employment
Tourist arrivals
Tourist overnights
Unemployment rate
Urban
Urban & semi-urban
Youth
0
0.2
0.4
0.6
0.8
1

4.2.2. Cultural and Creative Industries

First of all, we need to look at how CCIs are distributed across the regions under analysis, based on the share of these industries in total regional employment. A first fact that becomes apparent is that CCIs are particularly concentrated in the more urban regions and around the large capital cities (Figure 19). This is nothing new. Spatial location patterns and the tendency of CCIs to concentrate in clusters around urban regions, benefiting from agglomeration economies, have been extensively studied in the literature (Luciana Lazzeretti et al., 2008, 2012; Philip Cooke & Luciana Lazzeretti, 2008; Rafael Boix-Domènech & Luciana Lazzeretti, 2012; Rafael Boix-Domènech et al., 2015, 2016; Iván Boal-San Miguel & Luis César Herrero-Prieto, 2020). See Huiwen Gong and Robert Hassink (2017) and Caroline Chapain and Dominique Sagot-Duvauroux (2020) for more detailed reviews.

Figure 19. *Employment in Cultural and Creative Industries, 2019*



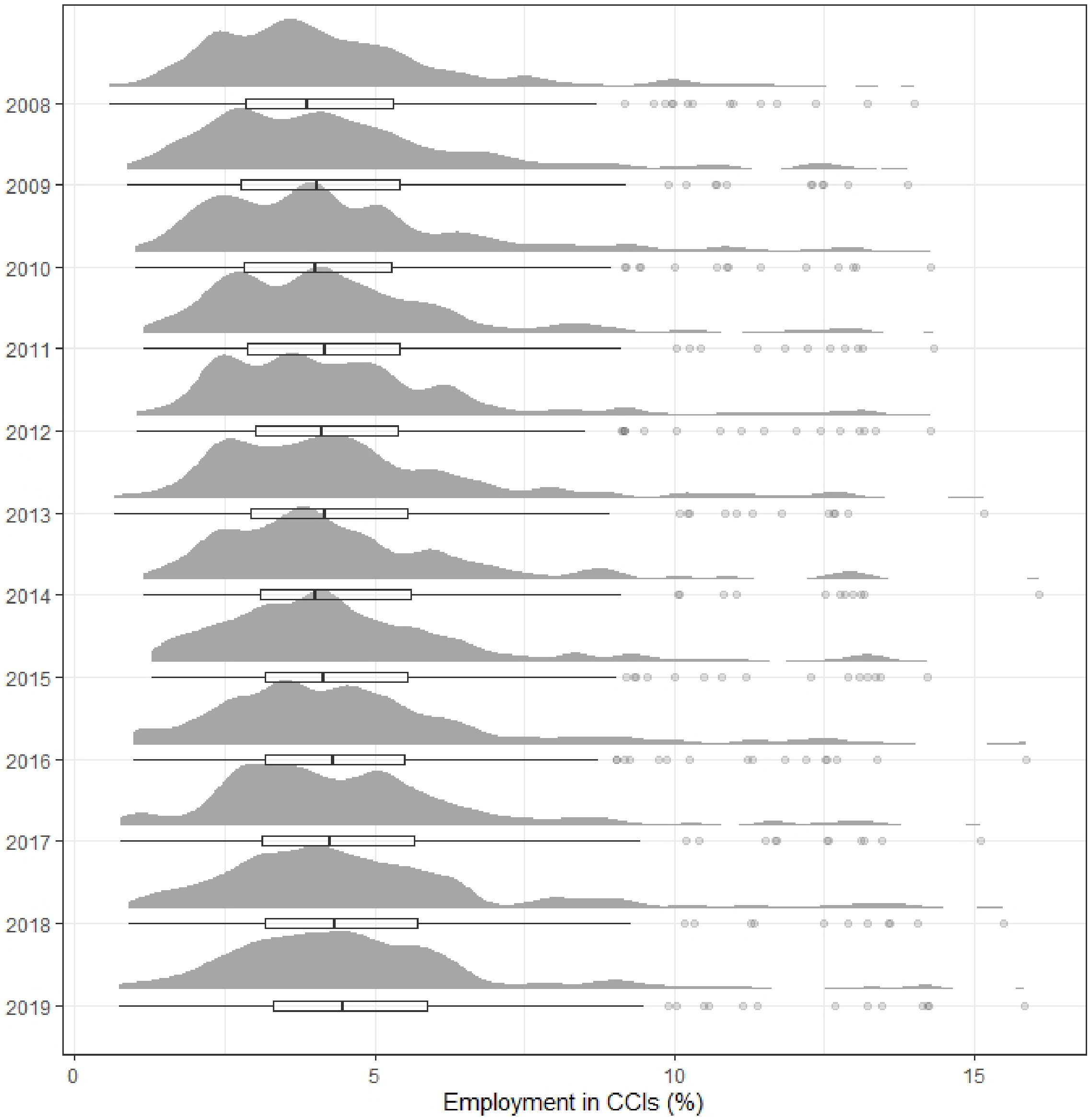
Source: Own elaboration from LFS

In 2019, the region with the highest level of CCI employment was Prague with 15.84%. In contrast, the region of Central Greece was at the bottom with a meagre 0.73% of employment in CCIs. Most regions are between 3% and 6%, although there are a few top leading regions with values above 10%. These correspond mainly to the large conurbations where the role of these industries is more prominent. In 2019, there were only 12 regions above 10%, albeit fairly evenly spread across countries. From highest to lowest: Prague, Berlin, Stockholm, Bratislava, London, Helsinki-Uusimaa, Oslo and Akershus, Île de France, Vienna, Madrid, Central Hungary, and Hamburg. On the opposite side, there were also only 12 regions with values below 2%. However, these are rather more concentrated in Greece (predominantly), Portugal and Spain. From lowest to highest: Central Greece, Thessaly, Ionian Islands, South Aegean, Ceuta, Eastern Macedonia and Thrace, Western Macedonia, Alentejo, North Aegean, Melilla, Peloponnese, and the Azores.

Figure 20 shows the distribution of employment in CCIs by region from year to year. We can see that the distribution, far from being normal, is quite elongated at the top. At the beginning, two or three peaks are observed, but these become more diffuse until they practically disappear at the end of the period, transforming into a sort of smoother mountain. This seems to be mainly due to the fact that some regions that were concentrated at very low values have been increasing their employment in CCIs and moving closer to the rest. In fact, also the median value has been increasing, being 3.89% in 2008 and 4.48% in 2019.

The regional distribution, but distinguishing by country, can be seen in Figure 21. The phenomenon mentioned above is more clearly visible. That is, in most countries there are one or two regions that clearly stand out from the rest, which are concentrated at a considerable distance. Drawing a parallel with cycling, we have the front-runners and the peloton. See, for instance, the case of the Czech Republic. But there are also exceptions that are more evenly distributed, such as the Netherlands, where the differences between regions are narrower.

Figure 20. *Box and density plots of the distribution of employment in CCIs across regions by year*

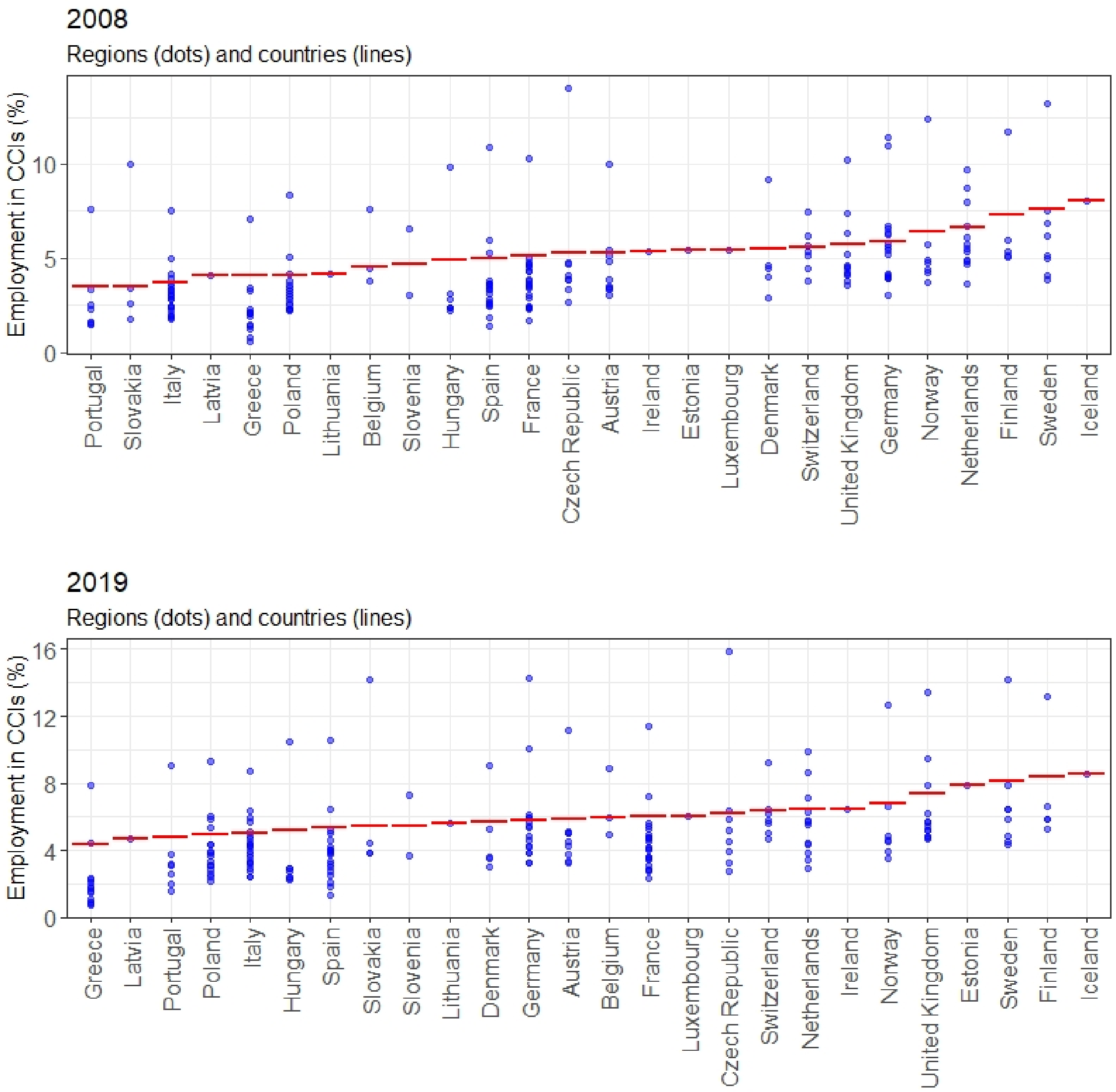


Source: Own elaboration from LFS

There are also important differences between countries, from 4.35% in Greece to 8.56% in Iceland in 2019, nearly double. Country-by-country data and their evolution from 2008 to 2019 can be found in more detail in Table 11. A clear positive trend can be seen in almost all of them. The only two countries that have a slightly lower share of employment in CCIs in 2019 than in 2008 are the Netherlands and Germany. On the contrary, in some countries CCI employment has experienced an extraordinarily positive evolution, such as Estonia (+2.47 percentage points), Slovakia (+1.92 pp), United Kingdom

(+1.61 pp) or Lithuania (+1.44 pp). In the European OECD countries as a whole, it has risen in just over a decade from 5.18% to 5.95% of total employment[10].

Figure 21. *Employment in CCIs by regions and countries, 2008 vs. 2019*



Source: Own elaboration from LFS

[10] Note that these figures (i.e. the average over total employment in the whole territory of analysis) are higher than the median values for the regions outlined above. This is because the regions with the highest CCI employment are usually also the most populated.

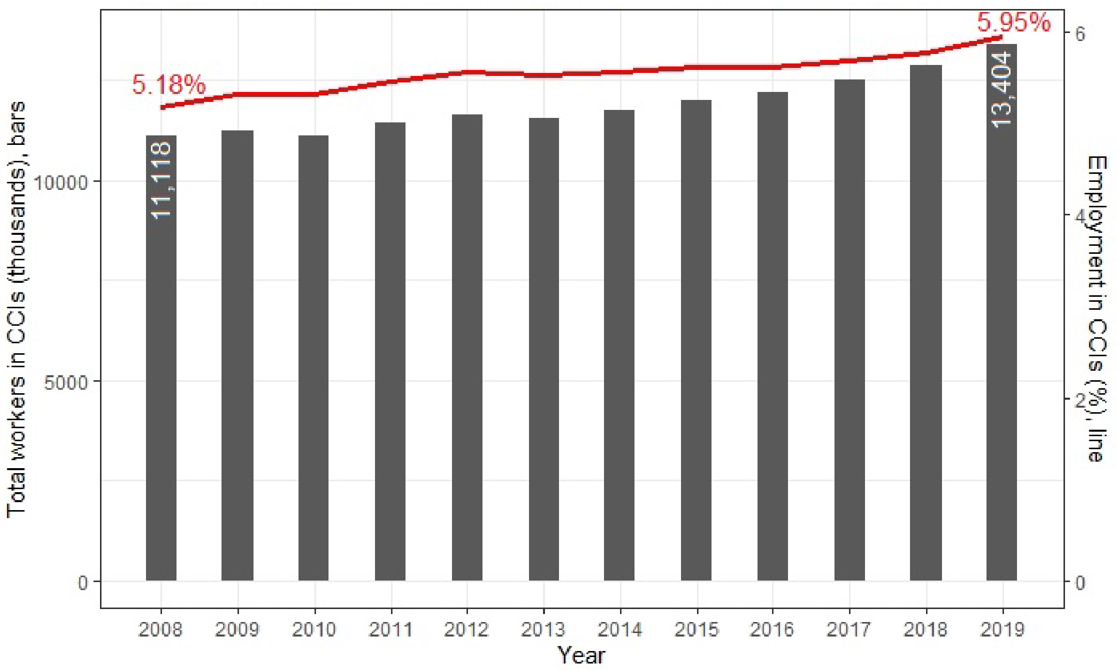
Table 11. *CCI employment by country (%), 2008-2019*

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	5.28	5.58	5.44	5.09	5.28	5.50	5.65	5.68	6.03	6.04	5.85	5.85
Belgium	4.56	4.99	5.03	4.91	4.90	4.48	4.71	4.56	4.54	4.88	5.77	5.95
Czech Republic	5.25	5.38	5.56	5.59	5.52	5.80	5.88	5.87	6.14	6.05	6.25	6.18
Denmark	5.53	5.53	5.75	5.59	5.66	5.64	5.54	5.83	5.73	5.38	5.39	5.67
Estonia	5.40	5.16	5.10	5.90	6.27	6.61	6.76	7.02	7.55	7.63	7.76	7.87
Finland	7.27	7.40	7.73	7.84	7.89	7.88	7.98	8.21	7.81	7.92	8.01	8.38
France	5.10	5.27	5.26	5.58	5.53	5.42	5.36	5.34	5.31	5.48	5.72	6.00
Germany	5.91	5.94	5.95	5.86	5.94	5.59	5.56	5.60	5.63	5.59	5.65	5.76
Greece	4.09	4.05	3.90	3.61	3.81	3.98	3.96	3.72	3.95	3.94	4.19	4.35
Hungary	4.89	4.57	4.69	4.68	4.88	5.15	4.69	4.83	5.14	4.51	4.66	5.17
Iceland	8.08	8.49	8.07	7.97	7.96	8.07	8.70	9.34	9.24	8.74	8.61	8.56
Ireland	5.34	5.69	5.93	6.10	6.29	6.41	6.49	6.66	6.76	6.67	6.44	6.44
Italy	3.69	3.66	3.60	4.69	4.77	4.81	4.75	4.77	4.83	4.85	4.91	4.99
Latvia	4.08	4.26	4.82	4.15	4.12	4.69	4.81	4.66	4.65	4.93	4.77	4.65
Lithuania	4.20	4.32	4.07	4.30	4.55	4.73	4.77	4.85	4.65	4.88	5.46	5.64
Luxembourg	5.45	5.30	5.78	5.89	6.09	6.02	6.30	5.11	4.86	4.90	6.33	6.06
Netherlands	6.65	6.66	6.55	6.27	6.35	5.98	5.89	5.98	6.06	6.01	6.17	6.42
Norway	6.41	6.54	6.62	6.79	6.95	6.68	6.63	6.62	6.47	6.54	6.52	6.78
Poland	4.10	4.32	4.30	4.24	4.30	4.40	4.46	4.54	4.55	4.67	4.83	4.96
Portugal	3.47	3.46	3.61	3.45	3.54	3.68	4.07	4.19	4.21	4.19	4.49	4.79
Slovakia	3.50	3.97	4.07	4.15	4.41	3.79	4.25	4.56	4.51	4.60	4.75	5.42
Slovenia	4.68	5.01	5.14	5.05	4.62	5.09	5.31	5.49	4.83	5.19	5.14	5.43
Spain	5.02	4.90	4.96	4.97	5.12	5.22	5.26	5.19	5.14	5.47	5.28	5.35
Sweden	7.62	7.66	7.62	7.75	7.70	7.52	7.51	7.50	7.53	7.66	7.79	8.14
Switzerland	5.61	5.81	5.52	5.62	5.63	5.86	6.10	6.14	6.17	6.17	6.31	6.34
United Kingdom	5.77	6.36	6.28	6.38	6.64	6.77	6.91	7.13	7.02	7.18	7.18	7.37
TOTAL	5.18	5.33	5.32	5.46	5.56	5.53	5.56	5.61	5.62	5.68	5.78	5.95

Source: Own elaboration from LFS

This leads us to talk about the trends experienced by the CCIs during this period, which has in fact been positive in most years (Figure 22). It has gone from 11,118,307 workers in 2008 to 13,403,681 in 2019. An increase of 20.56%, and nearly 2.3 million new jobs, i.e. more than 200,000 per year on average. Moreover, this evolution is comparatively more positive than that of the other sectors, as can be seen from the fact that their share of total employment has not stopped growing either.

Figure 22. *CCI employment trends in European OECD countries, 2008-2019*



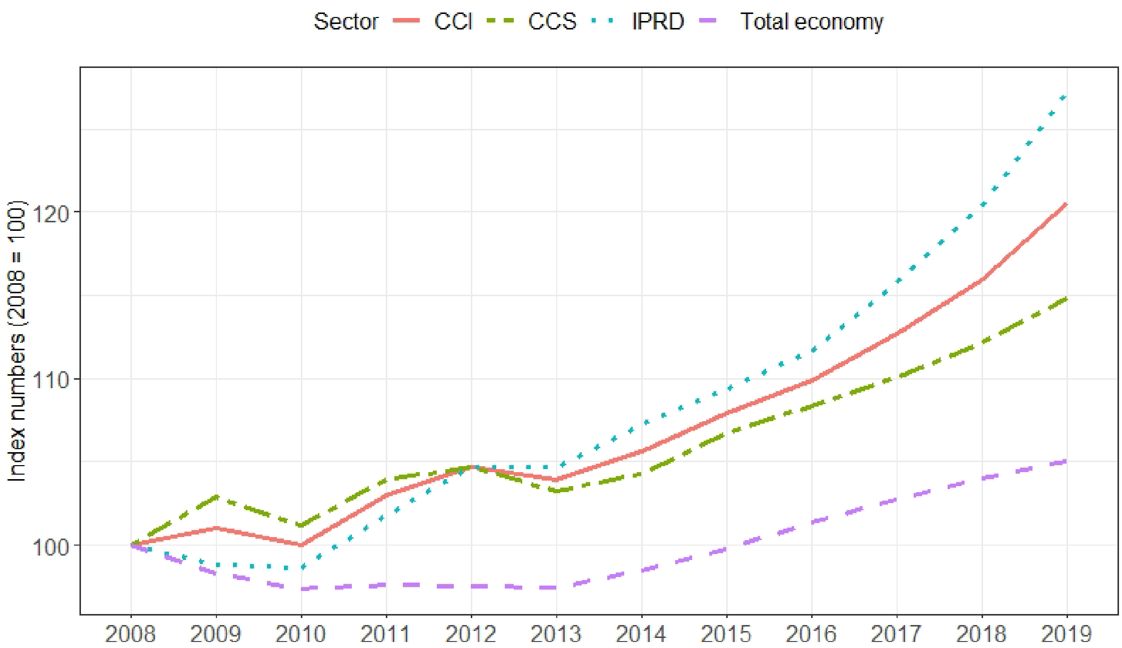
Source: Own elaboration from LFS

This shows the high capacity of CCIs for growth and job creation, but also shows their resilience. Especially if we take into account the economic recession, job destruction and subsequent stagnation experienced in Europe during the first half of the period as a result of the 2008 economic crisis. In this extremely unfavourable context, employment in CCIs has held up much better than the total volume of employment (Figure 23). While overall employment fell within the crisis and did not recover its previous level until 2015, CCIs continued to create jobs at extraordinary rates. By the end of the period, CCIs had grown cumulatively by 20.56% compared to 5.04% for the whole economy. This fact points to the resilience and strategic position of

CCIs in the change of production model, at least in terms of employment. Especially in contexts of economic instability and uncertainty such as the current one.

One might wonder whether this evolution is attributable to the CCIs as a whole, or only to part of them. In particular, those most closely linked to sectors with a high technological content. Returning to the distinction we had made in Figure 17, with CCS on the one hand (those defined by Manuel Vilares et al. (2022) in the narrower sense, i.e. G1 + G2 + G3) and IP + R&D on the other, we find that both have experienced a considerably more positive evolution than overall employment (Figure 23).

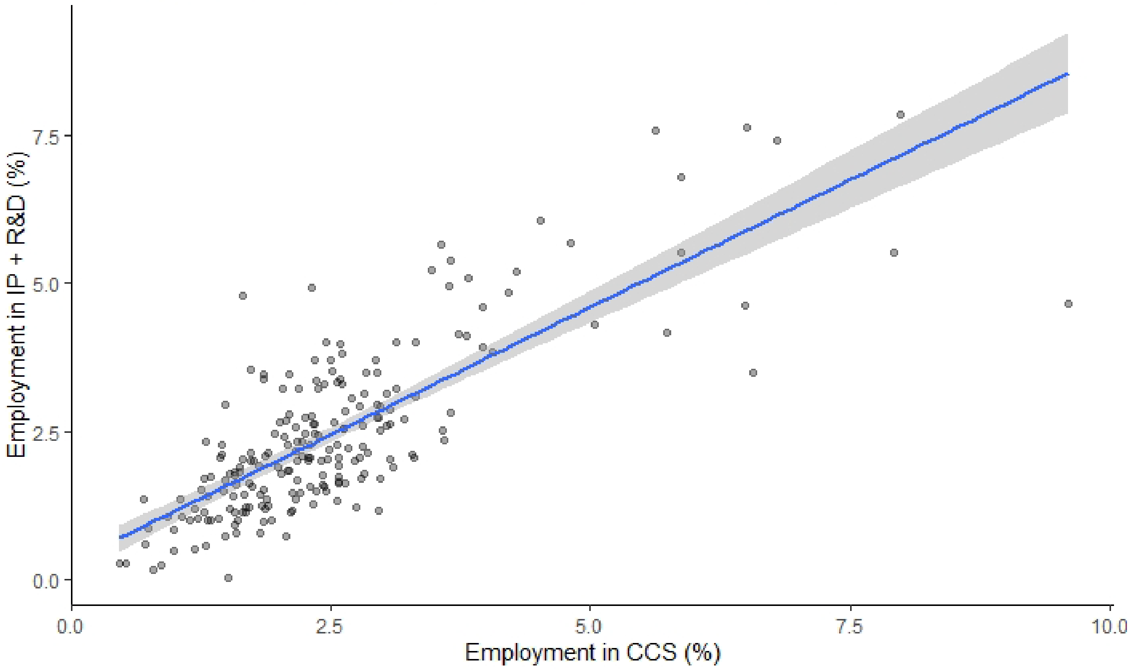
Figure 23. *Employment growth in European OECD countries, 2008-2019*



Source: Own elaboration from LFS

Another question of interest is the relationship between employment in CCS and in IP+R&D: whether they are located in the same regions, whether they complement and reinforce each other, whether they are completely independent or whether they are rather substitutes. Looking at the data, there are clear patterns of co-location between CCS and IP+R&D. That is, they generally go together: regions with high employment in CCS also have high employment in IP + R&D, and vice versa (Figure 24). The Pearson correlation coefficient between the two is 0.757. Thus, to a large extent, these are different links in the broader phenomenon of CCIs. This is in fact what we hypothesised when taking CCIs as a whole, considering the cultural and creative ecosystem in its broadest conception as proposed by Manuel Vilares et al. (2022) (Figure 6). Moreover, the two sub-categories are very evenly balanced, with CCS accounting for 3.04% of employment in European OECD countries as a whole, and IP + R&D industries for 2.91%. Consequently, when using the CCI measure, both subgroups are also fairly faithfully represented. Indeed, both correlate with the former (i.e. with the set that includes themselves and the other subgroup) with coefficients of 0.938 and 0.937 respectively (CCS the first, IP + R&D the second).

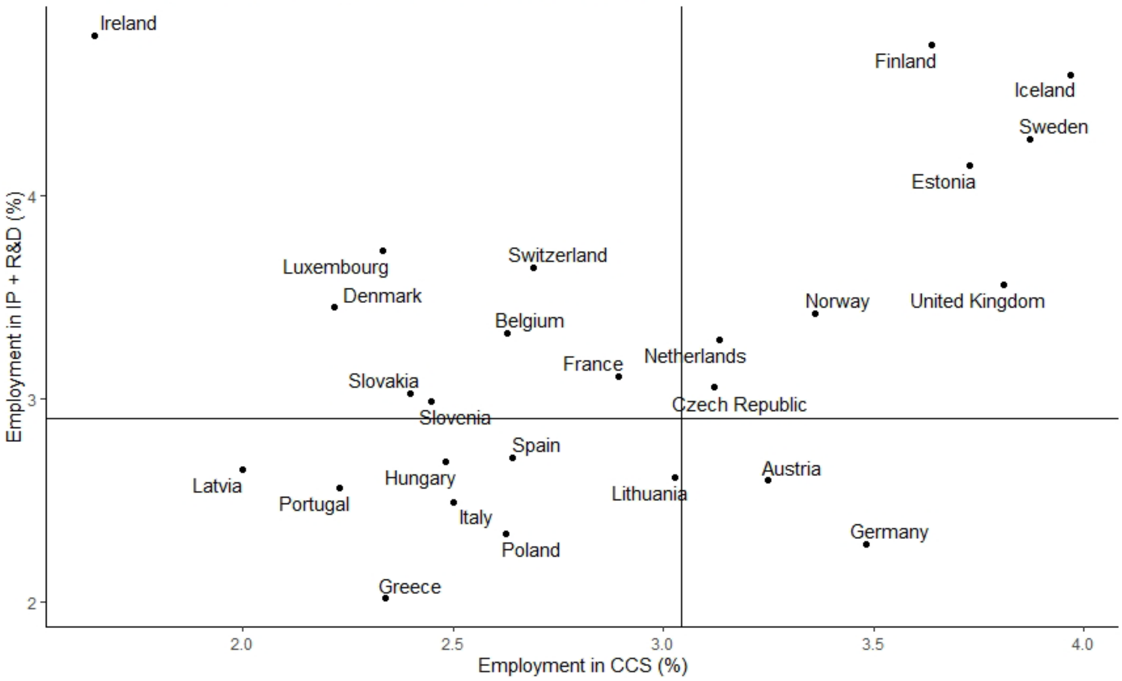
Figure 24. *Regional co-location between CCS and IP + R&D, 2019*



Source: Own elaboration from LFS

A notable exception to this general trend is Ireland. When grouped by country, Ireland was at the two extremes in 2019: it had the highest share of employment in the IP + R&D sectors (4.79%, compared to the average of 2.91%) and the lowest share of employment in CCS (1.65%, compared to the average of 3.04%). This probably has to do with Irish peculiarities regarding the location of the European headquarters of large multinational technology corporations in recent years (e.g. Meta or Alphabet) due to tax benefits (Manuel Vilares et al., 2022), along with a certain neglect of other types of economic activities such as CCS. It is well illustrated in Figure 25. The graph is divided into four quadrants according to whether they rank above or below the overall employment average in CCS (vertical division) and in IP + R&D (horizontal division), respectively. In the second quadrant (top right) we find the countries that excel in both sub-classifications: the "top creatives". In contrast, in the third quadrant (bottom left) are the countries with lower relative employment in both subgroups: the "lower creatives". In the first quadrant (top left) and the fourth quadrant (bottom right) we have countries that excel in one of the sub-divisions but rank below in the other. In the first quadrant, countries specialising in IP and R&D, and in the fourth quadrant, those specialising in the CCS core.

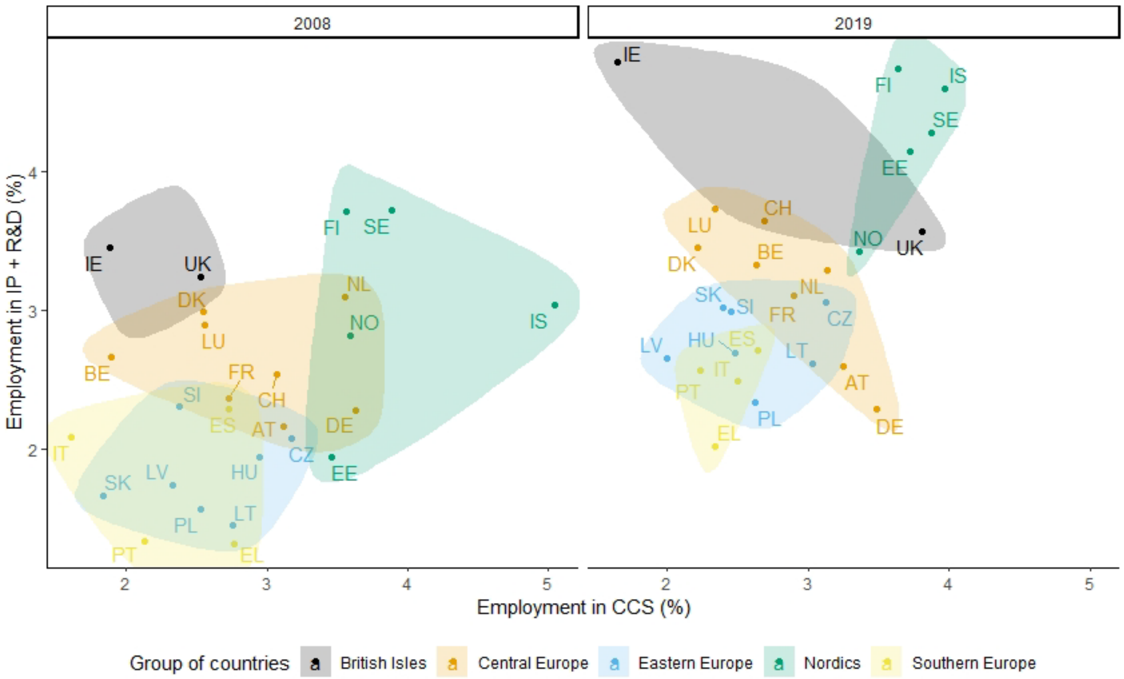
Figure 25. *Contrasting employment in CCS and IP + R&D by country, 2019*



Source: Own elaboration from LFS. *Note:* The vertical and horizontal lines represent the joint average of CCS and IP+R&D employment, respectively

From a dynamic perspective, and looking at country groups, Figure 26 shows a comparison of CCS and IP + R&D employment between 2008 and 2019. We see a generalised increase in both subgroups in most countries, especially in IP + R&D. The leading countries are the Nordic countries, followed by Central Europe. At the bottom are the southern and eastern countries, although the latter have substantially improved their position. The British Isles, i.e. the United Kingdom and Ireland, follow very different trends from each other. While in 2008 they shared the same characteristics, relatively well positioned in IP + R&D and not so well positioned in CCS, by 2019 each had followed a markedly different trajectory. The UK has mostly increased its employment in CCS, to positions close to the Nordics. In contrast, Ireland has greatly increased its employment in IP+R&D, becoming an outsider with no resemblance to any other country. There are also other important changes such as Iceland, which has significantly reduced its share of CCS employment while increasing its share of IP + R&D employment. Estonia, on the other hand, has also greatly increased its employment in IP + R&D, but without reducing that of CCS.

Figure 26. *Employment in CCS and IP + R&D by country, 2008 vs. 2019*



Source: Own elaboration from LFS

It should be clarified that the grouping of countries is for pattern visualisation purposes only. There are a couple of changes from more conventional classifications. We have grouped Estonia in the Nordic countries, rather than Eastern Europe, and Denmark in Central Europe, rather than with the Nordics. Although Estonians often claim to be considered Nordic rather than grouped with the Baltics, due to cultural, historical and linguistic ties, it is included in the Nordics mainly because of its evolution. In 2008, it was close to the rest of its eastern peers, but by 2019 it was clearly standing out alongside the Nordics, even surpassing Norway in both industry groupings. Denmark, on the other hand, while there is no doubt about its regional affiliation to the Nordic countries, presents moderate values in this field, much closer to those of its Central European neighbours.

Although country patterns have been presented here for the sake of simplicity, regional patterns are also similar, with the logical greater level of heterogeneity.

4.2.3. Well-being

As for the exploration of well-being data, we will do so in a very cursory manner since it can be found extensively elsewhere. For example, on the regional BLI website (OECD, 2023b) or in the reports that the OECD has published on it (OECD, 2014).

Figure 27 shows the 2019 regional scores for each of the well-being dimensions. The last map corresponds to the arithmetic mean of the scores of the eleven dimensions, without any weighting[11]. Without going into each dimension, we will focus only on this last map that shows the overall picture. Though there are regions that have their specific strengths or weaknesses in particular dimensions.

We can distinguish several poles of high well-being regions. One of these is around the North Sea, comprising the south of the UK (except London), much of the Netherlands and the south of Denmark. It also extends to the

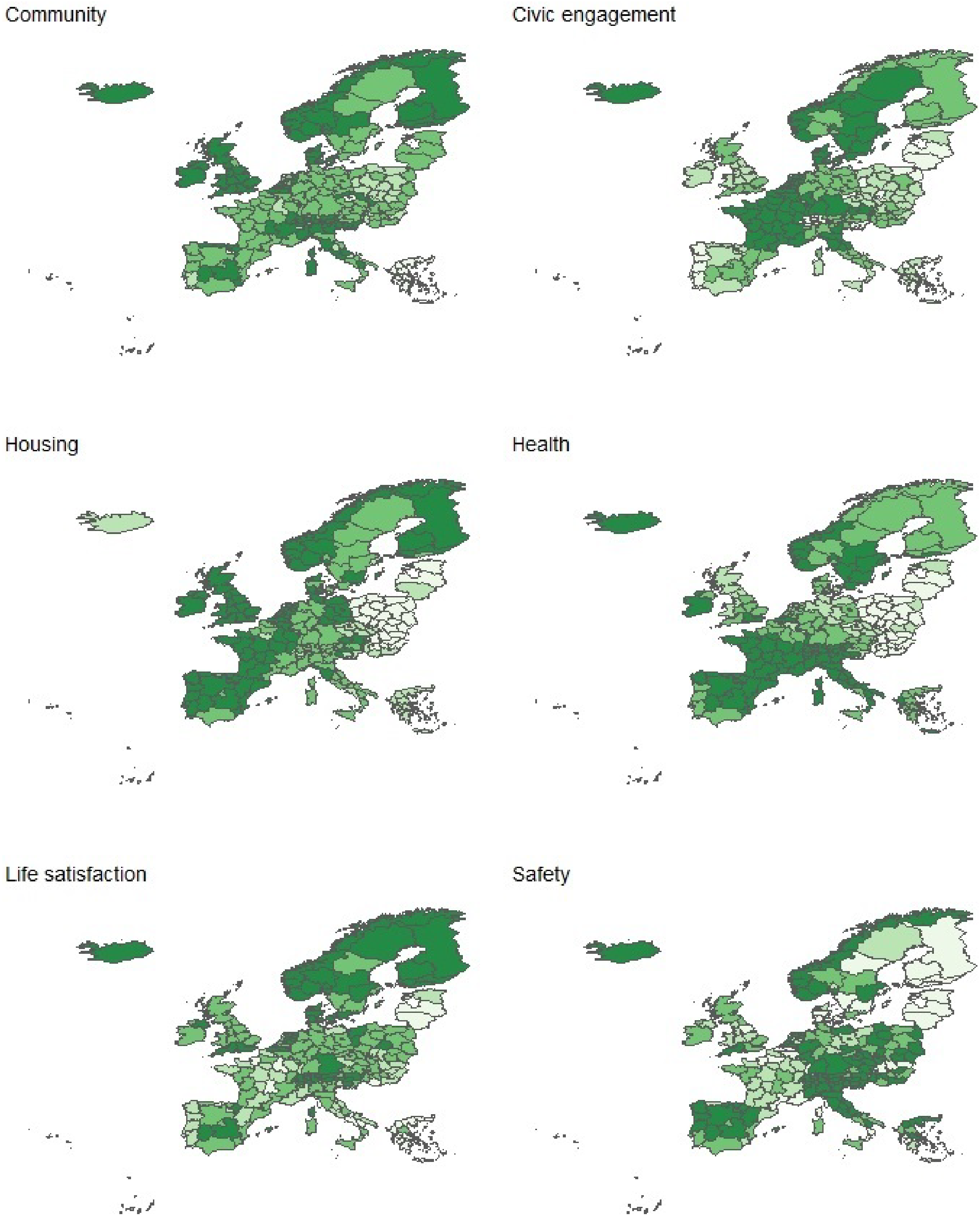
[11] Since in this section we do not intend to go into each dimension separately, but rather into a general overview of well-being, we cannot use the raw indicators (as we will do in the statistical analysis), with very different scales, but rather the normalised indicators (i.e. converted to a 0-10 scale), so that they can be averaged. To obtain these scores, the methodology used by the OECD (2008, 2018b) is reproduced for our sample.

rest of the Nordic countries, including the whole of Norway, Iceland, much of Sweden and the Finnish region of Helsinki-Uusimaa. On the other hand, we have another pole in central Europe, which includes Luxembourg, parts of Austria and Switzerland, southern Germany and the Italian autonomous region of Bolzano/Bozen. To these should be added the Basque Country and Navarre. Three Norwegian regions top the ranking, with the highest average score of 8.80 for Western Norway.

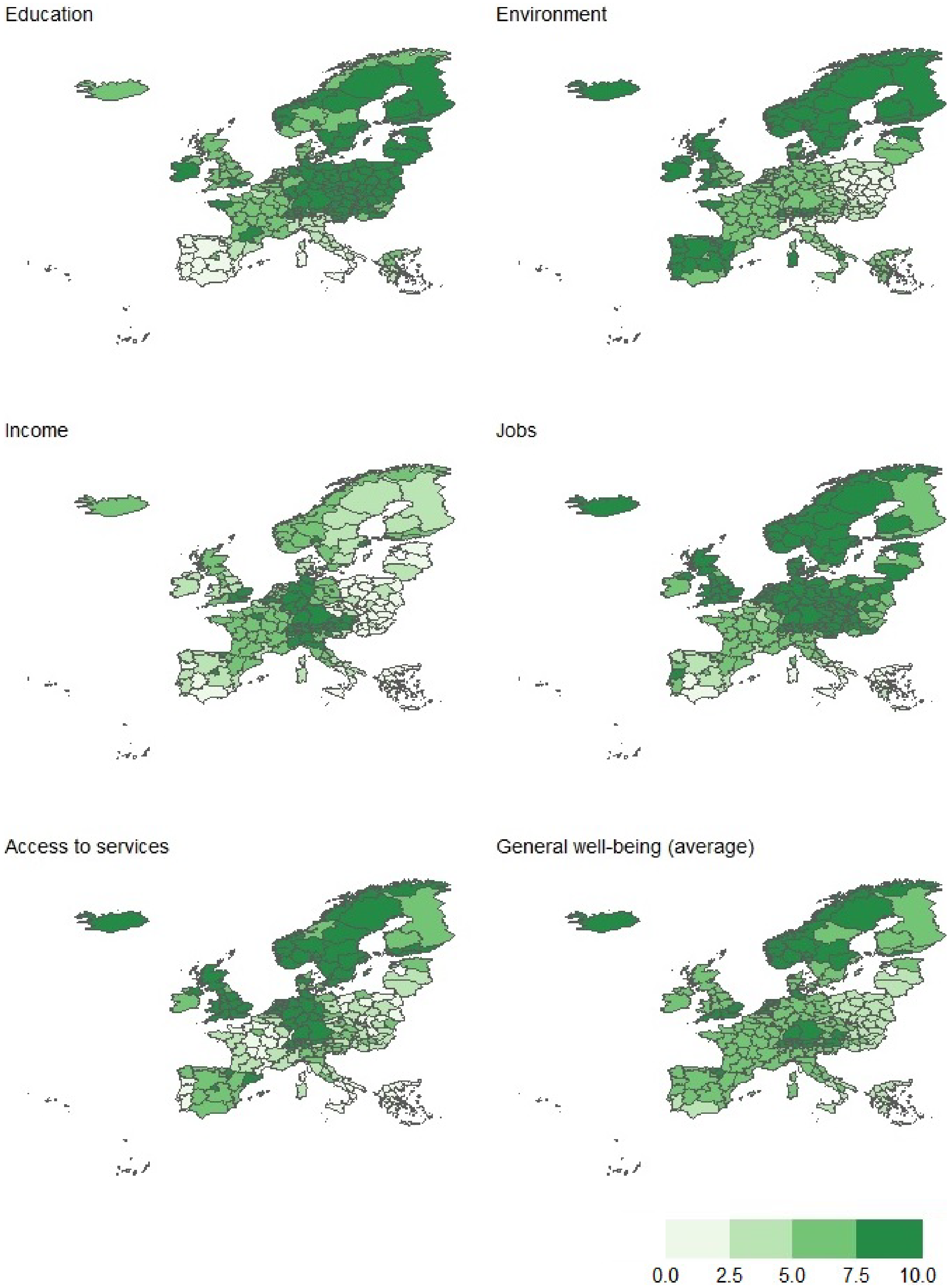
The lower part of the ranking concentrates a number of regions corresponding entirely to Southern and Eastern Europe. We have, on the one hand, the whole of Greece, the south of Spain (Andalusia, Ceuta and Melilla), the south of Italy (except Basilicata), and the south and the Atlantic islands of Portugal. On the other hand, we have the entire countries of Latvia, Lithuania, Poland and Slovakia, part of Hungary and the Northwest region of the Czech Republic. These are the regions with an average score below 5, as there is actually only one region below 2.5: Western Greece, with a 2.37. In fact, the five lowest scoring regions are all Greek, and eight of the bottom ten.

A comparison between the situation in 2008 and 2019 can be seen in Figure 28. The average for each country corresponds to the population-weighted average of the overall scores of its regions. There are some significant changes, such as the harsh ravages of the economic crisis and austerity policies in Greece, which has been relegated to last place. Denmark has also dropped a few positions, while Hungary, Luxembourg or Finland have followed the opposite trend. Yet it should not be forgotten that these scores are established in comparative terms, so a lower score does not necessarily imply a worsening of well-being but probably a smaller improvement compared to the rest.

Figure 27. *Regional well-being scores, 2019*

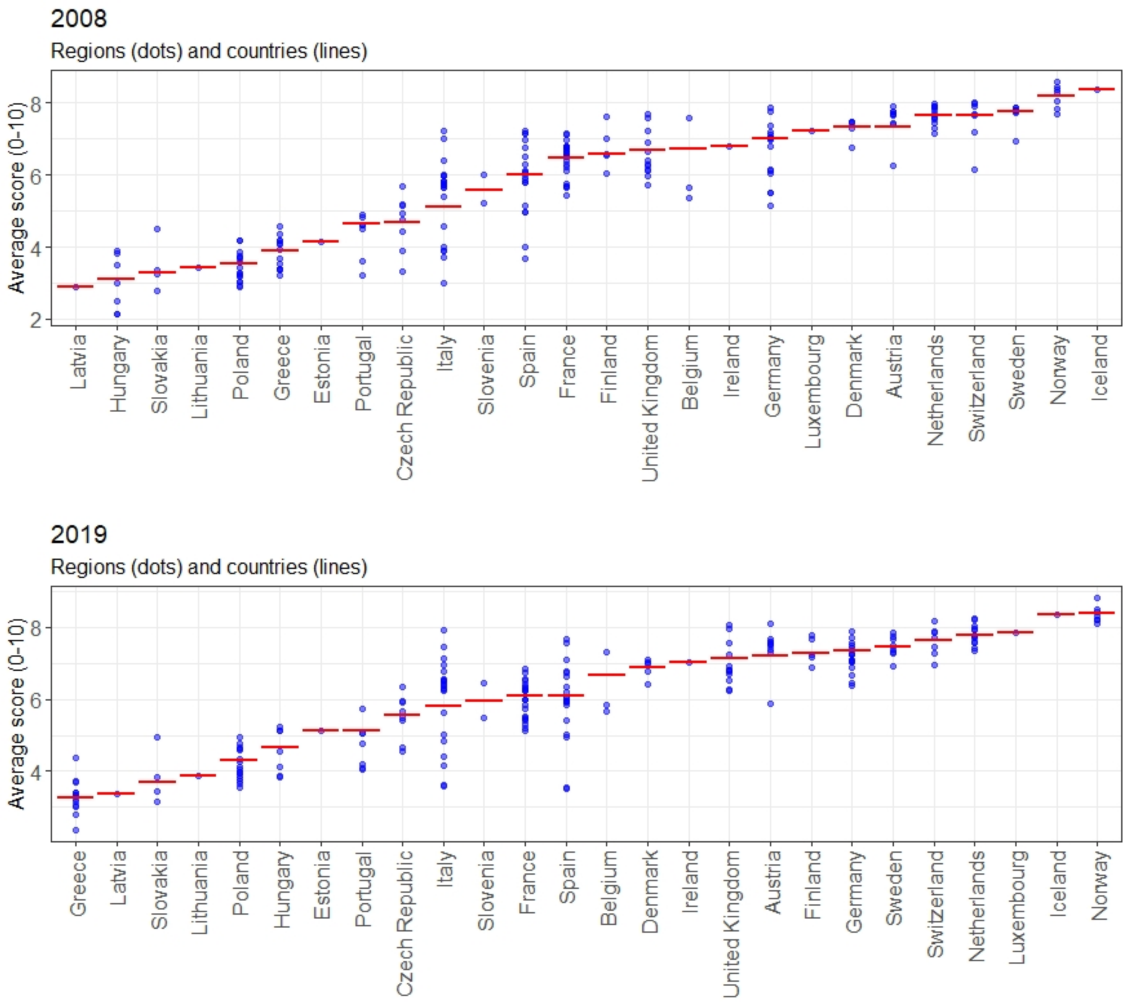


Source: Own elaboration


Education
Environment
Income
Jobs
Access to services
General well-being (average)
0.0
2.5
5.0
7.5
10.0

Another striking aspect is the marked regional disparity mainly in Italy and Spain, compared to other countries such as the Netherlands, Norway or Denmark where regional differences are very small. In the case of Germany, the intense process of regional convergence that has taken place in little more than a decade can be observed. Further details for each dimension of well-being, using the original indicators, can be found in Annex III (Figure 73).

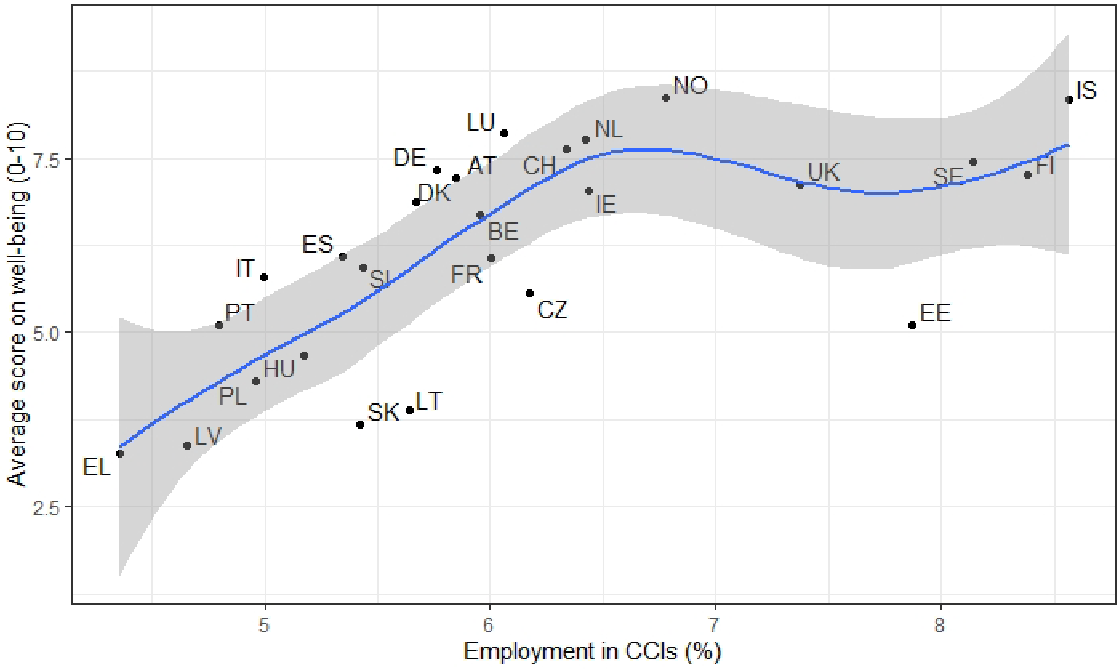
Figure 28. *General well-being (average), 2008 vs. 2019*



Source: Own elaboration

As a first approximation, we ask whether CCIs and well-being are indeed associated, even without drawing any causal interpretation. Just to start testing our intuition. Figure 29 plots these two variables together. The smoothed relationship between the two can be observed with the local regression represented by the blue line using locally estimated scatterplot smoothing (LOESS), the shaded area being the 95% confidence interval. It is noted that the relationship does indeed appear to be positive. At least up to medium levels of CCIs. At higher values, the curve becomes flatter.

Figure 29. *Contrasting CCIs with average well-being by country, 2019*



Source: Own elaboration

However, this is for illustrative purposes only and, as mentioned, no causal statement can be drawn from it. Causality could be reversed, the statistical association could be affected by confounding variables, or it could be a mere spurious correlation. To properly identify causal pathways and quantify the effects attributable to CCIs, well-specified models must be developed and rather more complex techniques applied. This is addressed in chapters 5 and 6.

CHAPTER 5

Causal models

Identifying the causal pathways through which CCI effects occur and being able to capture them without bias is surely the main challenge of this thesis. The purpose is not just to obtain predictive models, or mere statistical associations, but causal explanations.

Since we are working simultaneously with eleven different dimensions, we have to start by applying some operational simplifications. First we elaborate a single basic model that can be generalised to all dimensions, and then we go into the detail of each dimension, leading to eleven different models. In the case of income, however, since a solid analytical model that integrates CCIs already exists and is well validated in the literature, we will stick to this model.

5.1. Generalised basic model

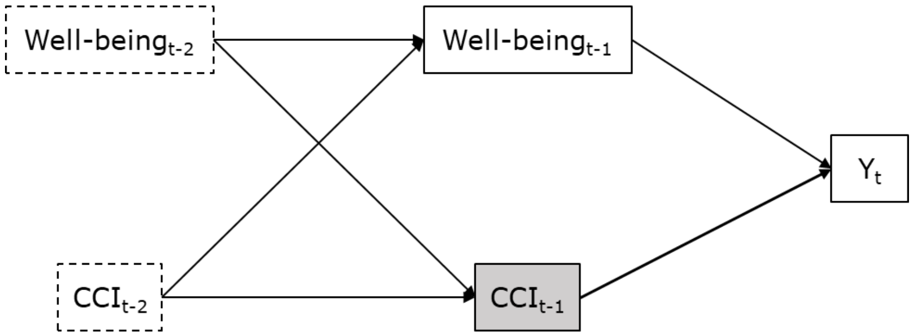
We start with the simplest possible model before moving on to more complex models. We consider that each dimension of well-being depends on the CCIs and the rest of well-being. As argued in section 3.3.1 and depicted in Figure 13, the effects are bidirectional, both from CCIs to well-being (and to each dimension of well-being) and from well-being to CCIs. Moreover, we assume that these effects are not instantaneous, but rather occur with some time lag[12].

Building on these prior assumptions, we plot a first basic generalised graph. For a dimension *Y* in period *t*, the causal path is plotted in Figure 30 in the form of a directed acyclic graph (DAG). This is thus a self-reinforcing

[12] The validity of this assumption is tested below with the Granger causality test (see section 6.1 for the methods and section 7.1 for the results).

endogenous model, in which CCIs and well-being influence each other over time.

Figure 30. *Generalised basic DAG for any well-being dimension*



Source: Own elaboration

In order to infer the causal impact of the CCIs, the rationale of the DAGs is followed (Ian Shrier & Robert W. Platt, 2008; Johannes Textor et al., 2016), ascertaining the minimum sufficient adjustment for the identification of the causal effect (see Judea Pearl & Dana Mackenzie, 2018 for a better understanding). In this simple model, the minimum sufficient adjustment to identify the effect of the treatment variable (i.e. CCI$_{t-1}$) requires including Well-being$_{t-1}$ as an explanatory variable, leaving Well-being$_{t-2}$ and CCI$_{t-2}$ aside. Hence the latter variables are represented in dashed rectangles. This also involves that CCI and well-being in *t-3*, ..., *t-n* do not have to be included. Therefore, for dimension *Y*, in region *i* and in period *t*, we obtain the following equation:

$$Y_{i,t} = f\left(CCI_{i,t-1}, Wellbeing_{i,t-1}\right) + \varepsilon_{i,t}$$

where $\varepsilon_{i,t}$ is the random error attributable to factors not included in the model.

The next step is to disaggregate the well-being term since, for each dimension, there are some that intervene and some that do not. In addition, it is necessary to add other confounders that may be relevant for each model. We assume the same time lag structure as in the general model. Thus, the equations will follow the following general structure:

$$Y_{i,t} = f\left(CCI_{i,t-1}, X_{i,t-1}\right) + \varepsilon_{i,t}$$

where X represents a set of confounders, including well-being indicators and other variables, and the rest retaining the stated meaning. We establish which variables should be included in each model from the literature and theoretical reasoning, as explained in the next section.

5.2. Full models

In the following DAGs, in addition to the CCIs and the respective well-being dimensions, other variables that may causally affect the dependent variable are introduced. But they only enter the model if they are also related in some way to the CCIs or to the dimensions of well-being, following the reasoning of the minimum sufficient adjustment of the DAGs to avoid distortions in the identification of the causal path of the CCIs.

Causal antecedents are plotted in t-2. Well-being in that period is grouped together for the sake of simplicity and to facilitate the visualisation of the graphs since it does not affect the model (although each of the dimensions involved in t-1 has different causes in the previous period). Variables other than CCIs and well-being are only plotted in t-2 in case they have some causal impact on CCIs in t-1. We place above the CCIs the well-being dimensions involved in each model, and below them other confounders. Variables in dashed rectangles indicate that they are not required for the minimum sufficient adjustment and are therefore not considered in the estimations.

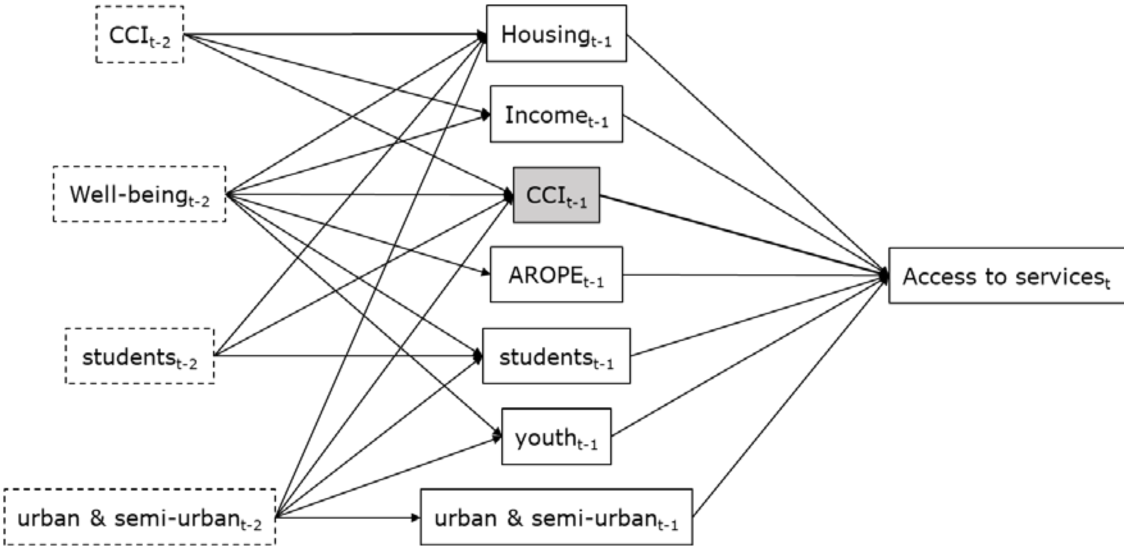
Each arrow represents a causal relationship. These are explained below for each model. But before going into this, there are some systemic relationships that recur and will not be stressed each time. In particular, aggregate well-being affects both the CCIs and each of the dimensions of well-being (as discussed in the previous section), and the CCIs affect all dimensions of well-being through different channels (this is actually the research hypothesis on which this thesis is based).

5.2.1. Access to services

We consider the following variables to be involved as explanatory factors for access to services (i.e. the share of households with broadband connection). Housing, because better and larger houses will also generally be better equipped. Also income, because households with more disposable income can afford broadband connection; and at the aggregate level, higher average income levels will increase the proportion of households with a better connection (Christopher G. Reddick et al., 2020).

The proportion of urban or semi-urban population is another factor to consider, as broadband connection (e.g. via fibre optics) first reaches these environments with a higher concentration of people, greater proximity to networks and a higher return on initial investment (Juan Rendon Schneir & Yupeng Xiong, 2016). On the other hand, students, especially at post-compulsory levels, often need a good internet connection to do research work, access virtual educational platforms, etc. Therefore, households with students will be more likely to hire a broadband connection, and more students will imply the same at the aggregate level (Tonny J. Oyana, 2011). Similarly, young people are more accustomed to using the internet and electronic devices from a young age, so they value being connected more and will be more likely to purchase such services. Consequently, more young people will presumably imply more connected households (Tonny J. Oyana, 2011; Christopher G. Reddick et al., 2020). Finally, we introduce the variable of population at risk of poverty and social exclusion, given that this is a barrier to accessing goods that are not strictly basic needs. If there are many households that have difficulties in covering basic needs, or even if they do not have stable or decent housing and services such as water, electricity or gas, they will not be able to consider contracting a broadband connection (Christopher G. Reddick et al., 2020). Figure 31 depicts this causal model.

Figure 31. *DAG for access to services*



Source: Own elaboration

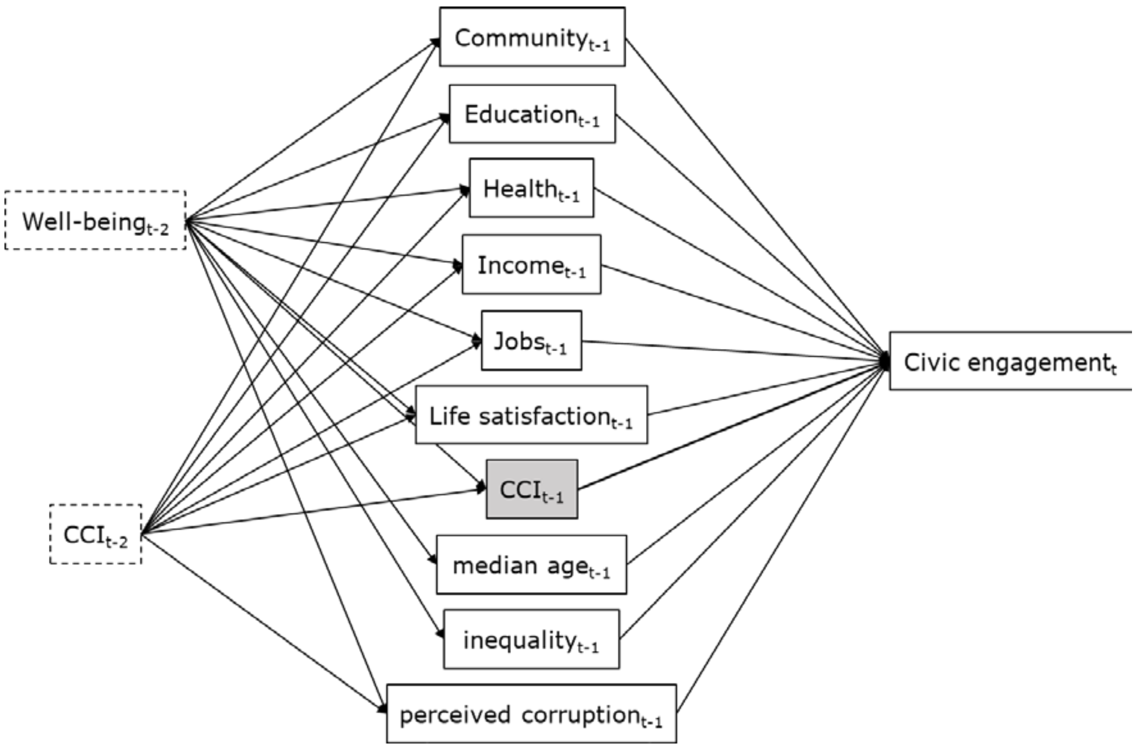
Other arrows are also visible in the antecedents from t-2 to t-1. In addition to those from CCIs to well-being and from well-being to self and CCIs (which as mentioned above will not be justified each time), the following are depicted. Well-being also affects students, youth and AROPE. The number of students relative to the youth population depends, among others, on a number of variables that are contained in the dimensions of well-being. For example, income (due to direct, indirect and opportunity costs of education), employment (as an opportunity cost of staying in education, and as an incentive to attain jobs requiring higher qualifications), educational attainment (it is more likely to stay in education if parents and most of the social environment have also done so (Erzsébet Bukodi & John H. Goldthorpe, 2013)), etc. The youth ratio is also affected by well-being. For example, the labour market situation, income or housing make it easier or more difficult to have children (Svetlana Sukneva et al., 2020); longer life expectancy increases population ageing and therefore youth loses relative importance, etc. Finally, well-being logically impacts on poverty and social exclusion, with determinants such as income, jobs, health, education, housing, etc. As for the relationship of urban and semi-urban population to housing, this is explained in its respective model. In turn, this also has an impact on CCIs, as noted in section 4.2.2. Urban areas allow for greater proximity and facilitate the exchange of ideas that fosters creativity, as well as bring potential demanders of cultural goods and services closer (Huiwen Gong & Robert Hassink, 2017). In this way, urban and semi-urban areas attract and facilitate the creation, establishment and continuity of CCIs (for instance, hardly a village of 1,000 inhabitants will have a cinema, a large museum or a concert hall with stable programming). In addition, cities concentrate universities and, in the case of semi-urban areas (medium-sized cities and large towns), secondary schools and vocational training centres. They therefore attract students moving from predominantly rural areas to urban or semi-urban areas, and the population from the latter has more options to continue their studies (Raoul Van Maarseveen, 2021). In turn, urban and semi-urban areas have higher concentrations of young people because of the attraction they generate through work and study opportunities, while rural regions are generally older (Vanessa Burholt & Christine Dobbs, 2012). The link between students and housing is explained in the respective model. And finally, students affect CCIs because they tend to be one of the groups with the highest cultural consumption and participation (Martin Falk & Tally Katz-Gerro, 2016) due to their lifestyle, interests and availability of time and health and lack of burdens (e.g. university towns tend to have an intense cultural scene), and therefore they generate strong potential demand for CCIs. The resulting equation for region *i* in period *t* is as follows.

$$
\begin{aligned}
Access\ to\ services_{i,t} \\
&= f\big(CCI_{i,t-1}, Housing_{i,t-1}, Income_{i,t-1}, urban\ \&\ semiurban_{i,t-1}, \\
&students_{i,t-1}, youth_{i,t-1}, AROPE_{i,t-1}\big) + \varepsilon_{i,t}
\end{aligned}
$$

5.2.2. Civic engagement

The causal model explaining civic engagement (i.e. voter turnout) is summarised in Figure 32. We begin by unpacking the dimensions of well-being involved. Firstly, dense community support networks strengthen social cohesion so that people engage with the community around them and participate more in decision-making processes (Vivien Lowndes, 2004). Also, the higher the level of education, the more likely people are to vote (Karl Oskar Lindgren et al., 2019), as they understand and follow political events better and value their responsibility as citizens. Furthermore, education awakens social consciences and can trigger activist commitments. Health is also a necessary condition for civic and political participation (Barry C. Burden et al., 2017). In turn, income has also been shown to be one of the main determinants of voter turnout: the higher the income, the more likely to vote (e.g. William W. Franko et al., 2016). The employment situation, which is often a major concern of the population and an indicator of economic performance, also plays a role (Richard J. Cebula, 2017). A low employment rate, in the short term, can encourage turnout as a punishment vote against the outgoing government; or, in the long term, it can generate political disaffection and lack of confidence in the system, reducing turnout. Finally, people who are more satisfied with life are more likely to vote, while dissatisfied people are more pessimistic, tend to reduce their involvement and are more likely not to vote (Patrick Flavin & Michael J. Keane, 2012).

Figure 32. *DAG for civic engagement*



Source: Own elaboration

Additionally, we must introduce three other variables to control for confounding. On the one hand, the median age, as voter turnout varies greatly with age (e.g. Yosef Bhatti et al., 2012) and will therefore also vary with the median age of the region. On the other hand, inequality reduces voter turnout (e.g. Daniel Horn, 2011). The high capital concentration leads to the affluent having more political power, and therefore people on low incomes may cease to see politics as an arena in which they really have any leverage and stop voting. Finally, perceived corruption can have a dual effect on voter turnout: encouraging it in the short term to oust those in power and bring about political change, or reducing it if it is perceived as systemic and leads to political disaffection. Aksel Sundström and Daniel Stockemer (2015) find evidence suggesting rather the latter effect.

In the priors from t-2 to t-1, there are some arrows that need to be explained. Well-being affects median age, inequality and perceived corruption. It affects the median age obviously through life expectancy, but also the labour market situation, income or housing affecting birth rates (Svetlana Sukneva et al., 2020), for instance. Well-being also impacts on inequality through some dimensions such as jobs (the lower the employment rate, the greater inequality between those who work and those who do not) or low education levels (which open a gap between a predominantly low-skilled labour force and an educated minority with higher incomes). Perceived corruption is also affected by well-being (Hui Li et al., 2015). Low well-being (i.e. negative indicators on several dimensions) may motivate the perception of widespread corruption as a way of seeking explanations and blame for such problems. In turn, the very existence of such corruption may be one of the causes of low well-being, so that it is more likely to be perceived. Finally, CCIs may also have an effect on perceived corruption, as the content generated (films, series, plays, photographs, exhibitions, etc.) can foster a critical spirit, serve as a tool for social and political denouncement and raise awareness, e.g. by pointing out corruption and promoting ethical behaviour (Daniela Dumitru, 2019). The resulting equation for region *i* in period *t* is as follows.

$$
\begin{aligned}
&Civic\ engagement_{i,t} \\
&\qquad = f\big(CCI_{i,t-1}, Community_{i,t-1}, Education_{i,t-1}, Health_{i,t-1}, \\
&\qquad Income_{i,t-1}, Jobs_{i,t-1}, Life\ satisfaction_{i,t-1}, median\ age_{i,t-1}, \\
&\qquad inequality_{i,t-1}, perceived\ corruption_{i,t-1}\big) + \varepsilon_{i,t}
\end{aligned}
$$

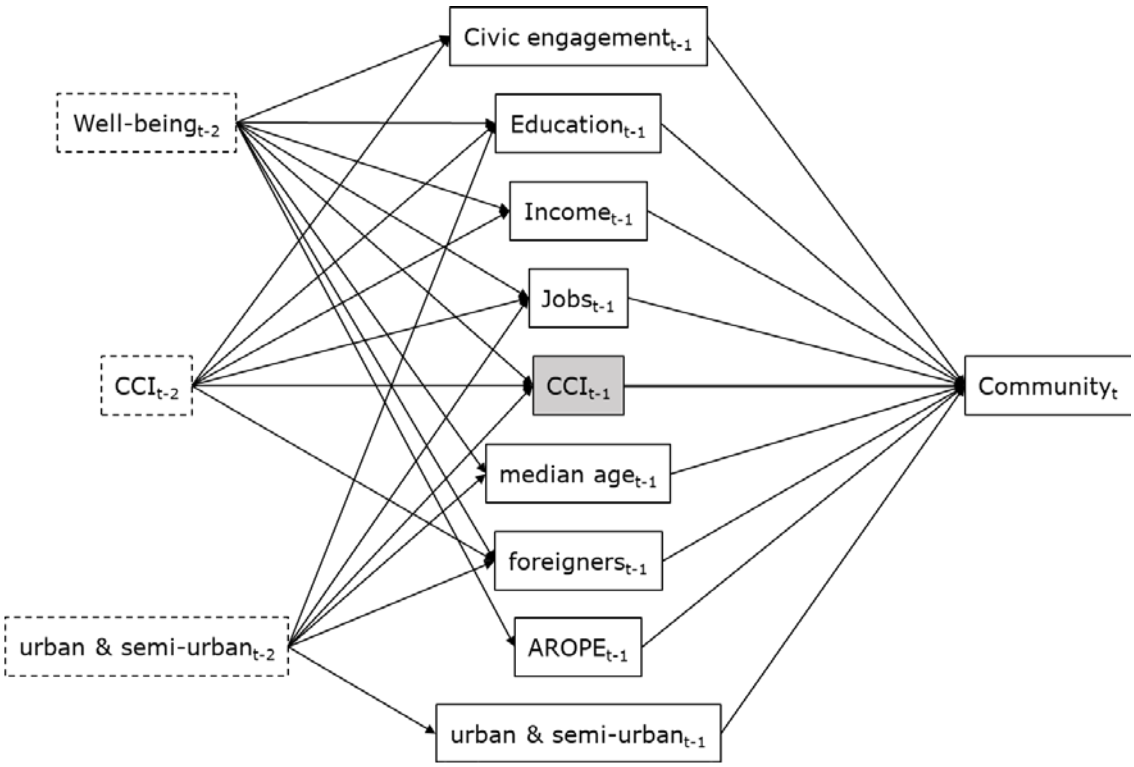
5.2.3. Community

The model for community (Figure 33) includes four dimensions of well-being as explanatory variables: civic engagement, education, income and jobs. In the first, greater political involvement, participation in public life and civic engagement strengthen social ties among the community (Jing Guo & Hsuan Ting Chen, 2022). Education is an essential area of socialisation and generates new circles of friends and relationships with similar interests and concerns (Jian Huang et al., 2009). The same is true for employment, which is one of the main environments of socialisation in our contemporary societies and the lack of which is a major risk factor for social exclusion (Laura Pohlan, 2019). Finally, higher income increases the opportunities to establish social links (Anneli Kaasa & Eve Parts, 2008), for example through leisure activities (going out for dinner, a concert, a drink, travel, etc.).

Four other variables must be introduced as confounders. The first is median age. Older people tend to have reduced social connections and are much more likely to suffer from unwanted loneliness (Keming Yang & Christina Victor, 2011; Maike Luhmann & Louise C. Hawkley, 2016). Therefore, if the median age is higher, the percentage of people who have someone to rely on may decrease. The second is the foreign-born population, as they have fewer social networks in the countries of destination (Rowan Ten Kate et al., 2020), especially in the early years (e.g. they may have the whole family far away). Also poverty and social exclusion for obvious reasons, as people excluded from society will find it very difficult to get social support (Petra Böhnke, 2008). The latter is the percentage of the population living in urban or semi-urban areas. This can have a double effect (Jens F.L. Sørensen, 2016). On the one hand, these areas concentrate people and it is more accessible to maintain personal contacts even if they live in other parts of the city or even in other cities through public transport and better connections.

Despite this, rural areas have closer human contact, neighbours know each other, meet in the same places and form social networks that help to combat loneliness, whereas in cities sometimes not even neighbours in the same building know each other. The predominant effect is not clear, but in any case it is a relevant factor to take into account.

Figure 33. *DAG for community*



Source: Own elaboration

On the other hand, we have a series of arrows connecting the causal antecedents to these variables. Departing from well-being, the one going to median age has already been explained in the model for civic engagement, and the one going to the AROPE rate in the one for access to services. There remains the one that goes to the foreign-born population. This is based on the fact that the foreign-born population emigrates in most cases in search of better job opportunities or income, in short, greater well-being (Maryam Aslany et al., 2021; Nicole B. Simpson, 2022), so that those regions will be the ones that concentrate the largest foreign population. CCIs also attract foreign population, since an environment of creativity and cultural dynamism fosters an atmosphere more open to diversity and multiculturalism, making the foreign population feel more at ease and prefer to live there. In addition to attracting creative workers, along the lines of Richard Florida (2002). The relationship between the urban and semi-urban population and education and jobs are explained in the respective models, and that with CCIs has been explained in the model for access to services. It also affects median age as the population in rural areas is generally older than in urban and semi-urban areas (Vanessa Burholt & Christine Dobbs, 2012). The latter attract young people for education, work and leisure opportunities and therefore have a lower median age. Following the same argument, foreigners are also more likely to live in urban and semi-urban areas. The resulting equation for region *i* in period *t* is as follows.

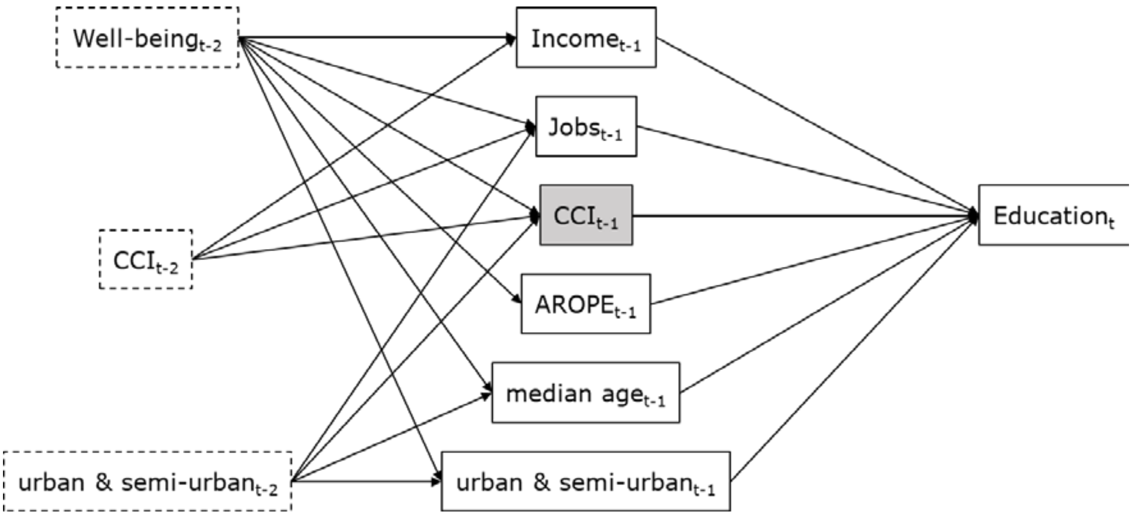
$$\begin{aligned} Community_{i,t} = f\big(& CCI_{i,t-1}, Civic\ engagement_{i,t-1}, Education_{i,t-1}, Income_{i,t-1}, \\ & Jobs_{i,t-1}, median\ age_{i,t-1}, foreigners_{i,t-1}, \\ & urban\ \&\ semiurban_{i,t-1}, AROPE_{i,t-1}\big) + \varepsilon_{i,t} \end{aligned}$$

5.2.4. Education

Figure 34 shows the causal graph for educational attainment. The determinants of well-being are income and jobs. Household income is a key determinant of educational attainment (Ekber Tomul & Havva Sebile Savasci, 2012). It makes it possible to study without having to combine it with a job and therefore to be able to devote more time to it, move to a different city and assume the costs of accommodation, pay for private classes, etc. Moreover, at an aggregate level, a higher average income in the region allows for better educational services. On the other hand, employment plays a dual role. Lower-skilled jobs are an opportunity cost of continuing education, while high-skilled jobs are an incentive to study for better employment opportunities in the future (Sarah Schmitt-Wilson & Caitlin Faas, 2016). A higher or lower employment rate will have implications for people's decisions to pursue post-compulsory education.

In addition, three other variables play an important role. Poverty and social exclusion pose a huge barrier to accessing post-compulsory education (Louise Morley & Rosemary Lugg, 2009; Vittorio Daniele, 2021). Other concerns become more pressing and often the direct cost (fees), indirect cost (transport, accommodation or school materials) and opportunity cost (work income foregone) are unaffordable. On the contrary, being in urban or semi-urban environments makes it easier to study because of the presence of advanced educational institutions. Whereas people living in rural areas have to travel to the cities to go to high school or university (paying for transport, rent, etc.), so the proportion of people reaching higher levels of education will generally be lower (Raoul Van Maarseveen, 2021). Finally, as widespread access to education has been expanding over time, regions with a younger median age will generally have higher percentages of the population with upper secondary or higher levels of education (Filippo Berti Mecocci et al., 2022).

Figure 34. *DAG for education*



Source: Own elaboration

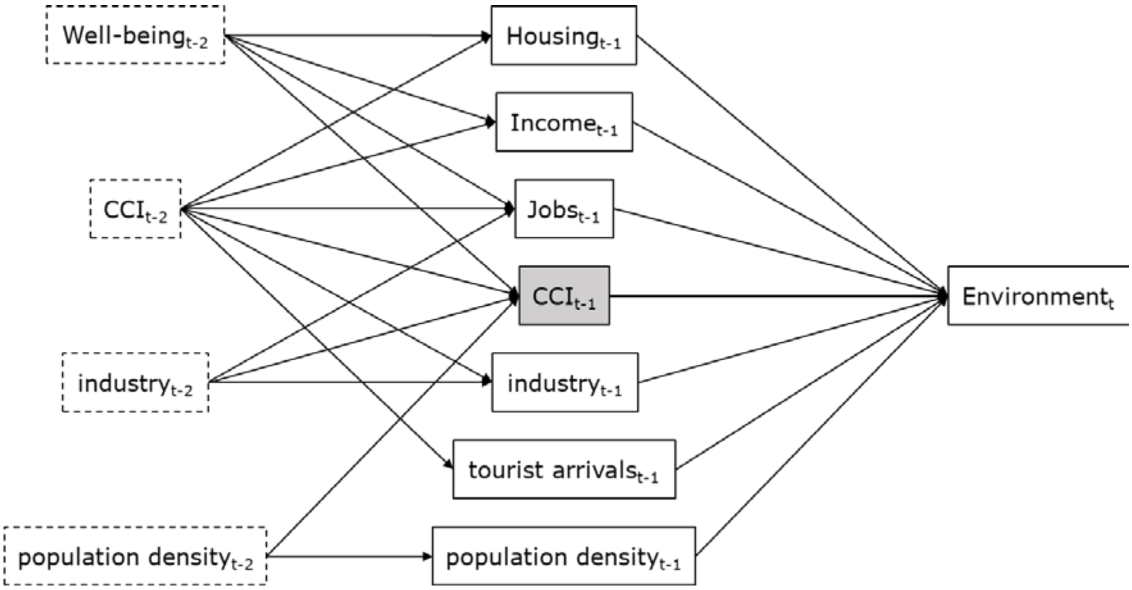
The rest of the arrows can be found explained in other models. Those connecting well-being with AROPE and urban and semi-urban population, and the latter with CCIs, have already been explained in the model for access to services. The link from well-being to median age is explained in the civic engagement model, and the one from urban and semi-urban population to median age, in the community model. While the arrow connecting urban and semi-urban population with jobs is explained in its respective model. The resulting equation for region *i* in period *t* is as follows.

$$Education_{i,t} = f\big(CCI_{i,t-1}, Income_{i,t-1}, Jobs_{i,t-1}, AROPE_{i,t-1},$$
$$median\ age_{i,t-1}, urban\ \&\ semiurban_{i,t-1}\big) + \varepsilon_{i,t}$$

5.2.5. Environment

Three dimensions of well-being are used to explain the environment, i.e. air pollution, as shown in Figure 35. On the one hand, housing, since larger dwellings imply a more intensive use of resources per inhabitant, as well as higher consumption of heating, electricity or air conditioning (Alex Wilson & Jessica Boehland, 2005; André Stephan & Robert H. Crawford, 2016; Fateh Belaïd et al., 2019). Higher income also means more production, more consumption and therefore more emission of pollutant gases (Tarek Ghalwash & Runar Bra, 2008; Bo Pieter Johannes Andrée et al., 2019). In line with the above, the employment rate is a thermometer of the intensity of economic activity, which generates emissions both in the workplace and during commuting.

Figure 35. *DAG for environment*



Source: Own elaboration

Three other factors must be taken into consideration. Firstly, the share of industrial activity in the economy, as these are generally energy and material resource intensive activities, so they will be more likely to emit harmful gases and particulate matter (Daulet Assanov et al., 2021). Secondly, tourism, which, in addition to being a source of overexploitation of natural resources (depending on the type of tourism and whether it reaches saturation levels), involves travel (air travel, cruises, etc.) that generates polluting gases (Salih Turan Katircioglu, 2014). For this reason, we have taken the variable of tourist arrivals, and not overnight stays, because it accounts for travel. Third and last, population density, as more people concentrated in one place generate more emissions from their activity (Shuaishuai Han & Bindong Sun, 2019). Although, at the same time, a less dispersed population also reduces commuting, so with an optimal urban structure, emissions can be reduced (Shuaishuai Han et al., 2020).

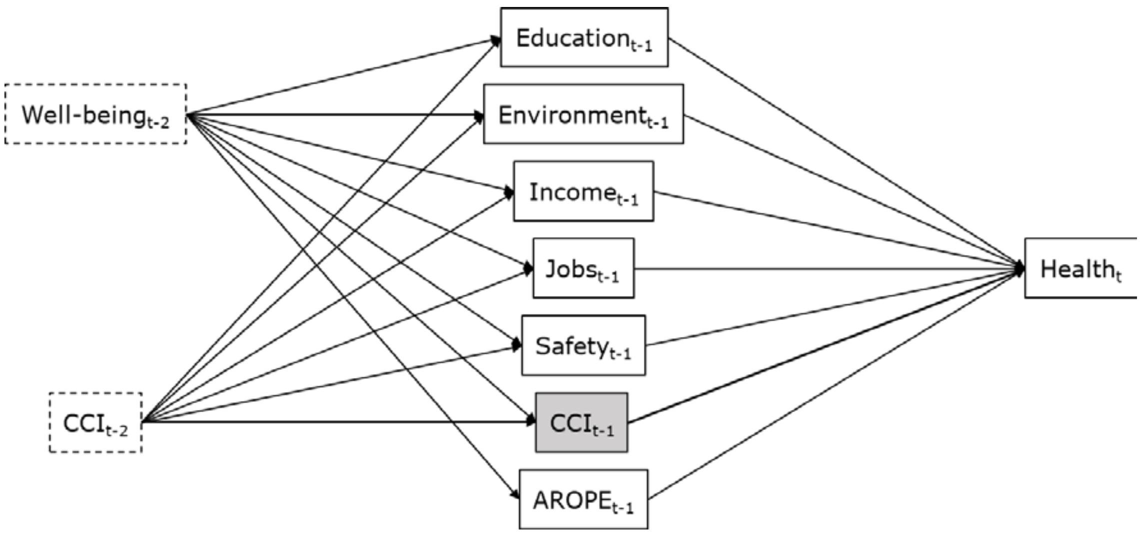
As for the arrows located in the causal antecedents, CCIs affect tourist arrivals by generating attractive values for visiting a territory, including heritage, festivals, an attractive cultural agenda, etc. Indeed, cultural tourism accounts for 39% of the total volume of tourism (Greg Richards, 2018). The relationship between CCIs and industry is due to the fact that both sectors are parts of the total economic activity, so that the greater relative presence of one of them (e.g. industry) implies that the rest (including CCIs) represent a smaller part of the total. Therefore, the arrows connect both CCIs to industry and industry to CCIs. The arrow from industry to jobs is explained in the respective model. Finally, similarly to the connection between urban and semi-urban settings and CCIs in the model for access to services, population density also affects CCIs because of the proximity both between creative workers (which fosters the exchange of ideas and creative processes) and to the potential demand for cultural goods and services (Huiwen Gong & Robert Hassink, 2017). The resulting equation for region *i* in period *t* is as follows.

$$\begin{aligned} Environment_{i,t} \\ &= f\big(CCI_{i,t-1}, Housing_{i,t-1}, Income_{i,t-1}, Jobs_{i,t-1}, industry_{i,t-1}, \\ &\quad tourist\ arrivals_{i,t-1}, population\ density_{i,t-1}\big) + \varepsilon_{i,t} \end{aligned}$$

5.2.6. Health

For health, whose model is shown in Figure 36, five dimensions of well-being are included as explanatory variables. The first is education, since it allows people to acquire healthier habits, to know what food is more convenient and to value their own health more (Vesna Bilas et al., 2014). The second is the environment, since it refers to particulate matter ($PM_{2.5}$) in the air, which is harmful to people and negatively affect their health (Samuel Asumadu Sarkodie et al., 2019). The next one is income. A higher income allows for better nutrition, paying for sports activities, nutritionists, private medical services to avoid waiting lists, access to drugs and treatments that are not free, buying a safer car, etc. At an aggregate level, a higher average income allows for better health services. In fact, Vesna Bilas et al. (2014) point out that, in Europe, income and educational attainment alone explain about 72.6% to 82.6% of life expectancy. The fourth is jobs. These can act in different directions. Joblessness has harmful effects on the sufferer, reducing income, self-esteem, social circles and in severe cases can lead to depression, self-neglect and even suicide (Hendrik Schmitz, 2011; Tae Jun Kim & Olaf von dem Knesebeck, 2015). On the other hand, work can also involve occupational hazards and accidents, or harmful effects on health: long hours of sitting, stress, breathing in harmful substances (e.g. miners or workers who have been in contact with asbestos), sleep disorders or other problems associated with working night shifts, etc. Lastly, safety (i.e. homicides) logically reduces life expectancy as a reason for premature death (Matthew Redelings et al., 2010; Patrick Sharkey & Michael Friedson, 2019).

Figure 36. *DAG for health*



Source: Own elaboration

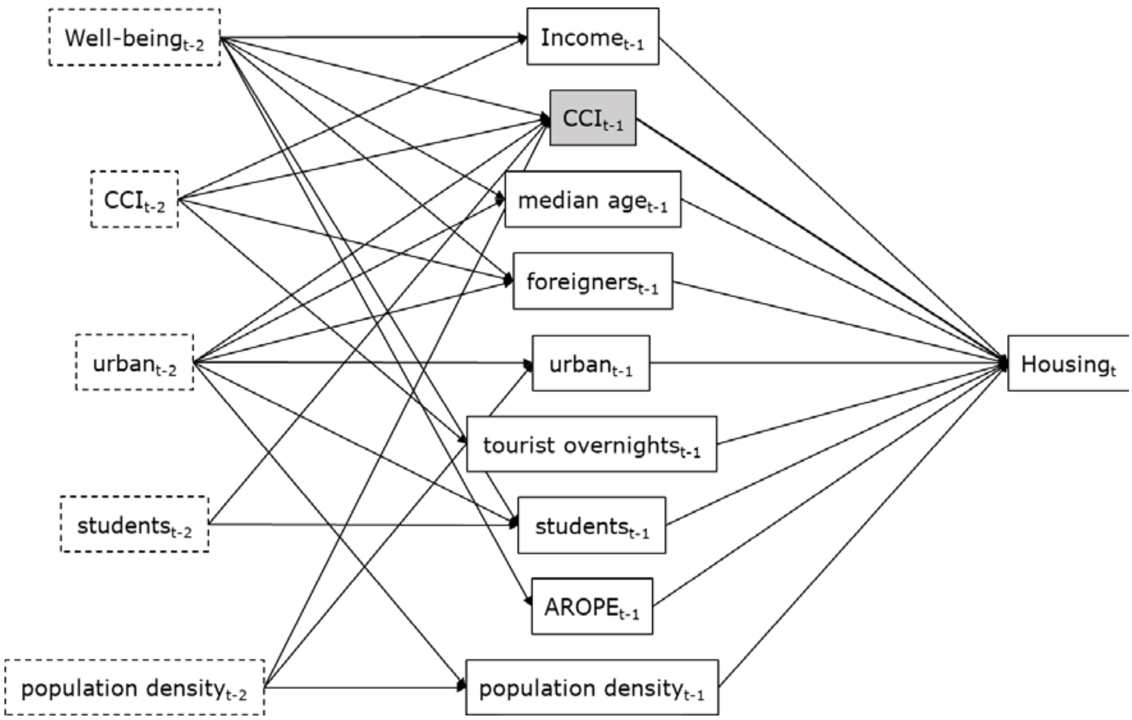
To this we must add poverty and social exclusion, as people suffering from poverty and social exclusion endure poorer living conditions (e.g. difficulties in maintaining appropriate home temperatures, or even living on the streets in cases of severe poverty) leading to lower life expectancy (Raphael Mendonça Guimarães & Flavia Cristina Drumond Andrade, 2020). To conclude, the arrow from well-being to the AROPE rate has already been explained in the model for access to services. The resulting equation for region *i* in period *t* is as follows.

$$Health_{i,t} = f\big(CCI_{i,t-1}, Education_{i,t-1}, Environment_{i,t-1}, Income_{i,t-1}, Jobs_{i,t-1}, Safety_{i,t-1}, AROPE_{i,t-1}\big) + \varepsilon_{i,t}$$

5.2.7. Housing

The causal model for housing is depicted in Figure 37. Naturally, income could not be left out, as it determines access to better and larger dwellings (Lucy Telfar Barnard et al., 2020), so a higher regional level of disposable household income entails that people tend to have better housing.

Figure 37. *DAG for housing*



Source: Own elaboration

Although in this case we only consider one dimension of well-being, we need to introduce up to seven additional confounders. Firstly, the median age. If the population has a younger median age, they generally have greater student and labour mobility and do not have home ownership where they are going to live or large savings to access the housing market (Cecilia Enström Öst & Mats Wilhelmsson, 2019). In addition, a lower median age also reflects faster population growth and therefore greater pressure on housing demand. Secondly, the presence of a large foreign-born population implies significant recent population growth and, since they do not originally have a home in the destination country, this implies a higher demand that can put pressure on the market (Pierre Wilner Jeanty et al., 2010; Eric Monnet & Clara Wolf, 2017). The same is true if it is an area that attracts a large number of students, who generally turn to the rental market, driving up prices (Nick Revington, 2021). Another effect in the same sense is caused by tourism, which means an injection of demand and an increase in housing costs (therefore, at the same cost, a worsening of conditions or smaller dwellings) if rental housing and newly constructed buildings are used for tourist accommodation due to the prospect of higher profitability (Aitziber Etxezarreta-Etxarri et al., 2020; Josip Mikulić et al., 2021). In this case, we do not focus on arrivals but on tourist overnight stays, as they indicate the intensity of use of tourist accommodation (which could otherwise be dwellings). On the other hand, it is relevant to consider whether the context is predominantly urban (Karolien De Bruyne & Jan Van Hove, 2013). In big cities, there is more demand for housing, especially of a transitory nature, as well as higher population growth than in rural areas, which can contribute to stressing the housing market. Next, poverty is logically another relevant factor, as it is unlikely that those who suffer from poverty will have access to adequate housing (Mark Stephens & Guido Van Steen, 2011). Finally, perhaps the most obvious factor of all: population density (Karolien De Bruyne & Jan Van Hove, 2013). If people live more concentrated in less space, and land becomes scarce, housing will tend to be smaller.

As for the causal relationships running from t-2 to t-1, most of them have already been explained. Those from well-being to median age, to students and to AROPE, from urban to median age and to students, and from students to CCI, are explained in the model for access to services. Causal relationships emanating from well-being, CCI and urban to the foreign-born population are explained in the community model. The link between population density and CCI is explained in the model for environment. The effect of CCIs on tourist overnight stays is similar to what is explained for tourist arrivals in the model for environment, except that in this case it should be added that an intense cultural offer not only attracts visits, but also makes them last longer. There remains the relationship between the population living in urban areas and population density. On the one hand, population density is one of the defining features of urban areas (among many others). And in turn, urban areas tend to attract people who want to be close to services, so the population tends to live more concentrated due to urban dynamics. The relationship is therefore in both directions. The resulting equation for region *i* in period *t* is as follows.

$$\begin{aligned} Housing_{i,t} = f\big(&CCI_{i,t-1}, Income_{i,t-1}, median\ age_{i,t-1}, foreigners_{i,t-1}, urban_{i,t-1},\\ &tourist\ overnights_{i,t-1}, students_{i,t-1}, AROPE_{i,t-1},\\ &population\ density_{i,t-1}\big) + \varepsilon_{i,t} \end{aligned}$$

5.2.8. Income

As mentioned at the beginning of this chapter, we will not follow the same process to build a model in the case of income. Given that there is already a well-founded and well-tested analytical model that incorporates CCIs, this is the one we will apply.

It is an adaptation of the semi-endogenous growth model of Charles Jones (1995, 2001). It was first proposed and applied by Rafael Boix-Domènech and Vicent Soler-i-Marco (2017) and subsequently by Rafael Boix-Domènech et al. (2021, 2022). It starts from decomposing income per capita (*GDP/P*) as a product of productivity and the labour-to-population ratio (*GDP/L x L/P*), with CCI entering as a component of the former. Without going into detail on how the model is derived, which can be found for example in Rafael Boix-Domènech et al. (2022), it places the generation of ideas as a key determinant of productivity together with capital intensity. CCI workers contribute precisely to this generation of ideas, increasing the stock of knowledge.

The variables resulting from solving the model are CCI, share of employment in the rest of sectors (excluding the primary sector and construction to avoid perfect collinearity in linear estimations), capital stock per worker (*K/L*), growth rate of ideas (g_A), composite of growth rates of population, ideas and depreciation rate ($n + g_A + d$), total employment (*L*) and labour-to-population ratio (*L/P*). The same time structure as in the other dimensions is followed, introducing lagged variables. Although this is not contemplated in some applications of the model that did not involve time series (Rafael Boix-Domènech et al., 2021, 2022), we find a precedent in Rafael Boix-Domènech and Vicent Soler-i-Marco (2017). The resulting equation for region *i* in period *t* is as follows.

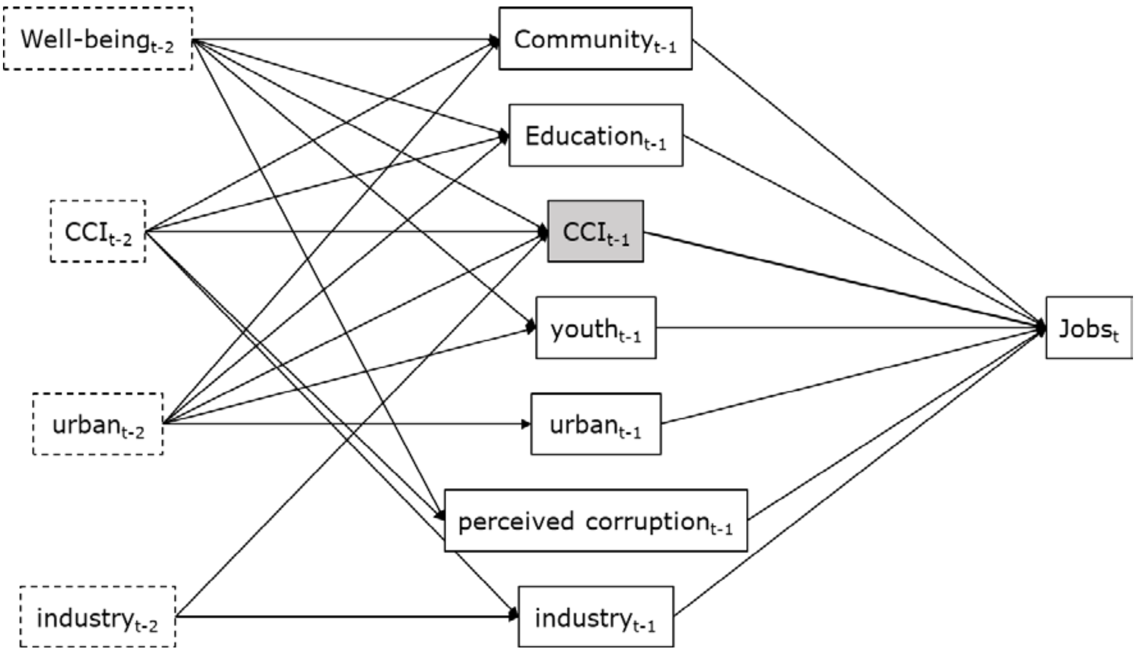
$$Income_{i,t} = f\left(CCI_{i,t-1}, rest_{i,t-1}, K/L_{i,t-1}, g_{A\,i,t-1}, n + g_A + d_{i,t-1}, L_{i,t-1}, L/P_{i,t-1}\right) + \varepsilon_{i,t}$$

5.2.9. Jobs

The causal model for jobs includes two dimensions of well-being as explanatory variables along with four other confounders (Figure 38). On the one hand, the community is included because one of the main ways to get a job is precisely through personal networks and contacts (Lindsey B. Trimble & Julie A. Kmec, 2011). Therefore, a more interconnected society will tend to have higher employment rates and reduce frictional unemployment in particular. On the other hand, higher levels of education improve people's employability by making them more qualified for different jobs (Lynlea Small et al., 2018), which can also lead to the development of new job opportunities.

The remaining control variables include, firstly, youth. Generally, youth unemployment is higher because they have less experience, it is difficult for them to overcome the barrier to access their first job and they are more exposed to dismissal as they have access to more precarious and unstable contracts with lower severance pay (Sue Maguire et al., 2013). Moreover, a significant proportion of young people who are exclusively engaged in education are not in the labour force. The combination of both effects will presumably lead to a lower employment rate if the share of young people is higher. Secondly, the urban population (Sierdjan Koster et al., 2020), given that these areas tend to concentrate more job opportunities (being the main cause of rural-urban migration) because they are more economically dynamic and host more companies and public administrations. Thirdly, industry because industrial employment tends to be more stable and therefore less sensitive to the economic cycle in terms of job destruction (Laihui Liu & Suxia An, 2023). Finally, perceived corruption because it may indicate high levels of shadow economy (Daniel Němec et al., 2021). Thus, some employment would be channelled through informal networks and would not be captured in official statistics, so that the formal employment rate would be lower.

Figure 38. *DAG for jobs*



Source: Own elaboration

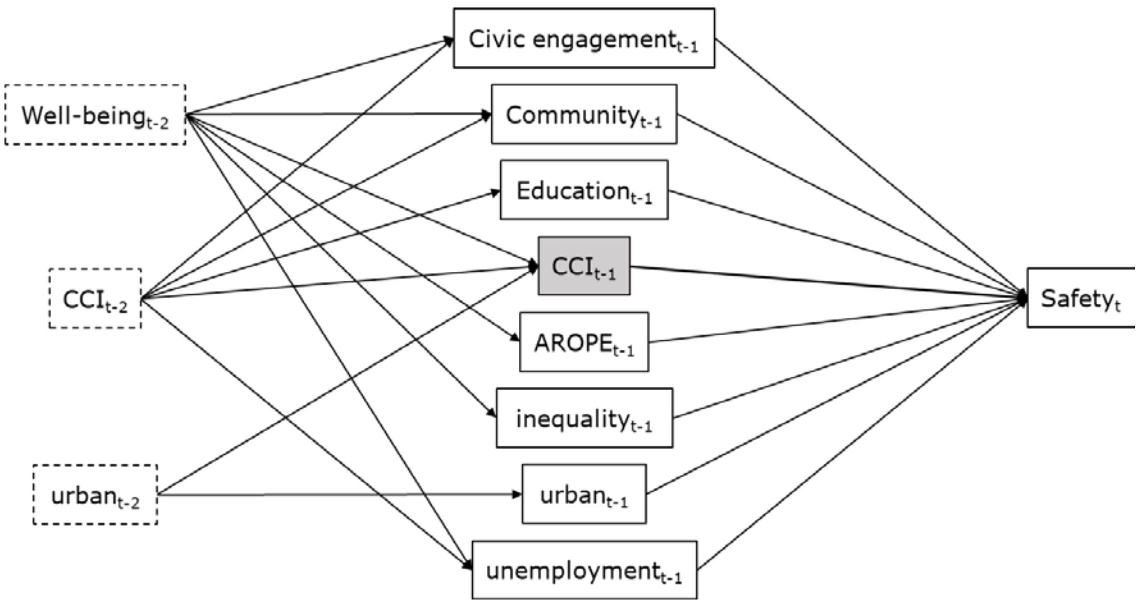
All effects from variables located in t-2 are explained in other models. Arrows from urban to community and education in their respective models. Those from well-being and urban to youth, in the one for access to services. Those from well-being and CCI to perceived corruption, in the one for civic engagement. And those linking CCI and industry in both directions, in the model for environment. The resulting equation for region *i* in period *t* is as follows.

$$Jobs_{i,t} = f\big(CCI_{i,t-1}, Community_{i,t-1}, Education_{i,t-1}, youth_{i,t-1}, urban_{i,t-1},$$
$$perceived\ corruption_{i,t-1}, industry_{i,t-1}\big) + \varepsilon_{i,t}$$

5.2.10. Safety

Figure 39 shows graphically the model for safety, i.e. homicide rate. The first is civic engagement. Greater civic engagement and sensitivity to responsibilities to society reduces the frequency of antisocial behaviour, including criminal acts (Paolo Buonanno et al., 2009). Secondly, the community, as better social ties and support networks reduce criminality, often caused by social maladjustment, rejection and marginalisation (Paolo Buonanno et al., 2009). Thirdly, education, which transmits not only technical knowledge but also ethical values, civics or critical thinking, which can act preventively against crime (Stephen Machin et al., 2011; Lance Lochner, 2020; Brian Bell et al., 2022).

Figure 39. *DAG for safety*



Source: Own elaboration

Four other confounding variables are also incorporated into the model. Firstly, the population at risk of poverty and social exclusion (Patrick Sharkey et al., 2017). Criminality is closely associated with poverty as a struggle for survival in the face of desperation, and with social exclusion because it can be triggered by situations of marginalisation and lack of social support. Second, income inequality has been shown to be a consistent determinant of crime in a multitude of studies, and its effect is particularly relevant in Northern and Eastern Europe (Bitna Kim et al., 2022). Thirdly, concentration in large cities often implies higher crime rates than in rural areas (Kyle C. Ward et al., 2018). This can have several explanations: the concentration of more potential victims for criminals; the ease with which crowds make it easier to commit certain crimes (not so relevant for homicides actually, except for mass attacks); more antisocial behaviour occurs because of the absence of strong social ties with the majority of fellow citizens (so their social rejection becomes less important); economic differences are more visible and evident, which can be a source of violence, etc. Finally, unemployment can be a source of conflict and criminality (Duha T. Altindag, 2012; Mikko Aaltonen et al., 2013). When people are desperate because of the loss of their source of income, they are psychologically affected by a sense of personal failure and social stigmatisation, which can lead to criminal behaviour. We use unemployment, and not the jobs indicator (i.e. employment rate), because in this case it is the absence of work and opportunities for those who seek and need them that opens the door to pursuing illicit means of earning a living.

As for the remaining arrows, located in the causal antecedents, those connecting well-being with AROPE and urban with CCI have been explained in the model for access to services. And the one connecting well-being with inequality, in the one for civic engagement. As for unemployment, it is affected by well-being logically through the employment rate and also by other factors such as education or community (those included in the jobs model). And it is also affected by CCIs, in the same logic of the jobs model, by the employment growth they cause. The resulting equation for region *i* in period *t* is as follows.

$$
\begin{aligned}
Safety_{i,t} = f\big(&CCI_{i,t-1}, Civic\ engagement_{i,t-1}, Community_{i,t-1}, Education_{i,t-1},\\
&AROPE_{i,t-1}, inequality_{i,t-1}, urban_{i,t-1}, unemployment_{i,t-1}\big) + \varepsilon_{i,t}
\end{aligned}
$$

5.2.11. Life satisfaction

Finally, the causal model for life satisfaction, depicted in Figure 40, is based on the premise that it is a cross-cutting dimension that translates into the subjective assessment of the rest of the objective capabilities of well-being (as discussed in section 2.1.3). This assumption is further supported by the fact that the life satisfaction is quite close to the average of the other well-being components[13].

Moreover, in this case another change must be made, differing from the rest of the models. As this is a dimension of subjective perception, what is valued is the life situation at a given time, not at a previous time, so it makes no sense to consider delays in the effect, neither of the CCIs nor of the rest of the dimensions of well-being. That is to say, each individual values his or her income, job, home, social relations, etc. at a given time (*t*), not those of the previous year (*t-1*), so that an improvement does not take long to have an effect in terms of life satisfaction, as it would in other dimensions.

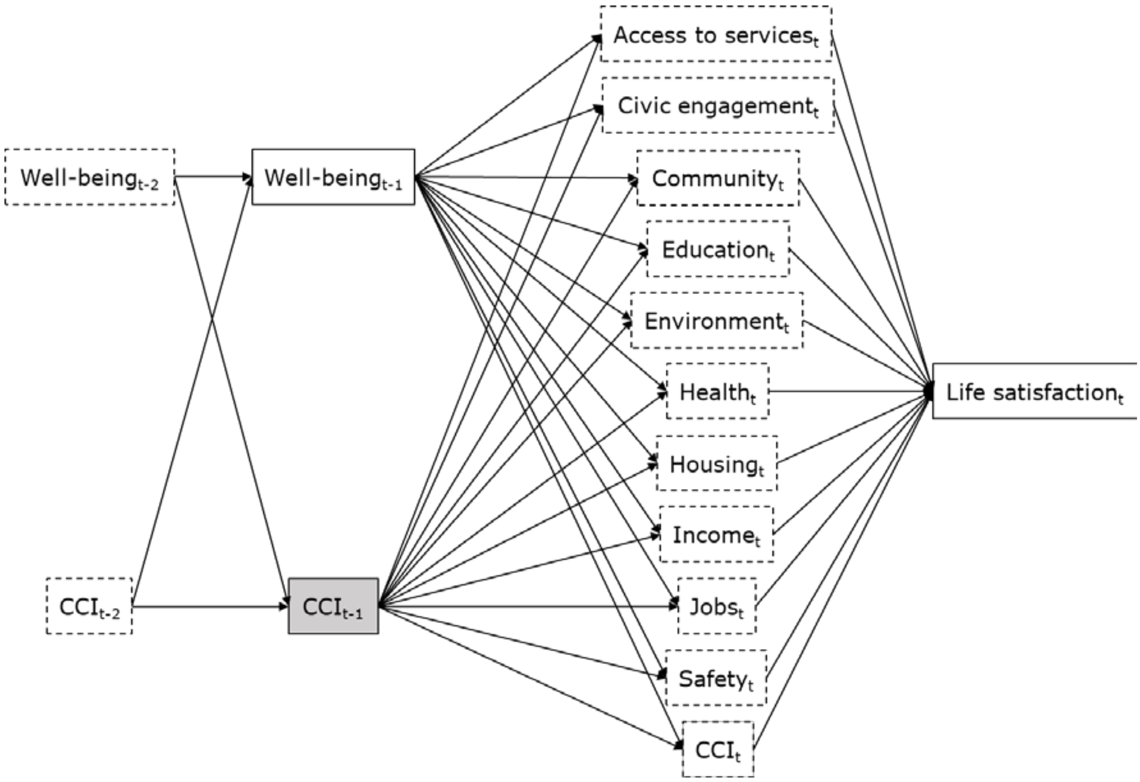
However, the measurement of the effect of CCIs must take into account two ways: both the direct effect (through the generation of cultural experiences, transmission of symbolic content, etc.), and the indirect effect, through the improvement of the rest of the dimensions of well-being. The indirect effect does take some time to be noticed, as the effects of CCIs on the other dimensions of well-being are not immediate. Therefore, to capture both effects, the treatment variable must still be the CCIs in the previous period (*t-1*).

This results in the DAG depicted in Figure 40. For minimum sufficient adjustment, it is necessary to incorporate a synthetic indicator of the objective well-being (i.e. the average of the scores of the other well-being dimensions) at *t-1* into the model as a control variable. The set of well-being dimensions in *t* must not be incorporated in the model to avoid redundancies and because, by acting as mediating variables (since they are also causal

[13] The Pearson correlation coefficient between the life satisfaction indicator and the mean scores of the other ten dimensions is 0.619.

paths through which impacts are transmitted), this would mask the real effect of the CCIs (Judea Pearl, 2010; Judea Pearl & Dana Mackenzie, 2018).

Figure 40. *DAG for life satisfaction*



Source: Own elaboration

The resulting equation for region *i* in period *t* is as follows.

$$Life\ satisfaction_{i,t} = f\left(CCI_{i,t-1}, Objective\ wellbeing_{i,t-1}\right) + \varepsilon_{i,t}$$

To sum up, Table 12 shows the summary of the variables considered in each of the eleven models, in addition to CCIs.

Table 12. *Summary of the determinants of well-being dimensions (other than CCIs)*

Dimension	Determinants
Access to services	Housing, Income, AROPE (Christopher G. Reddick et al., 2020), students, youth (Tonny J. Oyana, 2011), urban & semi-urban (Juan Rendon Schneir & Yupeng Xiong, 2016)
Civic engagement	Community (Vivien Lowndes, 2004), Education (Karl Oskar Lindgren et al., 2019), Health (Barry C. Burden et al., 2017), Income (William W. Franko et al., 2016), Jobs (Richard J. Cebula, 2017), Life satisfaction (Patrick Flavin & Michael J. Keane, 2012), median age (Yosef Bhatti et al., 2012), inequality (Daniel Horn, 2011), perceived corruption (Aksel Sundström & Daniel Stockemer, 2015)
Community	Civic engagement (Jing Guo & Hsuan Ting Chen, 2022), Education (Jian Huang et al., 2009), Income (Anneli Kaasa & Eve Parts, 2008), Jobs (Laura Pohlan, 2019), median age (Maike Luhmann & Louise C. Hawkley, 2016), foreigners (Rowan Ten Kate et al., 2020), AROPE (Petra Böhnke, 2008), urban & semi-urban (Jens F.L. Sørensen, 2016)
Education	Income (Ekber Tomul & Havva Sebile Savasci, 2012), Jobs (Sarah Schmitt-Wilson & Caitlin Faas, 2016), AROPE (Vittorio Daniele, 2021), median age (Filippo Berti Mecocci et al., 2022), urban & semi-urban (Raoul Van Maarseveen, 2021)
Environment	Housing (Fateh Belaïd et al., 2019), Income, Jobs (Bo Pieter Johannes Andrée et al., 2019), industry (Daulet Assanov et al., 2021), tourist arrivals (Salih Turan Katircioglu, 2014), population density (Shuaishuai Han & Bindong Sun, 2019)
Health	Education, Income (Vesna Bilas et al., 2014), Environment (Samuel Asumadu Sarkodie et al., 2019), Jobs (Tae Jun Kim & Olaf von dem Knesebeck, 2015), Safety (Patrick Sharkey & Michael Friedson, 2019), AROPE (Raphael Mendonça Guimarães & Flavia Cristina Drumond Andrade, 2020)
Housing	Income (Lucy Telfar Barnard et al., 2020), median age (Cecilia Enström Öst & Mats Wilhelmsson, 2019), foreigners (Eric Monnet & Clara Wolf, 2017), students (Nick Revington, 2021), tourist overnights (Josip Mikulić et al., 2021), urban (Karolien De Bruyne & Jan Van Hove, 2013), AROPE (Mark Stephens & Guido Van Steen, 2011), population density (Karolien De Bruyne & Jan Van Hove, 2013)

Dimension	Determinants
Income	Net capital stock per worker, growth rate of ideas, labour-to-population ratio, rest of employment, total employed persons, growth rate of population + growth rate of ideas + capital depreciation rate (Charles I. Jones, 1995, 2001; Rafael Boix-Domènech & Vicent Soler-i-Marco, 2017)
Jobs	Community (Lindsey B. Trimble & Julie A. Kmec, 2011), Education (Lynlea Small et al., 2018), youth (Sue Maguire et al., 2013), urban (Sierdjan Koster et al., 2020), industry (Laihui Liu & Suxia An, 2023), perceived corruption (Daniel Němec et al., 2021)
Safety	Civic engagement, Community (Paolo Buonanno et al., 2009), Education (Brian Bell et al., 2022), AROPE (Patrick Sharkey et al., 2017), inequality (Bitna Kim et al., 2022), urban (Kyle C. Ward et al., 2018), unemployment (Mikko Aaltonen et al., 2013)
Life satisfaction	Rest of well-being (cross-cutting dimension)

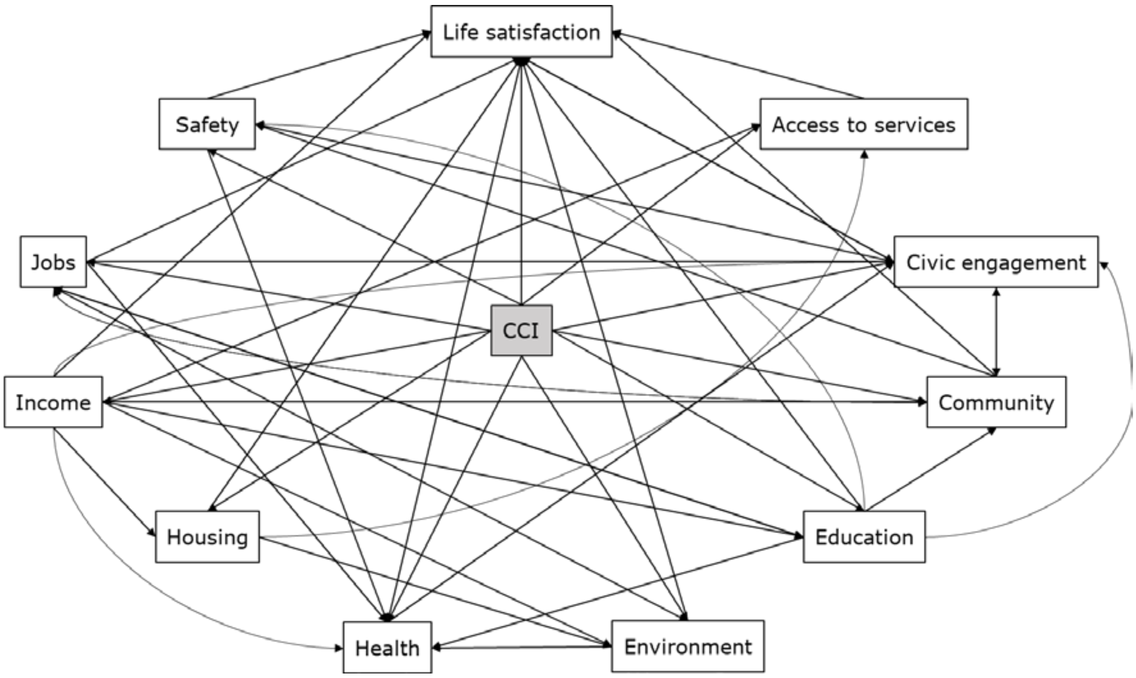
Source: Own elaboration

5.3. Some preliminary insights on an integrated model

Finally, the possibility of integrating the eleven models into a single structural equation modelling (SEM) has been explored. However, this idea had to be discarded at this stage of the research. Putting the eleven models together results in such a complex puzzle that it can hardly be represented graphically. Introducing all the variables and all the relationships between them is practically unmanageable, considering that in order to specify a proper complete SEM, the causal relationships that go towards each of the covariates introduced in the models should also be modelled, and not only treated as exogenous, as well as specifying all the correlations that are established between the variables. Explaining the determinants of each of these variables is definitely far beyond the scope of this research.

In the face of all this complexity (including elements as varied as life satisfaction, perception of corruption, pollution, poverty or median age), it is extremely complex to produce a parsimonious SEM and to achieve a convergence solution with an adequate fit. In our experimental trials it has not been possible. To illustrate this tangle of interrelationships, Figure 41 shows a very simplified preliminary integrated model. It only takes into account the CCIs and the dimensions of well-being, with the relationships outlined in the previous models, without introducing any other variables, nor specifying correlations or applying any time lag (ignoring that, in this case, the simultaneity of effects from many well-being indicators towards the CCIs should also be considered). Even with all these simplifications, the model is still extremely complex and unintelligible.

Figure 41. *Simplified integrated model, with no variables other than well-being dimensions and no time lags*



Source: Own elaboration

The idea has therefore been discarded because it is not considered feasible within the framework of this research. However, this issue will be revisited in the future through the use of substantially simplified versions of the models.

CHAPTER 6
Methods

6.1. Prior techniques to derive causal models

Our starting point, according to the causal framework introduced in the previous section, is a simple model in which a dimension of well-being in the year *t* is explained by CCIs and the aggregated well-being in a previous period. To check that the assumptions of the generalised model (Figure 30) are correct, both with regard to the one-year time lag and the double direction of causality, we apply the Granger causality test. But to do so, we must first obtain an aggregate measure of overall well-being, i.e. a composite indicator to be used as explanatory variable in the following equation.

$$Y_{i,t} = f\left(CCI_{i,t-1}, Wellbeing_{i,t-1}\right) + \varepsilon_{i,t}$$

Given that the raw indicators have very different scales, and that some may be strongly related to each other, averaging is not sufficient. Instead, factor analysis (Paul Kline, 1994) is used. Factor analysis is a data reduction technique used when a set of indicators are correlated with each other and compose (formative construct) or reflect (reflective construct) a broader concept that is not directly measurable, also known as a latent factor. In our case, latent factors would be different components of well-being that group together indicators from several related dimensions. Factor analysis works by analysing correlations among the observed variables and identifying patterns of relationship among the observed variables. Shared variance among several items is detected, thus reducing the overall variance with the underlying factors. As a result, the factors are linear combinations of several observed variables, each with a different weight. In this way, factor analysis manages to arrive at the minimum number of factors capable of explaining the maximum amount of information contained in the data. It can be exploratory or confirmatory. In our case, since we do not assume a priori grouping patterns of the dimensions, it is confirmatory factor analysis, although we do consider the resulting factors to be part of the broader notion of well-being.

It is an appropriate technique for the situation at hand because we are trying to reduce multiple related indicators that are part of a broader concept into a single composite indicator, which we obtain by weighting the resulting factors according to the proportion of variability explained. Before that, we first transform the negative indicators so that they all have direct rather than inverse interpretation, by subtracting each value from the sum of the minimum and maximum value (so that the minimum is transformed into the maximum and vice versa).

We apply generalised least squares (GLS) factor analysis with oblimin rotation to avoid the unrealistic assumption of no correlation between factors, since oblimin rotation doesn't force the factors to be orthogonal. To check the validity of the factor analysis method in our data, we applied the Kaiser-Meyer-Olkin (KMO) test, which tests whether there is partial correlation between variables that makes data reduction appropriate. For the same purpose we also apply the Bartlett’s test of sphericity. Finally, the parallel analysis provides the optimal number of factors into which the data should be grouped (Paul Kline, 1994).

Once the composite indicator of well-being is obtained, it is used to perform the Granger causality test (Clive W.J. Granger, 1969). This test is used to check whether the present and past behaviour of a time series is predictive of the behaviour of another variable, and whether this relationship is unidirectional or bidirectional. Therefore, we use it both to test causality from CCI to well-being and from well-being to CCI, as well as to verify the time lags assumed in the generalised model depicted in Figure 30. Since our data are not only time series but panel data, we use the version of the Granger (non-)causality test by Elena-Ivona Dumitrescu and Cristophe Hurlin, which is specific (2012) for panel data.

6.2. Estimation technique

For the estimation of causal effects, we will resort to advanced Machine Learning (ML) techniques. These, by not requiring rigid assumptions that are not necessarily met (e.g. linearity or other specific parametrical functions, normality, homogeneity, etc.) and being able to capture complex interactions between variables, offer more accurate results than traditional techniques such as ordinary least squares (OLS) regression and similar methods.

Every ML algorithm needs to be “trained” on a data set. There is a dependent variable and a number of features that could explain it. The algorithm tries to predict the former on the basis of the latter, so it learns from the data and identifies patterns among the features that are associated with certain values of the dependent variable. Naturally, the more data it “feeds in”, the more information it will have. Once the algorithm has been trained, if it is supplied with new data (the value of the variable to be estimated being unknown), it can provide as output a prediction of the target variable. Yet each ML method learns from the data in a different way and each has advantages and disadvantages.

We have a large enough database, with 2,508 observations (209 regions over 12 years) that become 2,299 when lagged variables are introduced in the models. This allows taking advantage of the potential of ML methods.

However, there are other drawbacks to ML techniques. Primarily, some of them are difficult to interpret in an intuitive way. More importantly, some of these methods are algorithms developed primarily for predictive purposes. Although they achieve very accurate predictions, particular caution is required when inferring causal relationships, which are not always possible without well-specified causal models.

A distinction should be made between two families of AI algorithms: interpretable artificial intelligence (IAI) and explainable artificial intelligence (XAI). IAI algorithms provide results with direct interpretation. That is, sets of rules, or also coefficients that can be directly interpreted as marginal effects or as elasticities, so that the reader can directly interpret how one variable changes as a function of another. IAI algorithms include the more traditional methods (linear, logistic, polynomial regression, etc.) but also later developments such as decision trees or highly complex meta-learners (i.e. algorithms that learn from other base algorithms).

In contrast, XAI algorithms are not directly interpretable. Essentially, they only provide a prediction of the dependent variable based on a set of features, but without reporting why this prediction is made, or what effect each particular feature has on it. While XAI includes ensembles of algorithms (e.g. random forests, bagging, boosting, etc.) or neural networks, among others.

However, we say that they are “explainable” because there are other supporting algorithms, called “explainers”, that allow us to explain (and therefore interpret) these predictions. These allow us to distinguish how variables contribute to the model's predictions at the global (e.g. feature importance, partial dependence plots, accumulated local effects, etc.) or local (e.g. individual conditional expectation, Shapley additive explanations, local interpretable model agnostic explanations, etc.) level. To cite a few examples, and without going into detail on each of them, the feature importance indicates how relevant each of them is to predict the target variable (although not in what direction). Partial dependence plots show how the estimate would change depending on different values of a given feature. The same with individual conditional expectation, but for each particular observation, given the other features. Shapley additive explanations show to what extent each variable has contributed, and in which direction, to the outcome of a given individual prediction. The list could go on and on. See Christoph Molnar (2019) for further information.

Explainers for XAI have experienced a remarkable boost recently, unravelling the opacity of the predictions of some algorithms hitherto considered indecipherable black boxes (Marco Tulio Ribeiro et al., 2016; Christoph Molnar, 2019). However, and although some authors consider that they can help to infer some causal relationships if the models are well specified (Qingyuan Zhao & Trevor Hastie, 2021), the interpretation of the results is always indirect and is applied on algorithms of an intrinsic predictive nature. Hence, causal inference may not be risk-free (Cynthia Rudin, 2019).

In light of the above, this research prioritises the use of IAI for its transparency and direct interpretability of results. However, we do not want to compromise on accuracy, nor do we want to assume rigid and restrictive assumptions that do not allow to capture the complex interactions that occur between variables. For this reason, we have opted for an advanced method with a high degree of precision and which in turn offers directly interpretable results that allow causal inference: Causal Forest. This technique achieves an optimal balance in the trade-off between accuracy and interpretability, as well as being based on solid theoretical foundations in causal logic (Stefan Wager & Susan Athey, 2018).

6.2.1. Causal Forest: a brief introduction

Causal Forest is a rather novel ML method developed by Stefan Wager and Susan Athey (2018). It is an ensemble of causal trees, but before explaining this, we should first briefly introduce the concept of decision tree and random forest.

Decision trees (Leo Breiman et al., 1984; Wei-Yin Loh, 2011) are one of the most popular ML algorithms. They split the data according to different values of the explanatory variables, like branches of a tree splitting from the trunk, until a predicted value (a leaf) is reached. These partitions are performed recursively in order to minimise a loss function such as the mean squared error (MSE) or the root mean squared error (RMSE), i.e. in a way that leads to the most accurate results. This results in a decision tree in which, depending on the values of the features of an observation, one direction or another is taken in each partition, moving along the branches to obtain the leaf as a prediction. If the output is a categorical variable, they are called classification trees, while if the output is a continuous variable, they are called regression trees.

For example, suppose we attempt to predict a person's salary depending on a number of features: education, gender, sector, occupation, age, years of experience, etc. In each case, the algorithm selects the variable that can provide the most information and the way of dividing it that achieves the lowest error. In this way, we will start from the trunk and, if the person has higher education, it will go to one side, and if not, to the other. We follow the corresponding branch and, if it is a man, it will go one way and if it is a woman, it will go the other way. And so on and so forth. So a woman with higher education, who works in a certain sector, who is over 35 years old, etc. will obtain a predicted salary range when she reaches the end of the branches, i.e. a leaf.

This method is very intuitive and easy to interpret. Moreover, it is fully nonparametric, is able to capture complex relationships between variables, and is robust to multicollinearity (i.e. high correlation among features) or the introduction of irrelevant variables that may generate noise. However, it may suffer from instability and overfitting, i.e. it may achieve very good predictions for the training data but may not work well with new, unseen data. If this is the case, the algorithm would not be at all useful for extrapolating conclusions beyond the original sample. In order to reduce this risk, these algorithms are often trained on a sample of data and then tested on another independent sample of data (i.e. by randomly splitting the original data) to check whether the fit is still good with new data so that the algorithm has been able to identify general patterns that do not occur only within the training sample.

Random forests (Leo Breiman, 2001) are able to overcome these problems of instability and overfitting. They are ensembles of decision trees. That is why they are called forests. Trees are iteratively formed with random subsamples of observations and random subsets of features, and the result of all of them is averaged. Despite significantly increasing accuracy and stability, the results are no longer directly interpretable without the use of an explainer (i.e. they are an XAI algorithm, not IAI).

In recent years there have been important developments in the field of machine learning for causal inference (Susan Athey & Guido Imbens, 2019; Daniel Jacob, 2021). One of them is causal trees, devised by Susan Athey and Guido Imbens (2016). It is a further development of decision trees but applied to the identification of heterogeneous treatment effects. Instead of splitting the sample by minimising the loss function (e.g. MSE) as conventional trees, it does so by trying to maximise the difference between treatment and control groups within the final leafs (previously identifying the treatment variable, CCI in our case) controlling for covariates. An honest split is applied to eliminate bias. That is, the sample is divided into two parts: one for partitioning and one for estimating treatment effects from the residual error of the first. This second step allows for directly interpretable estimates of the causal effect.

Just as random forests proceed with decision trees, a causal forest (Stefan Wager & Susan Athey, 2018) is an ensemble of honest causal trees. It generates random subsamples by bootstrapping (i.e. recursive partitioning of the sample and features) but applying the method of honest causal trees. It is a particular form of generalised random forests (Susan Athey et al., 2019), since causal forests are random forest-based estimators. Although they are not exactly the same, causal forests are closely comparable to meta-learners or meta-algorithms (Sören R. Künzel et al., 2019; Daniel Jacob, 2021).

Causal Forest provides both global (Average Treatment Effect, ATE) and local (individual treatment effect, ITE) estimates of the causal effect of the treatment variable under unconfounding (this is, if the causal model is correctly specified). In our case, employment in CCIs. In the presence of heterogeneous effects among regions (as expected), this allows to condition on the covariates to obtain the Conditional Average Treatment Effect (CATE), but also to identify which regions of the sample are likely to benefit most, or be harmed most, by the individual treatment effect depending on these covariates (Susan Athey & Guido Imbens, 2019). This is particularly useful for observing regional differences, identifying potential enhancers and inhibitors of CCI effects and formulating more efficient, fairer and better targeted policy recommendations.

It is important to note that only the estimate for the effect of the treatment variable is obtained, not for the rest of features, as these do not have a direct causal interpretation. This applies not only to causal forest but to any regression technique that might be used, since the model has been defined by closing the backdoor paths of the treatment variable and not the rest of the covariates, so the coefficients of the latter should by no means be interpreted in a causal way (Judea Pearl & Dana Mackenzie, 2018). But in the case of the causal forest, in addition, the residual error left by the partitions with the covariates is regressed only on the treatment variable, so the coefficients of the remaining variables in the model are therefore not even reported.

Causal forests do not present any problems when using variables with very different scales and variances, so we will not apply algorithms or any other mathematical transformation to the variables. Nor in the income model, since its original use in logarithms comes from expressing the equation in linearised form (Rafael Boix-Domènech & Vicent Soler-i-Marco, 2017), something that causal forests do not require.

Finally, it is worth noting that, for the statistical analysis, the open source software R has been used. In addition to the basic functions of the software, subsequent developments have been employed. In particular, the *grf* package (Julie Tibshirani et al., 2019) for causal forest estimates, the *psych* package (William Revelle, 2018) for factor analysis, *plm* package (Yves Croissant et al., 2008) for Granger causality test in panel data, the *stats* package (R Core Team, 2013) and the *car* package (John Fox et al., 2019) for OLS estimates and variance inflation factors (VIF).

Part III

Results and Implications

CHAPTER 7

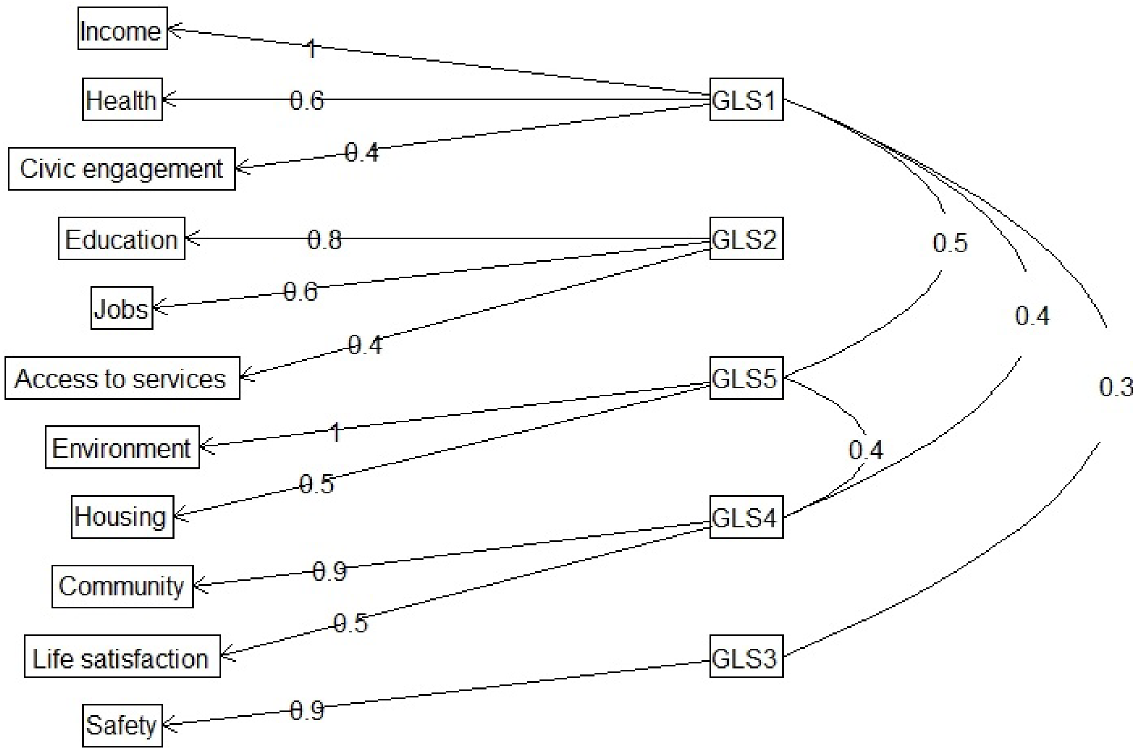
Results

7.1. Tests for the generalised basic model

To check the suitability of factor analysis for obtaining a composite indicator with the eleven well-being indicators, we applied the KMO test to the eleven well-being indicators. KMO test calculates the Measure of Sampling Adequacy (MSA), which must be greater than 0.5. This is fulfilled, since the overall MSA is 0.75 and that of all items is above 0.5, the lowest being Education with 0.56 and the highest Civic engagement with 0.89. This suggests that there is a partial correlation between the variables, i.e. there may be an overlap of information and therefore it is appropriate to apply a data reduction. To confirm this, Bartlett's test of sphericity is also applied. It tests the null hypothesis that the correlation matrix is equivalent to an identity matrix, i.e. that the variables are unrelated. The test is significant, with a p-value of 0 (i.e. less than 0.05), thus rejecting the null hypothesis and reaffirming the adequacy of the factor analysis. To find out how many factors to consider, we applied parallel analysis, which suggests that the number of factors should be five. The result is shown in Figure 42, with the five factors accounting for 69% of the total variance.

GLS1 refers to living conditions (economic, physical and social). GLS2, on the other hand, groups together personal development capabilities. Safety stands alone in GLS3. GLS4 relates to perceptions, as it covers the two subjective indicators of perceived social support and life satisfaction. Finally, GLS5 considers the living setting, including one's immediate home and the environment.

Figure 42. *Well-being factor analysis diagram*



Source: Own elaboration

To obtain a single measure of well-being, which was the intention, we aggregated these five factors but weighted them according to the proportion of variability explained. This results as follows:

$$Wellbeing = 0.25 \cdot GLS1 + 0.21 \cdot GLS2 + 0.12 \cdot GLS3 + 0.19 \cdot GLS4 + 0.22 \cdot GLS5$$

This provides a composite indicator of overall well-being. With this indicator, we proceed to verify the time lags assumed in the model (see Figure 30), both from CCI to Well-being and from Well-being to CCI. To do so, the Granger causality test is used. More specifically, the Granger (non-)causality test for panel data (like ours) developed by Elena-Ivona Dumitrescu and Cristophe Hurlin (2012). The tests are statistically significant and confirm Granger causality with a one-year lag, both from CCIs to well-being ($\tilde{Z}$ = 2.111, p-value = 0.035) and from well-being to CCIs ($\tilde{Z}$ = 4.223, p-value = 0.000). The test was also carried out with a two-year lag[14], the statistical

[14] Time lags of order greater than two cannot be tested since the length of the time series must be greater than *5 + 3 x order*. For a time lag of order 3 (*t-3*), the time

significance being stronger for a one-year lag. Thus, it is confirmed that the time lag structure of the models is correct and that there is a causal effect in both directions.

7.2. Overall results

7.2.1. Goodness of fit

The estimates resulting from applying the models explained in chapter 5 with Causal Forest are shown in Table 13. OLS has also been used as a reference. The estimate corresponds to the ATE on the indicator of each dimension, with the treatment variable being the percentage of employment in the CCIs. It is accompanied by goodness-of-fit measures of the model. In the case of OLS, the adjusted R^2. For Causal Forest, mean forest prediction and differential forest prediction. These two coefficients should be statistically significant and ideally close to 1 (Stefan Wager & Susan Athey, 2018). Especially the mean forest prediction, since values close to 1 denote that the estimates for the ATE are accurate. On the other hand, values close to 1 in the differential forest prediction imply that the model adequately reflects the heterogeneity of the effects, i.e. that the calibration of the heterogeneity estimates is correct (Stefan Wager & Susan Athey, 2018). Moreover, the significance of this second coefficient also allows us to reject the null hypothesis of no heterogeneity, in the manner of an omnibus test. These calibration tests are robust to heteroscedasticity.

Another test to assess potential model bias is suggested by Susan Athey et al. (2017, p. 4). They propose a measure of bias to quantify how much effort propensity and outcome models need to do to obtain unbiased estimates, rather than simply relying on difference-in-means. The calculation of this bias for each observation, scaled by the standard deviation of the outcome, is plotted in the histograms in Figure 43. Logically, they should be clustered around 0 and without significant and asymmetrical side tails.

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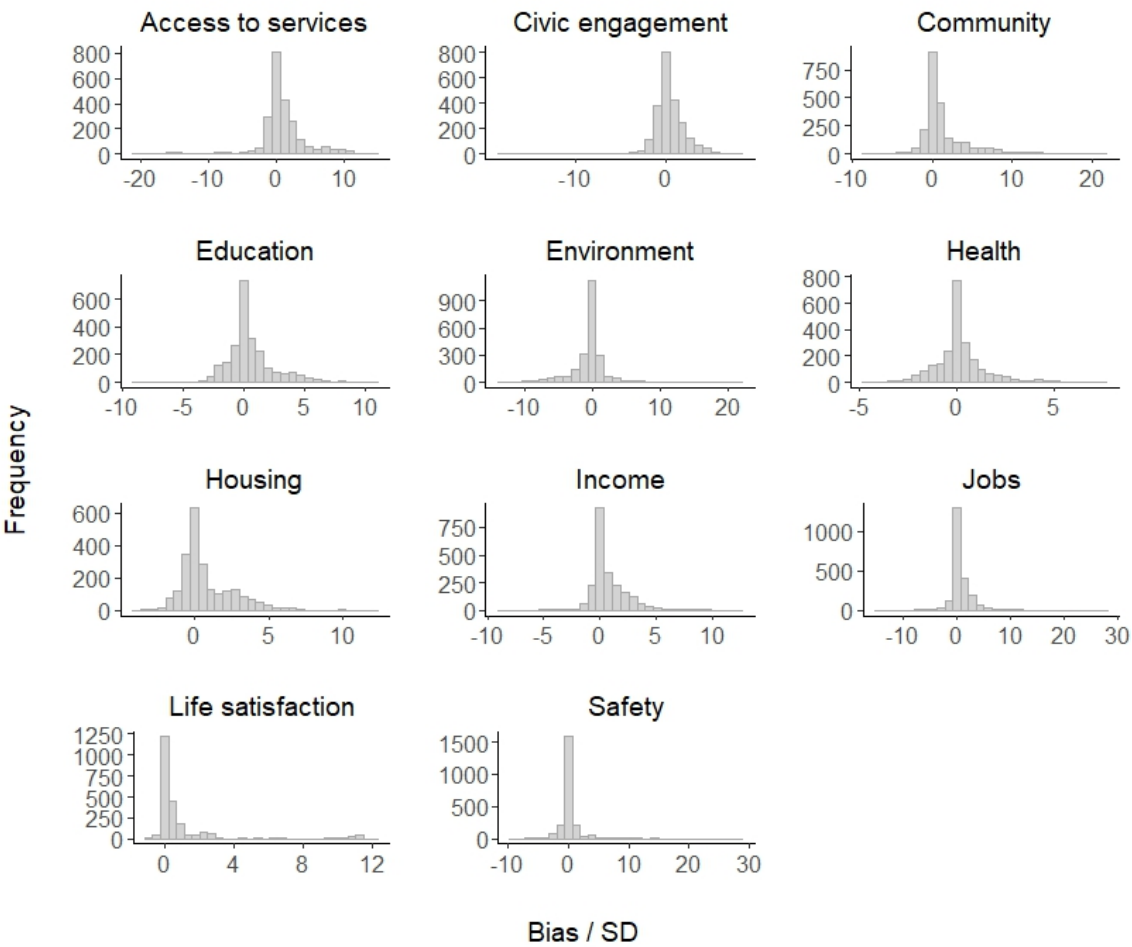
series should contain at least 14 years ($5 + 3 x 3 = 14$), ours being 12. However, effects in the medium (time lag of 5 years) and medium-long term (time lag of 11 years) are also estimated in section 7.4.

Although causal forests are robust to multicollinearity, models have been tested for multicollinearity in OLS using variance inflation factors (VIFs). There is no high multicollinearity (i.e. VIF > 5) in any model, except for the income model between the variable g_A and the composite $(n + g_A + d)$.

Looking at the mean forest prediction in Table 13, it can be seen that, in general, the models have a good fit. The only ones in which this coefficient is far from 1 are those of housing and safety. Figure 43 also shows that in general the bias is around 0. Although some irregularities can be seen, for example in the tail to the right of the housing model, confirming that the fit of this model is not particularly good.

Figure 43. *Histograms of model bias*



Source: Own elaboration. *Note:* See Susan Athey et al. (2017, p. 4) for more details on the calculation

Table 13. *Estimates for average treatment effect of CCIs on well-being indicators. Panel data from 2009 to 2019. Positive estimates / elasticities indicate well-being gains.*

		Causal Forest				OLS			
				Goodness of fit					
Dimension	**Unit**	**Estimate**	**Elasticity**	**Mean forest prediction**	**Diff. forest prediction**	**Estimate**	**Elasticity**	**R^2**	**N obs.**
Access to services	percentage points	1.218	0.076 *** (0.000)	0.980 *** (0.000)	1.282 *** (0.000)	1.331	0.083 *** (0.000)	0.350	2,299
Civic engagement	percentage points	0.299	0.020 ** (0.001)	1.020 *** (0.000)	2.140 *** (0.000)	1.271	0.085 *** (0.000)	0.412	2,299
Community	percentage points	0.445	0.023 *** (0.000)	1.208 *** (0.000)	1.739 *** (0.000)	-0.309	-0.016 *** (0.000)	0.259	2,299
Education	percentage points	2.877	0.178 *** (0.000)	0.993 *** (0.000)	1.460 *** (0.000)	2.486	0.154 *** (0.000)	0.434	2,299
Environment	µg/m³ $PM_{2.5}$	0.139	0.048 ** (0.001)	0.866 *** (0.000)	1.970 *** (0.000)	0.126	0.043 ** (0.004)	0.517	2,299
Health	years	0.065	0.004 *** (0.000)	0.998 *** (0.000)	1.908 *** (0.000)	0.043	0.002 *** (0.001)	0.691	2,299
Housing	rooms/person	0.015	0.042 *** (0.000)	1.660 *** (0.000)	1.844 *** (0.000)	-0.013	-0.035 *** (0.001)	0.379	2,299
Income	Euro PPS	210.477	0.064 *** (0.000)	1.095 *** (0.000)	1.924 *** (0.000)	314.881	0.096 *** (0.000)	0.564	2,299
Jobs	percentage points	0.450	0.032 *** (0.000)	0.976 *** (0.000)	1.684 *** (0.000)	1.279	0.090 *** (0.000)	0.698	2,299
Life satisfaction	0-10	0.023	0.014 * (0.010)	0.908 *** (0.000)	0.889 *** (0.000)	0.008	0.005 . (0.080)	0.392	2,299
Safety	homicide/100,000	0.017	0.078 (0.208)	0.693 * (0.022)	1.177 * (0.021)	0.030	0.141 ** (0.003)	0.105	2,299

Source: Own elaboration. *Note:* Signif. codes: '.' .1 '*' .05 '**' .01 '***' .001. p-values in brackets. Mean forest prediction and differential forest prediction should be statistically significant and ideally close to 1. Values of mean forest prediction, close to 1 denote that the estimates for the ATE are accurate. Values close to 1 in the differential forest prediction imply that the calibration of the heterogeneity estimates is correct.

7.2.2. Direction of impacts and statistical significance

After checking the fit, we turn to the results. We start with the general direction of the impacts (positive, negative) and the confidence intervals of statistical significance. Then, we will go in detail with the size of the effects.

The estimate, i.e. the average effect of the CCIs, should be read as the effect of a one percentage point increase in the share of CCIs over total employment, expressed on the scale of each outcome indicator. In all tables and figures in this chapter, the sign of the coefficients for dimensions with inverse indicators (i.e. environment and safety) is reversed to facilitate a straightforward interpretation in line with the other dimensions. That is, positive results in these dimensions should be read as *reduced* pollution and homicides.

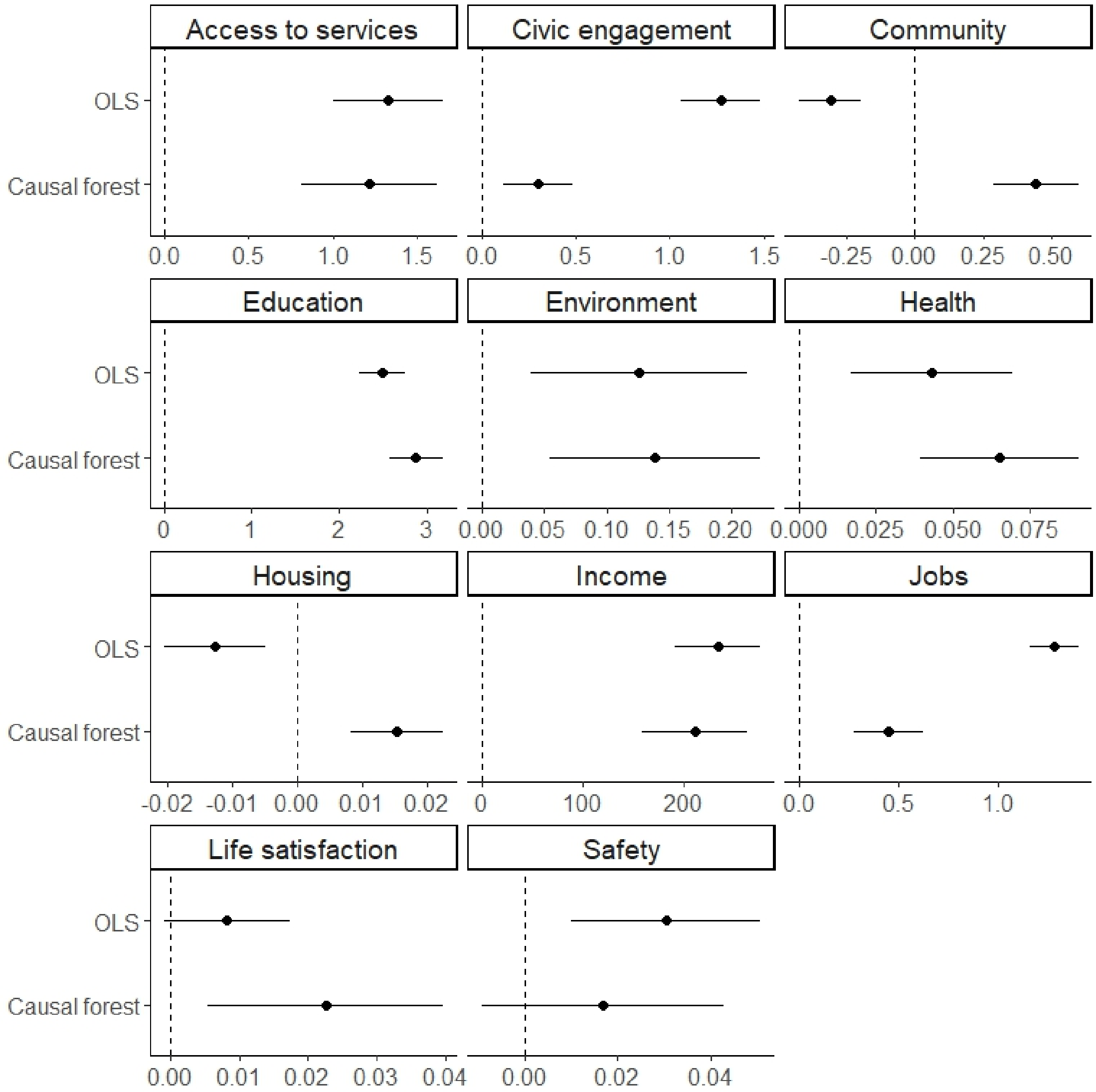
A positive average causal impact is observed in all dimensions. Although the impact on safety, albeit positive, has low statistical significance (p-value = 0.208).

The results for the same models with OLS are presented on the right hand side of Table 13 for comparison. The sign of the effect coincides in all cases except community and housing (negative in OLS, positive in causal forest). The effect sizes differ more, however. They are very similar in some dimensions (e.g. access to services or environment), but in others the causal forest moderates the OLS estimates quite a lot (e.g. civic engagement, community, jobs).

A more visual comparison of the estimates between the two methods can be seen in Figure 44. The dimensions where the confidence intervals do not even cross are civic engagement, community, housing and jobs.

Given the contradictions between the two models, it should be kept in mind that the causal forest estimates are more consistent and offer robust confidence intervals to clustering and heteroscedasticity, since a doubly robust estimator for ATE is applied through augmented inverse-propensity weighting (Stefan Wager & Susan Athey, 2018)[15].

Figure 44. *Comparison of average treatment effect of CCIs with OLS and Causal Forest*



Source: Own elaboration. *Note:* Lines indicate 95% confidence interval

7.2.3. Size of the effects

But, apart from statistical significance, we have not yet considered whether the effects are small or large, nor in what dimensions they are larger. In order to make these comparisons, absolute results are not enough, since the scale

[15] See James Robins et al. (1994) for a better understanding of inverse-propensity weighting.

of each indicator is very different (e.g. Euros PPP in income, years in health, etc.). Therefore, the estimates have also been transformed to average pseudo-elasticities (Table 13). Whereas in the estimates column, the absolute increase in outcome is shown for a unit increase in CCIs (i.e. by one percentage point over total employment), this amount is now multiplied by the average of the CCIs (for all regions and years) and divided by the average of the dimension indicator. This results in the relative effect i.e. the elasticity. Thus, a 0.05 should be interpreted as meaning that a 100% increase in the employment share of CCIs (i.e. doubling their size) causes an increase in the indicator of 5%.

The most notable effects are in education, with an elasticity of 0.178, followed by access to services (0.076) and income (0.064). This is followed by environment (0.048), housing (0.042) and jobs (0.032). In the lower middle are community or civic engagement (0.023 and 0.020 respectively), while the most moderate effects are on life satisfaction (0.014) and health (0.004). The elasticity in safety is 0.078, but it is not statistically significant.

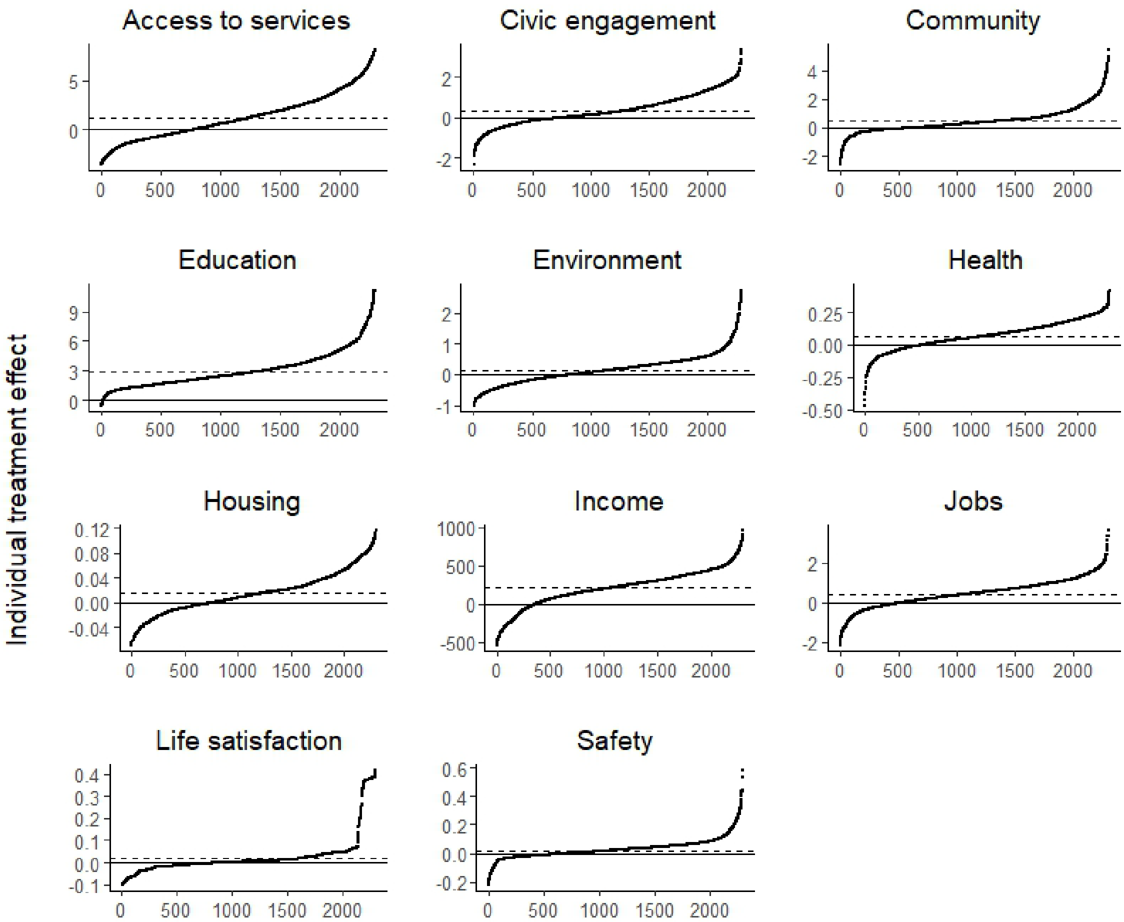
However, it would be a mistake to stay at this level of analysis since the ATE could hide a huge heterogeneity of effects across regions. In fact, the null hypothesis of no heterogeneity has been discarded in all models, as the differential forest prediction is significantly different from zero. The causal forest allows us to go beyond the average effect.

7.3. A closer look: great heterogeneity behind average effects

In order to observe differences in the treatment effect across observations (in each region and each year), we must obtain individual treatment effect estimates ($\tau(x)$). The estimates correspond to the predictive result of applying the trained causal forest algorithm on the individual characteristics of each observation (Eoghan O'Neill & Melvyn Weeks, 2018; Min Lu et al., 2018; Jiebin Chu et al., 2021; Michael C. Knaus et al., 2022; Ozden Gur Ali, 2022), but using only out-of-bag training samples. That is, for each observation, only the causal trees (within the full causal forest) trained with sub-samples that did not include that observation are taken into account, thus avoiding over-fitting.

As anticipated, the wide heterogeneity of the effects can be seen in Figure 45. The local effects are not concentrated strictly around the mean (ATE) but cross it, so that there are regions with significantly higher impacts and others with significantly lower impacts. In fact, in all dimensions, even if the ATE is clearly positive, there are local effects on both sides of zero, although with a greater or lesser predominance of the positive ones (in education, for example, the regions with a negative effect are negligible). Territorial differences for each dimension, from which some interesting patterns emerge, will be discussed in more detail in section 7.6.

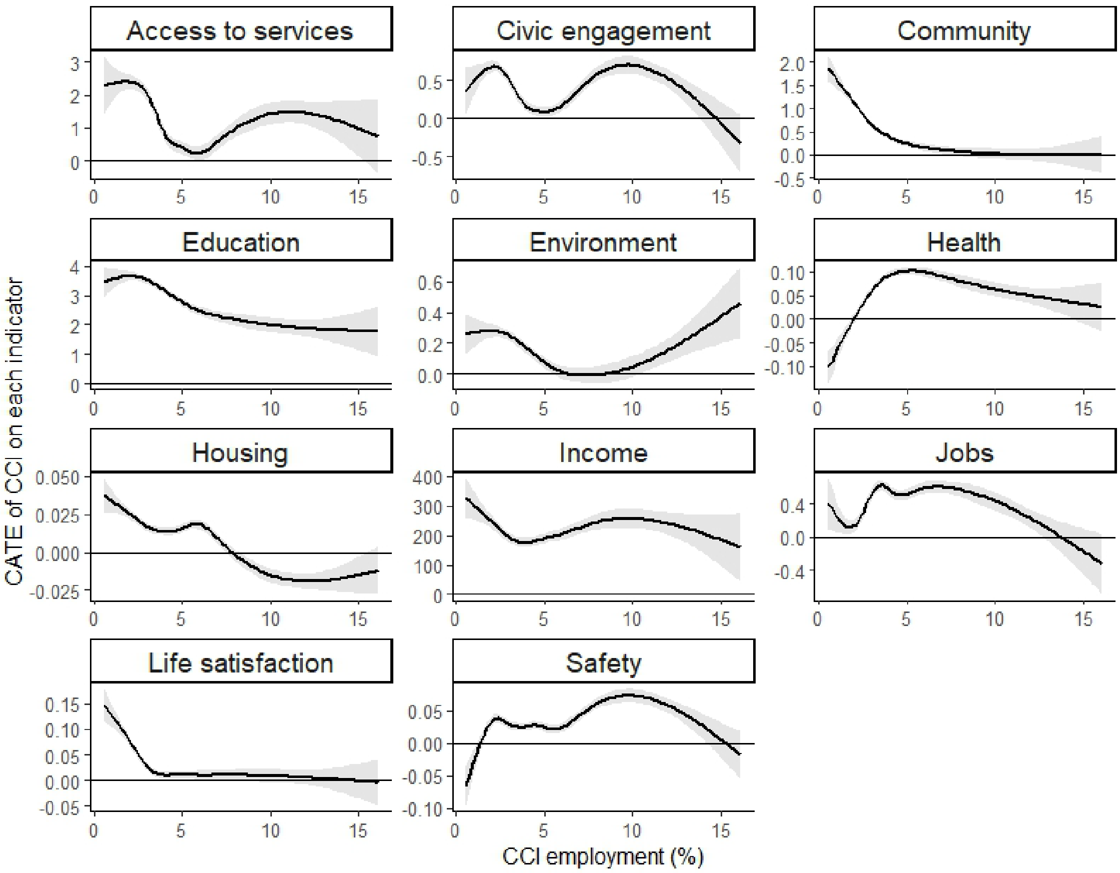
Figure 45. *Local effects of CCIs ordered from least to greatest, 2009-2019*



Source: Own elaboration. *Note:* The dashed line represents ATE

The next logical step is to investigate what might be the reasons why the effects are greater or lesser in different places. One possible determinant might be the level of CCIs in employment in the region. For instance, it could have more impact to increase CCIs from low levels and reach a saturation point at higher levels. Or, on the contrary, it could be necessary to have a certain critical mass of CCIs to start generating effects. This is what Figure 46 attempts to assess. Smoothed curves of the average local effects on each dimension are plotted together with the level of employment in CCI.

Figure 46. *Effect of CCIs on well-being by CCI level*



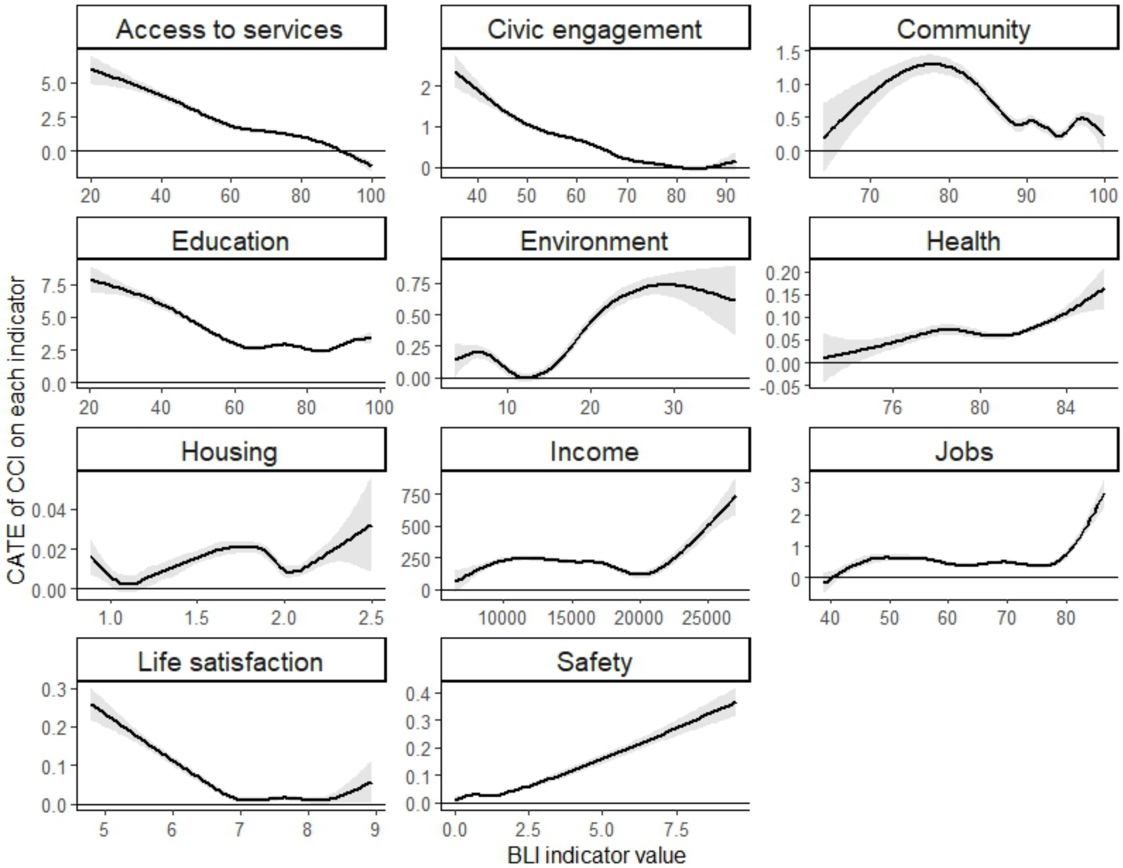
Source: Own elaboration. *Note:* Smoothed lines of local effects using Generalised Additive Model (GAM). The shaded area represents a 95% confidence interval.

Interesting patterns emerge. For example, community impacts occur mainly in regions with a lower share of employment in CCIs. When a high percentage of CCIs is reached (around 7%), average impacts tend to be zero. This happens even at a lower level for life satisfaction, where positive impacts are mostly found in regions with up to 4% of CCI employment. Higher impacts are also observed among low levels of CCIs in education, income (although they then remain remarkably positive) and housing (which even become negative after a certain point). On health, the impacts are even negative at the start but increase until the maximum effect is reached at around 5% of employment in CCIs, after which point they decline. Impacts on access to services and civic engagement, meanwhile, follow a similar, bimodal distribution. They start high, decline around 5% of CCI employment, and then increase again until they decline again from around 10%. In environment, impacts occur at low levels of CCI and especially at the highest levels, although they tend to be zero at levels in between (around 6-7%). For jobs, although the effect is generally positive (especially at medium levels of CCI), it declines after a certain point and, for very high levels of CCI (above about 14%), the impacts become even negative. Lastly, even if the average effect on safety is not statistically significant, it seems that positive effects might occur at medium and medium-high values of CCI employment.

Another interesting issue is to look at the effects as a function of the value of the target indicator. That is, how the effect of CCIs on income varies according to the income level of the regions, or how their effect on jobs varies according to the employment level of the regions. The list goes on. This is shown in Figure 47.

On this occasion, it is observed that whether in access to services, civic engagement, education or life satisfaction, the impact of CCIs is very high when starting from low values of the well-being indicator, and then decreases as the margin for improvement becomes narrower. A similar situation occurs in the environment, where the greatest impacts in terms of pollution reduction occur in those regions with the highest presence of particulate matter in the air. The opposite is true for health, income and jobs, with the greatest impacts occurring at high levels of the respective indicators. In the community dimension, the largest effects occur at values of around 80% of perceived social support, while they are smaller at both lower and higher levels. In housing, there are some ups and downs with no clearly defined pattern. Finally, although the overall impact of CCIs on safety is not statistically significant (p-value = 0.208), the graph in Figure 47 suggests that CCIs might reduce crime in regions with a high homicide rate, while they would be irrelevant in regions where the homicide rate is already low.

Figure 47. *Average effect of CCIs on well-being by indicator value*



Source: Own elaboration. *Note:* Smoothed lines of local effects using GAM. The shaded area represents a 95% confidence interval.

These results may have implications for regional well-being inequality. Since the effects are clearly decreasing as the indicator improves in the cases of access to services, civic engagement, education, environment, life satisfaction and safety, in these dimensions CCIs favour convergence in regional well-being. For income, jobs and health, by contrast, CCIs work in the opposite direction, as the most positive effects are reported in those regions that already perform well in these dimensions.

7.4. Effects over time

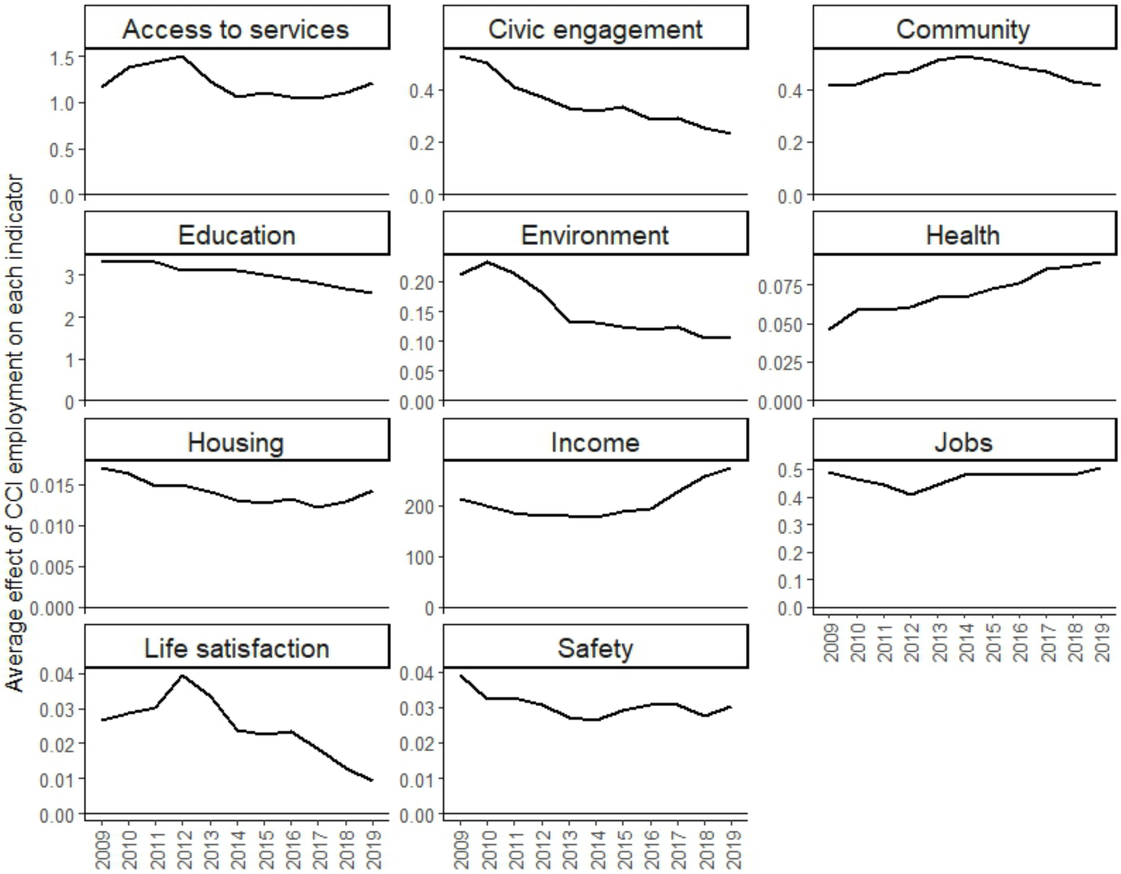
A final aspect to explore is the matter of time. So far, we are considering the impacts in the whole period, but now we look at how they have changed over time. It should be borne in mind that the period studied (2009-2019, since we have data since 2008 and there is a time lag of one year) includes some early years of economic recession and later years of recovery and growth. This could influence the impact of the CCIs, especially on those variables that are more sensitive to the economic cycle, such as income or jobs. In parallel, other processes and trends have taken place during this period, such as ageing (a key issue in health or indirectly in other dimensions such as community), digitalisation (relevant for access to services) or the progressive implementation of green energies and processes that seek to reduce environmental damage, among others.

To check whether the impacts have varied over time, we plot them by year in Figure 48. In general, the effects are very stable for most indicators over the period under analysis. We observe declining impacts over time in civic engagement, education and environment. In contrast, they have increased in health, and in income since the last few years. In community, impacts were increasing until the middle of the period and started to decline in 2015. This is also the case for life satisfaction, the effects of which were increasing until 2012 and decreased from 2013 onwards. In the rest of the dimensions, there are some ups and downs but around relatively stable values.

Closely related to the last aspect analysed, the time horizon of the impacts could also be the subject of discussion. So far, the impacts of the CCI employment in a given year on the well-being indicator in the following year are considered, i.e. with a time lag of one year. This is not an arbitrary decision but is suggested by the results of the Granger causality test using short term lags, as explained in section 7.1. However, it could be argued that the impacts of CCIs on certain dimensions have a longer-term influence and do not occur as immediately but over a longer period of time, i.e. with longer time lags.

We therefore repeat the analysis in order to estimate the effect in the medium term (time lag of 5 years) and in the medium-long term (time lag of 11 years, the maximum allowed by the sample of 12 years). This logically reduces the number of observations by eliminating the initial years and, in the case of the long run, leaves only the observation of the last year (2019) for the 209 regions. The results of both analyses, compared with the short-term results, are shown in Table 14.

Figure 48. *Yearly evolution of the average effects of CCIs on well-being, 2009-2019*



Source: Own elaboration. *Note:* Obtained by averaging the local estimates for each year

As can be seen in Table 14, the goodness of fit of the models generally worsens when the time horizon is extended, as the effects may be somewhat more diffuse. This is especially apparent in the calibration of the heterogeneity of the effects (i.e. differential forest prediction) in the long run.

Table 14. *Causal Forest results of the effect of CCIs in the short (1 year), medium (5 years) and long term (11 years)*

					Goodness of fit				
Dimension	**Lag**	**Estimate**	**Elasticity**		**Mean forest prediction**		**Diff. forest prediction**		**N obs.**
Access to services	1 year	1.218	0.076	***	0.980	***	1.282	***	2,299
	5 years	1.155	0.065	***	1.213	***	1.236	***	1,463
	11 years	1.148	0.058	**	1.020	.	0.571		209
Civic engagement	1 year	0.299	0.020	**	1.020	***	2.140	***	2,299
	5 years	0.315	0.021	**	0.896	***	2.012	***	1,463
	11 years	0.490	0.031		1.298	**	-1.138		209
Community	1 year	0.445	0.023	***	1.208	***	1.739	***	2,299
	5 years	0.448	0.023	***	1.269	***	1.608	***	1,463
	11 years	0.388	0.019		-1.680		-0.039		209
Education	1 year	2.877	0.178	***	0.993	***	1.460	***	2,299
	5 years	2.460	0.147	***	1.025	***	1.664	***	1,463
	11 years	2.450	0.138	***	1.208	***	1.814	***	209
Environment	1 year	0.139	0.048	**	0.866	***	1.970	***	2,299
	5 years	0.204	0.074	***	0.667	***	1.900	***	1,463
	11 years	0.380	0.139	**	1.002	**	0.774		209
Health	1 year	0.065	0.004	***	0.998	***	1.908	***	2,299
	5 years	0.101	0.006	***	1.005	***	1.895	***	1,463
	11 years	0.142	0.008	**	0.807	*	-0.711		209
Housing	1 year	0.015	0.042	***	1.660	***	1.844	***	2,299
	5 years	-0.017	-0.045	***	0.793	***	1.665	***	1,463
	11 years	-0.019	-0.049	.	0.922	*	1.192		209
Income	1 year	210.477	0.064	***	1.095	***	1.924	***	2,299
	5 years	186.927	0.055	***	1.449	***	2.121	***	1,463
	11 years	260.740	0.069	***	1.131	***	0.816	.	209
Jobs	1 year	0.450	0.032	***	0.976	***	1.684	***	2,299
	5 years	0.815	0.056	***	0.981	***	1.799	***	1,463
	11 years	1.204	0.077	***	0.980	***	1.174		209
Life satisfaction	1 year	0.023	0.014	*	0.908	***	0.889	***	2,299
	5 years	0.015	0.009		0.881	***	0.891	***	1,463
	11 years	-0.019	-0.011		27.272	*	-45.246		209
Safety	1 year	0.017	0.078		0.693	*	1.177	*	2,299
	5 years	0.007	0.035		0.701		0.681	*	1,463
	11 years	-0.017	-0.089		3.870		-88.531		209

Source: Own elaboration. *Note:* Signif. codes: '.' .1 '*' .05 '**' .01 '***' .001. The complete table reporting the p-values is presented in Annex IV (Table 17).

Apart from that, education continues to show significant stable but somewhat decreasing effects in the short (elasticity of 0.178), medium (0.147) and long run (0.138) is education. Something similar happens with access to services, which goes from 0.076 in the short term to 0.065 in the medium term and 0.058 in the long term. Income effects are fairly stable as well, with an elasticity of 0.064 in the short term, 0.055 in the medium term and 0.069 in the long term. In the case of jobs, the elasticity even increases from 0.032 (short term) to 0.056 (medium term) and 0.077 (long term). The same is true for the environment, from 0.048 in the short term to 0.074 in the medium term and 0.139 in the long term. The same applies to health effects, which increase from the short (elasticity of 0.004), to the medium (0.006) and long term (0.008). In these dimensions, the positive effects are confirmed at all time horizons, albeit with different intensities.

In the case of civic engagement, the elasticity hardly changes between the short and medium term (from 0.020 to 0.021), but becomes non-statistically significant in the long term (p-value = 0.121). Exactly the same for community, with identical elasticity in the short and medium term (0.023) and no statistically significant effect in the long term (p-value = 0.117). In life satisfaction, the effect occurs mainly in the short term (elasticity of 0.014), while it decreases and loses statistical significance in the medium term (elasticity of 0.009 and p-value=0.225) and disappears in the long term (p-value=0.645).

The only significant change of sign occurs in housing, with a positive impact in the short term (elasticity of 0.042) but negative in the medium and long term (-0.045 and -0.049, respectively). Finally, these analyses allow us to confirm that CCIs have no statistically significant effect on safety (i.e. homicide rate) in the short (p-value = 0.208), medium (p-value = 0.727) or long term (p-value = 0.569).

All in all, the results suggest that, although in some dimensions the medium and long-term effects are relevant and persistent, the most appropriate time horizon for the analysis does not require such a long time lag and achieves a better adjustment in the short term. However, interesting points are noted, such as that the effect on the employment rate (jobs) increases over time, or that the negative effects on housing are manifested in the medium and long term.

7.5. Sensitivity to CCI definitions

Throughout this presentation of results, a question may have crossed the reader's mind. In chapter 1, it was noted that there is no consensus on the definition of CCIs and the sectors they should include. Consequently, the findings could be conditioned by the chosen definition, and might be different if other sectoral classifications were considered. While, as noted above, we do not have sector-by-sector disaggregated data due to limitations of the Eurostat database for statistical significance[16], we do have two sub-classifications within our broad concept of CCI: those strictly defined as cultural and creative sectors (CCS) and those identified as other intellectual property and research and development activities within the cultural and creative ecosystem (IP + R&D) (Manuel Vilares et al., 2022).

As displayed above in Figure 17, CCS include: Printing and reproduction of recorded media (NACE 18); Manufacture of jewellery, bijouterie and related articles (NACE 32.1); Manufacture of musical instruments (NACE 32.2); Publishing activities (NACE 58); Motion picture, video and television programme production (NACE 59); Programming and broadcasting activities (NACE 60); Advertising (NACE 73.1); Specialised design activities (NACE 74.1); Photographic activities (NACE 74.2); Translation and interpretation activities (NACE 74.3); Creative, arts and entertainment activities (NACE 90); and Libraries, archives, museums and other cultural activities (NACE 91).

In turn, IP+R&D include: Telecommunications (NACE 61); Computer programming, consultancy and related activities (NACE 62); Information service activities (NACE 63); Scientific research and development (NACE 72); Other reservation service and related activities (NACE 79.9); and Amusement and recreation activities (NACE 93.2). The comparative results of the three classifications are shown in Table 15.

[16] The data disaggregated by sector at the regional level have a large number of missing values, so that data quality suffers greatly. Broader groupings have been preferred, as explained in section 4.1.2.

Table 15. *Causal forest estimates for average treatment effect using different definitions of CCIs*

					Goodness of fit			
Dimension	**Definition**	**Estimate**	**Elasticity**		**Mean forest prediction**		**Diff. forest prediction**	
Access to services	CCI	1.218	0.076	***	0.980	***	1.282	***
	CCS	0.386	0.013		1.065	*	1.478	***
	IP+R&D	2.814	0.081	***	0.992	***	1.308	***
Civic engagement	CCI	0.299	0.020	**	1.020	***	2.140	***
	CCS	0.024	0.001		-0.055		2.103	***
	IP+R&D	0.992	0.031	***	1.129	***	2.044	***
Community	CCI	0.445	0.023	***	1.208	***	1.739	***
	CCS	0.208	0.006	.	1.577	**	2.185	***
	IP+R&D	0.898	0.021	***	1.223	***	1.950	***
Education	CCI	2.877	0.178	***	0.993	***	1.460	***
	CCS	3.860	0.128	***	1.053	***	1.500	***
	IP+R&D	4.342	0.125	***	0.961	***	1.543	***
Environment	CCI	0.139	0.048	**	0.866	***	1.970	***
	CCS	-0.193	-0.036	**	1.604	***	1.681	***
	IP+R&D	0.499	0.080	***	0.957	***	2.358	***
Health	CCI	0.065	0.004	***	0.998	***	1.908	***
	CCS	0.081	0.002	***	1.016	***	2.280	***
	IP+R&D	0.130	0.003	***	0.928	***	1.680	***
Housing	CCI	0.015	0.042	***	1.660	***	1.844	***
	CCS	0.014	0.020	*	2.428	***	2.109	***
	IP+R&D	0.020	0.025	***	1.377	***	2.218	***
Income	CCI	210.477	0.064	***	1.095	***	1.924	***
	CCS	348.135	0.057	***	1.059	***	2.093	***
	IP+R&D	204.777	0.029	***	0.934	***	1.534	***
Jobs	CCI	0.450	0.032	***	0.976	***	1.684	***
	CCS	1.309	0.049	***	1.290	***	1.867	***
	IP+R&D	0.190	0.006		0.913	.	1.709	***
Life satisfaction	CCI	0.023	0.014	*	0.908	***	0.889	***
	CCS	-0.001	0.000		0.562		0.814	***
	IP+R&D	0.059	0.017	***	0.931	***	0.883	***
Safety	CCI	0.017	0.078		0.693	*	1.177	*
	CCS	-0.001	-0.003		0.798		0.881	*
	IP+R&D	0.075	0.161	***	0.902	***	1.455	***

N. observations = 2,299

Source: Own elaboration. *Note:* Signif. codes: '.' .1 '*' .05 '**' .01 '***' .001. The activities included in each of the definitions are listed in Figure 17. The complete table reporting the p-values is presented in Annex IV (Table 18).

It can be seen that the results in some dimensions are indeed remarkably sensitive to the definition used. In others, the effects are quite similar (Table 15). Figure 49 graphically compares the confidence intervals of the ATE for each of the dimensions.

The sensitivity to the definition is low for education, for which it is confirmed that the effects are positive and quite powerful whatever the definition adopted (elasticity of 0.128 for CCS and 0.125 for IP+R&D). They are also similar across definitions for health (elasticities of 0.002 and 0.003 respectively) and housing (elasticities of 0.020 and 0.025).

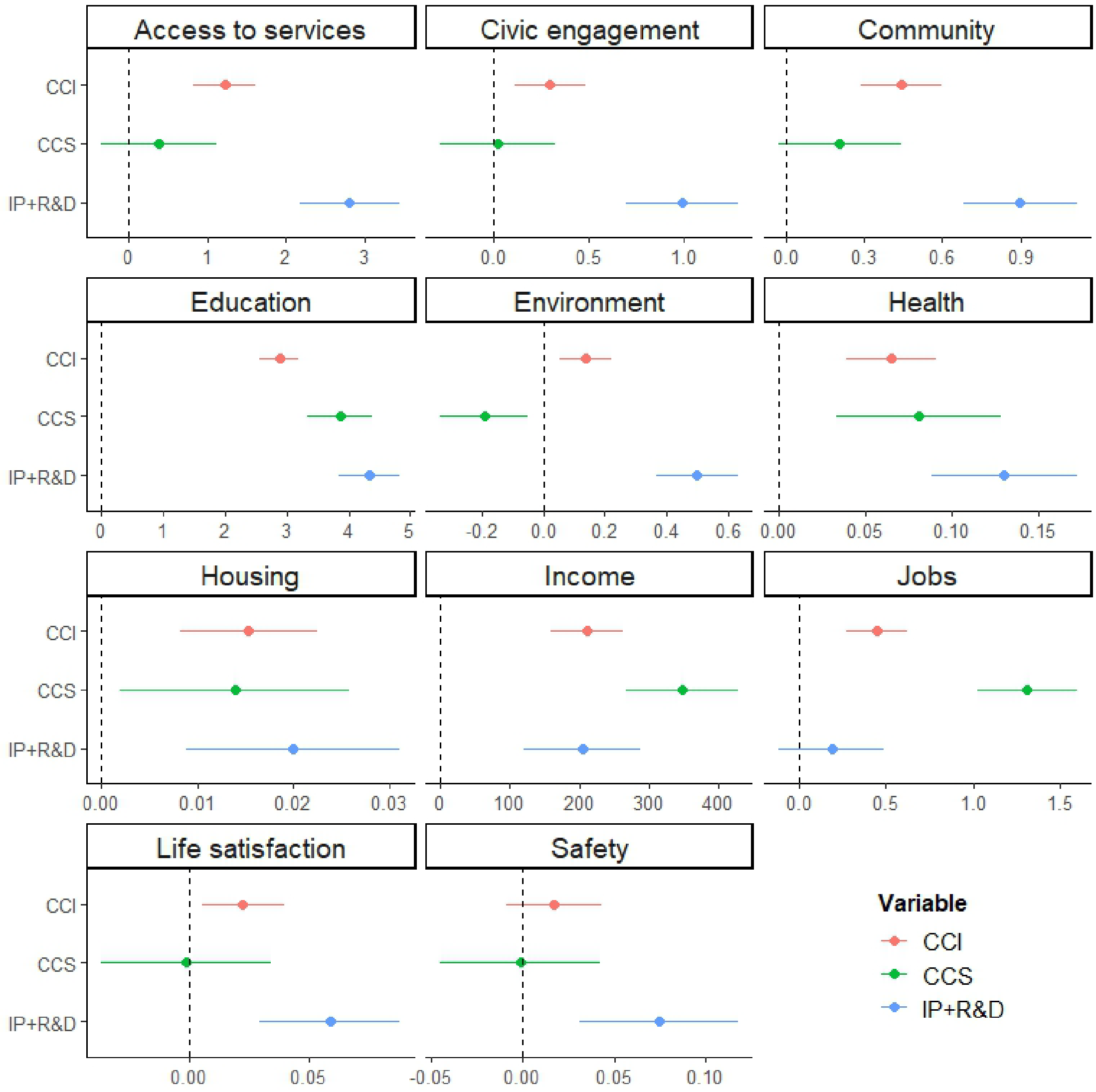
In other cases, it is the effect of CCS that dominates, as for income (elasticity of 0.057 for CCS versus 0.029 for IP+R&D) and jobs (elasticity of 0.049 for CCS and 0.006 for IP+R&D).

The effects of IP+R&D prevail for access to services, civic engagement, community, safety and life satisfaction. In the case of access to services (i.e. household broadband connection), it is the IP+R&D industries that are responsible for the overall effect of CCIs, with an elasticity of 0.081, compared to 0.013 for CCS (with a low statistical significance, p-value = 0.302). Something very similar happens with civic engagement, i.e. voter turnout (elasticity of 0.031 for IP+R&D and nearly zero for CCS –0.001–). Also in community the effects of IP+R&D are notably higher (0.021), while those of CCS (with worse fit) are lower (0.006). Regarding safety, the effect of CCS remains not statistically significant, but there does appear to be a positive impact (i.e. a reduction in crime) in the case of IP+R&D (elasticity of 0.161). Similarly, for life satisfaction, IP+R&D has an elasticity of 0.017, while the effect of CCS is zero.

Finally, there is only one dimension where both sub-groupings act in opposite directions: environment. It is the IP+R&D activities that succeed in reducing air pollution (0.080), while CCS actually worsen it (-0.036). Since the positive effect of IP+R&D is greater, it dominates over the opposite effect of CCS for the CCIs as a whole (0.048).

It is clear that the definition of CCIs and the selection of the activities that comprise them are relevant. Given that the definition adopted conditions the results in many dimensions, it is by no means neutral. Especially in terms of policy implications.

Figure 49. *Average treatment effect with causal forest for different definitions of CCIs*



Source: Own elaboration. *Note:* Lines indicate 95% confidence interval

7.6. Discussion of findings by dimension

Detailed analyses are provided below for each dimension, starting with the clearest and strongest, followed by those that are weaker or raise more unanswered questions, and ending with life satisfaction as the umbrella dimension.

7.6.1. Education

The effects of CCI on education are the strongest, with the highest elasticity (0.178) and hardly any region where local effects are negative (see Figure 45). Moreover, the impacts are similar in both CCS and IP+R&D (Figure 49). Further, they do not only occur in the short term, but their effects are also persistent in the medium and long term (Table 14). A one percentage point increase in the weight of CCIs in employment would result in an increase of 2.877 percentage points of the population aged 25-64 with post-compulsory education (ISCED 3 or higher). For the European OECD countries as a whole, this would mean 7.65 million more educated people. For a region like Brussels, it could translate into around 19,000 people.

These findings are consistent with those obtained by Filippo Berti Mecocci et al. (2022), with a research also linking CCI and educational attainment in European regions. It is also in line with the findings of multiple studies on the benefits of different forms of cultural participation on educational achievement (Alessandro Crociata et al., 2020), or with those linking culture to the attraction of highly educated human capital (Mikaela Backman & Pia Nilsson, 2018).

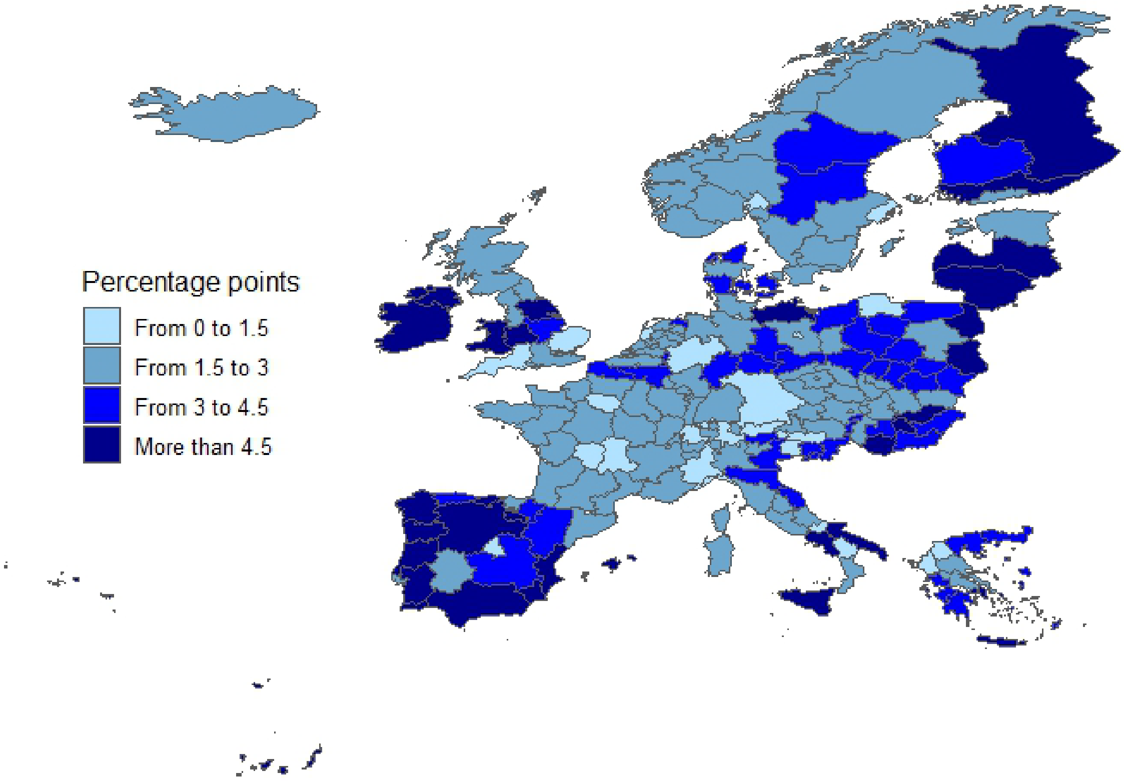
There are multiple explanations for this phenomenon. The main one is the cognitive and sensory stimulation brought about by culture and creativity, with positive effects on learning and skills development. But also the CCI workforce itself tends to be more educated on average (in the EU, 60.4% of cultural employment with tertiary education compared to 36.6% of the total workforce in 2021, according to Eurostat). They therefore attract highly educated workers and incentivise the educational training of potential future local employees. In addition, the existence of job opportunities in the cultural and creative field may motivate students with an artistic vocation to continue their studies.

Impacts are even higher when there is little CCI employment in the region (Figure 46), as well as when starting from low levels of education (Figure 47), but then remain quite high in both cases. This is contrary to what one would expect according to Filippo Berti Mecocci et al. (2022) or Alessandro Crociata et al. (2020), since CCIs and education are mutually reinforcing and therefore their benefits would be incremental. The explanation for the opposite tendency could be found in the fact that, in contexts where there is a higher risk of dropping out of the education system, introducing CCIs can have a greater impact and make a significant difference to that larger mass of the population at the margin and susceptible to be affected, or due simply to some saturation effect when high educational levels are achieved. There is also a slight decline in impact over the years (Figure 48), which may be due to a combination of the two previous trends, as both CCI employment and educational attainment have been rising in most regions over the period under consideration.

At territorial level, although there are sporadic negative effects in a few regions in specific years, the average effects over the period (2009-2019) are positive for all regions. Though with different intensities. The regions of Portugal, Ireland, Finland, large parts of Spain, Eastern regions, some regions of Southern Italy, Wales, Northern Ireland and some regions of England seem to be the main beneficiaries of the effects of CCIs on education. On the contrary, it appears that large capital city regions tend to have smaller effects even when surrounded by the opposite, as is the case for example in Madrid, Paris, Lisbon, Stockholm, Oslo or Berlin. Lower effects are also reported in central Europe, southern England and some regions in Italy and Greece (Figure 50).

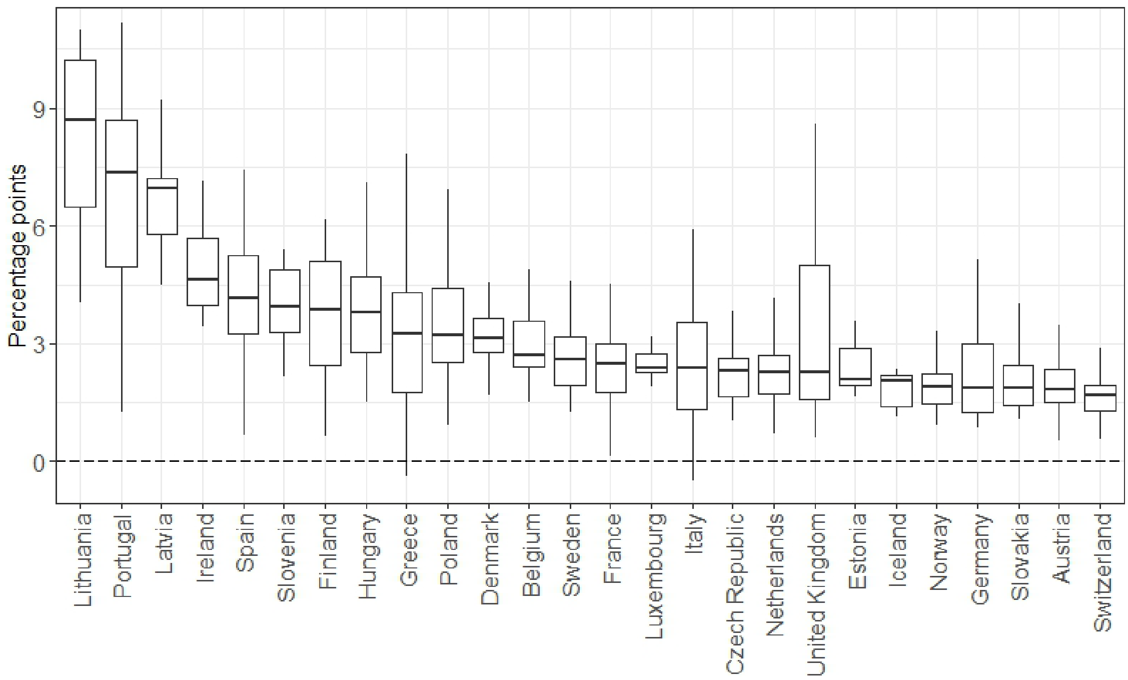
By country, Lithuania, Portugal, Latvia, Ireland and Spain top the list with the highest positive effects. At the bottom, with the most moderate yet mostly positive effects are Switzerland, Austria, Slovakia, Germany and Norway (Figure 51).

Figure 50. *Map of individual treatment effects of CCIs on Education (educational attainment, %), average 2009-2019*



Source: Own elaboration

Figure 51. *Box plot of individual treatment effects of CCIs on Education (educational attainment, %) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.6.2. Income

The result in the income model is in line with expectations, confirming the positive effect already reported in previous studies. An elasticity of 0.064 is reported, consistent with that obtained in the most recent studies (Rafael Boix-Domènech & Vicent Soler-i-Marco, 2017; Rafael Boix-Domènech et al., 2022). A one percentage point increase in CCI employment would lead to an increase of 210.48 Euros in net household disposable income per capita. In aggregate terms, this would mean that one percentage point more for CCIs in total employment in European OECD countries would lead to an increase of around 100,000 million Euros in overall net household income. For a region with the population of Calabria, this could translate into around 390 million Euros.

A relevant and novel result of this research is that positive impacts are obtained for both CCS and IP+R&D, but actually of greater magnitude for CCS (Table 15). This suggests that the criticism of some authors (Nicholas Garnham, 2005; Susan Galloway & Stewart Dunlop, 2007) that the economic impact of CCIs was inflated and masked by the addition of high-tech activities (concentrated to a greater extent in IP+R&D) could be unfounded. CCIs, and in particular CCS, act as a key part of the economic system with a role in the generation and dissemination of ideas that drives innovation in the economy as a whole. The effects, moreover, are not only short term but are persistent in the medium and long term (Table 14), as would be expected. This supports the conceptualisation of the role of CCIs in the economy in the framework of the “innovation model” (Jason Potts & Stuart Cunningham, 2008) or “evolutionary model” (Jason Potts, 2009) presented in section 3.1.

In any case, this does not mean that the onus is entirely on CCS but that both types of creative activities complement and reinforce each other, as in fact the elasticity of CCI is higher than those of CCS and IP+R&D separately (Table 15). This is in line with the argument made by Niccolò Innocenti and Luciana Lazzeretti (2019), who pointed out that CCIs benefit from cross-fertilisation and need contact with other nearby sectors with which to exchange ideas and knowledge in order to generate growth. The creation of symbolic content is becoming more and more relevant and, increasingly, CCIs provide inputs to other industries (as is very evident, for example, in the case of design or advertising). This interconnection with other economic activities also explains the small decline in the income effect of CCIs during the recession years (even though CCIs continued to grow), which increases when the dynamism in the rest of the economy picks up again, from 2015 onwards (Figure 48).

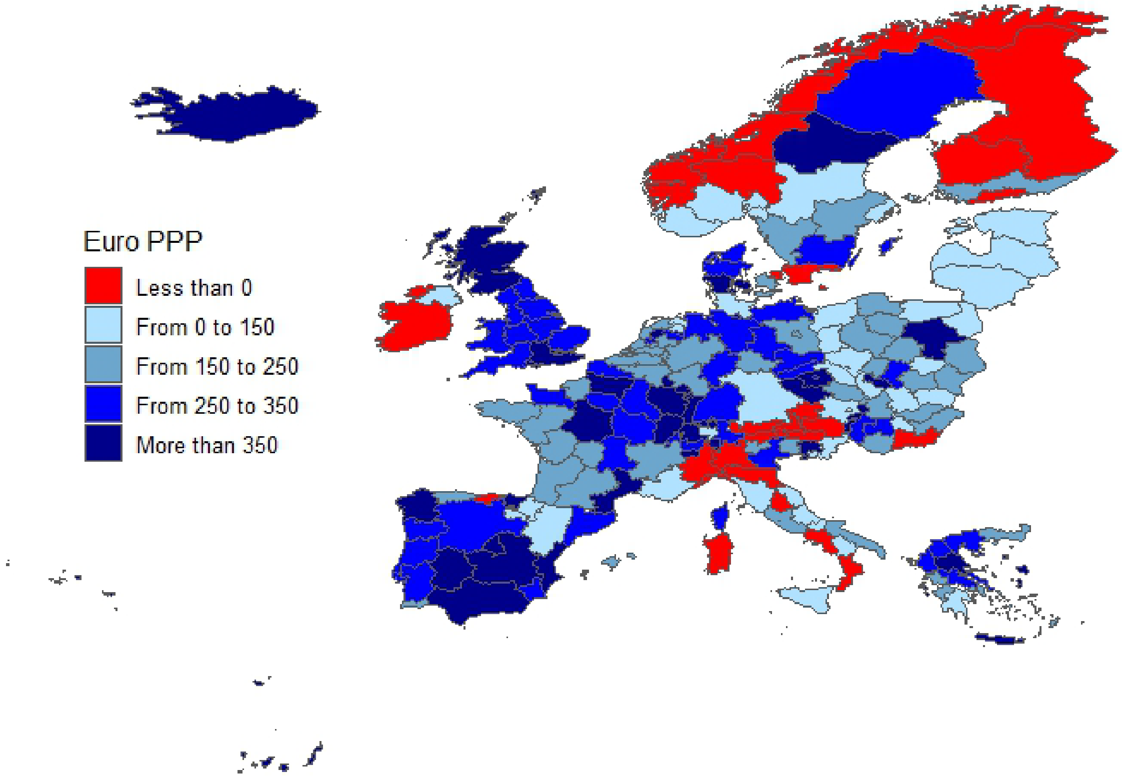
The effects are very positive even if the weight of CCIs on the employment of a region is small (Figure 46), indicating that a large critical mass is not necessary for these activities to generate significant impacts on the economy. They also have noticeable effects at high levels of CCI on the total employment (around 8-9%), while the effects then start to decline, although they remain always at any level quite positive.

On the other hand, in terms of income impacts depending on the initial income level, these start low, then moderate at most levels and finally, for levels above 20,000 Euro PPS, soar with strongly positive effects (Figure 47). This pattern is consistent with the results obtained in other studies (Rafael Boix-Domènech et al., 2022). It may be due to the fact that high-income regions concentrate higher value-added activities that take better advantage of the synergies of CCIs and their innovative potential. Likewise, because of the greater capacity for the ideas generated to permeate and transcend to the rest of society given the greater access to and use of cultural goods and services that occurs in high-income regions. However, this may pose difficulties for regional convergence, given that the regions that benefit most economically from boosting CCIs are precisely those with higher incomes.

At the territorial level, the regions with the greatest positive impacts are found e.g. in Iceland, Scotland and parts of Spain, among others. Conversely, negative effects are found in Norway, Finland, Ireland, Austria and several regions of Italy (Figure 52).

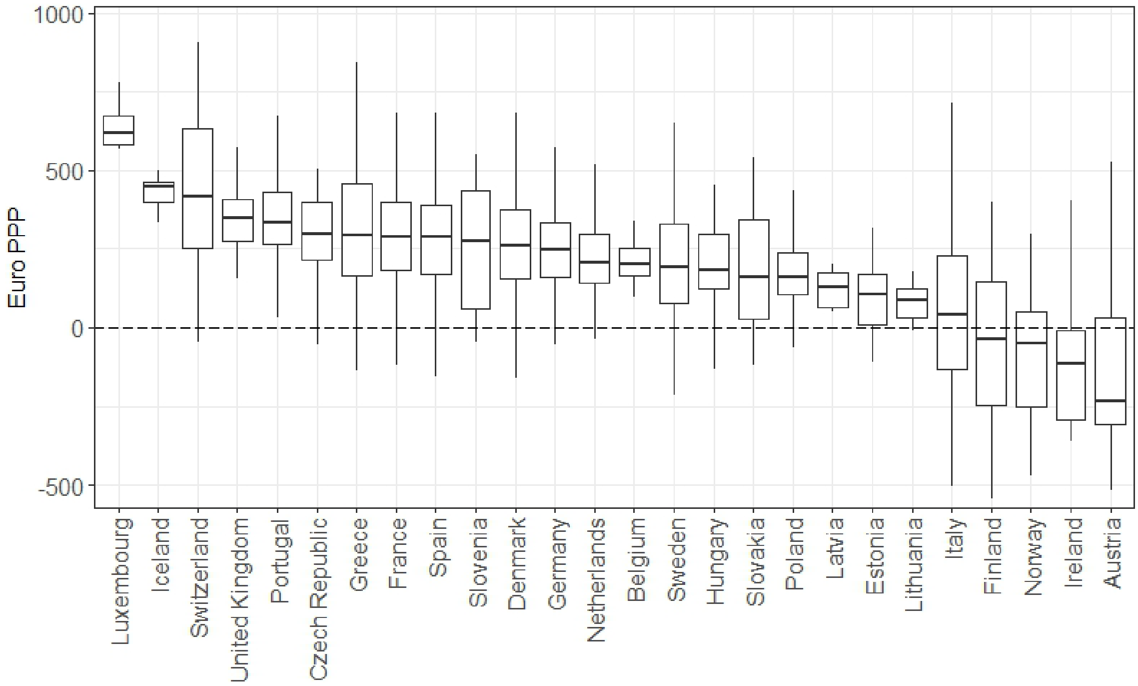
By country, both the most positive and negative effects are mostly in regions of high-income countries. The largest impacts are in Luxembourg, Iceland, Switzerland, the United Kingdom and Portugal. In contrast, Austria, Ireland, Norway and Finland have negative median effects, followed by Italy with very large internal heterogeneity across regions (Figure 53).

Figure 52. *Map of individual treatment effects of CCIs on Income (net disposable income per capita, Euro PPP), average 2009-2019*



Source: Own elaboration

Figure 53. *Box plot of individual treatment effects of CCIs on Income (net disposable income per capita, Euro PPP) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.6.3. Jobs

As would be expected, the positive impact on income has also a corollary with jobs, with a more moderate but equally relevant average elasticity (0.032). However, this effect is mainly due to CCS (elasticity of 0.049) and not to IP+R&D, whose elasticity is 0.006 with a low statistical significance (p-value = 0.219) (Table 15). This may be due to the fact that the effects of IP+R&D activities focus mainly on productivity. For the CCIs as a whole, an increase of one percentage point would lead to an increase in the employment rate of 0.45 percentage points. Assuming a one percentage point increase in the European OECD countries as a whole, 1.4 million jobs would be created. In a region the size of the Valencian Country, this would translate into 15,000 jobs.

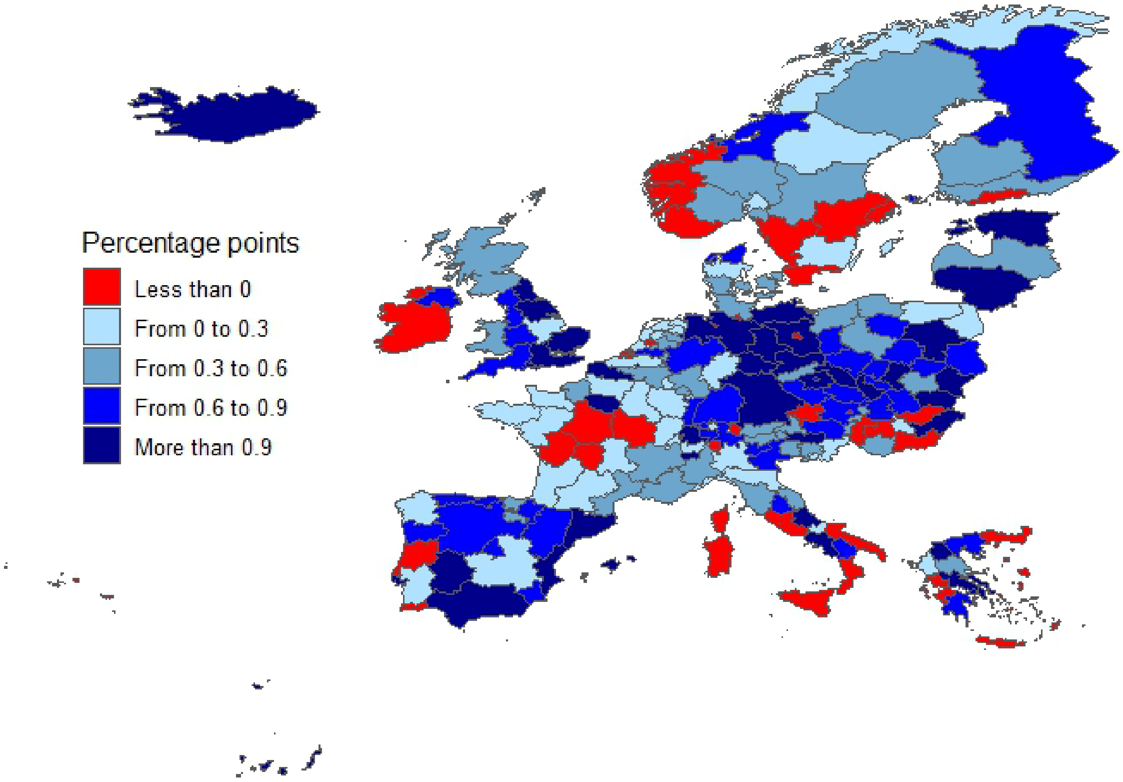
The main effects occur in regions that have from about 3.5% to 7.5% of employment in CCI (Figure 46). Thereafter, the effect on jobs declines and, for very high levels of CCI, tends to disappear. If we look at the effects in terms of the indicator, i.e. the employment rate, the pattern is similar to what happens with income. The effects are low at low employment rates, then there is a more or less stable moderate effect, until it shoots up for employment rates above 80% (Figure 47). One possible explanation for this phenomenon could be that CCIs have the capacity to activate the job creation potential of sectors that reach segments of the population that would not normally be employed (people with difficulties of socio-occupational insertion, housemakers, full-time students, etc.). In contexts where a large part of the working-age population is already employed, the exploitation of this type of job creation potential would become more relevant.

The variation of the effect over time is not particularly noticeable. There is only an initial drop in the first years of the crisis, when more jobs were destroyed, until 2012, and then it recovers (Figure 48). In any case, the effects of CCIs on employment also persist in the medium and long term (Table 14).

In terms of territorial patterns, we find particularly significant effects in the regions of Iceland, eastern and southern Spain, eastern England, parts of Greece, Germany (except for its large cities), city regions such as Lisbon or Paris, and some regions of Poland, Hungary, Italy or Switzerland. In contrast, the main negative effects are reported in Ireland, southern Italy, central France and Corsica, west coast of Norway and southern Sweden, Helsinki, Vienna and Upper Austria, parts of Hungary, Greece, Switzerland or Portugal, and large German cities (Berlin, Hamburg, Bremen) (Figure 54).

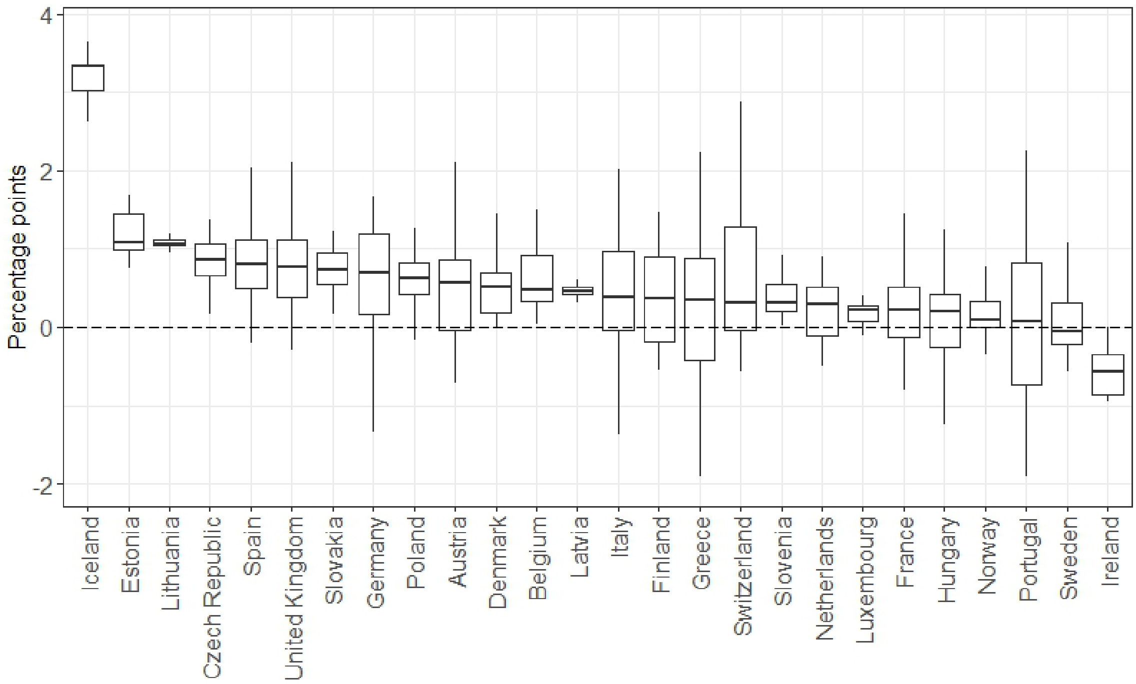
When grouped by country, the largest positive median effects are found in Iceland, Estonia, Lithuania, the Czech Republic and Spain. While the median effects are only negative in Ireland and Sweden, followed by Portugal (with wide heterogeneity), Norway and Hungary with low positive effects (Figure 55).

Figure 54. *Map of individual treatment effects of CCIs on Jobs (employment rate, %), average 2009-2019*



Source: Own elaboration

Figure 55. *Box plot of individual treatment effects of CCIs on Jobs (employment rate, %) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.6.4. Health

There is evidence of positive average impacts on health, which are found in both CCS and IP+R&D (Table 15). This is consistent with studies that point to the positive effects of cultural participation on health at the micro level (Daisy Fancourt & Saoirse Finn, 2019; Rarita Zbranca et al., 2022). Although it is true that, at the macro level, the effects on regional life expectancy are small (elasticity of 0.004), not surprisingly. This implies that a one percentage point increase in employment in CCIs would lead to an increase in average life expectancy of 24 days. This is not negligible either. As pointed out in chapter 3, cultural participation, resulting from the cultural goods and services produced by CCIs, activates a series of sensory, cognitive, social or physical mechanisms that generate both psychological and physiological benefits. Besides, the effects are also felt in the medium and long term (Table 14).

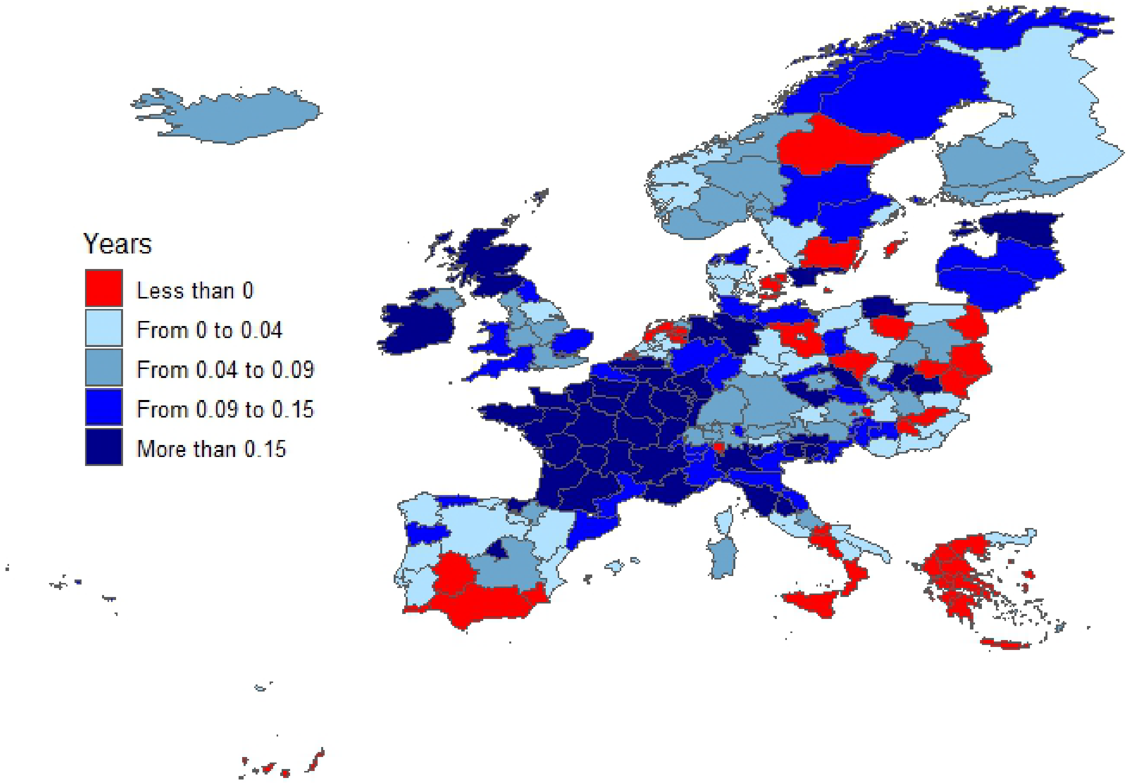
The average effects vary according to the share of CCI employment in the region (Figure 46). In fact, they start out negative, but increase very quickly and are already positive at around 2.5% of CCI employment. The maximum impact is reached at around 5%, and then slightly decreases little by little. This indicates that for the effects to be really significant, a certain critical mass of CCI is needed, and at a certain level, the marginal contribution of further increasing the presence of CCI would be decreasing since they would no longer make such a big difference.

It is also interesting to look at the effects depending on the life expectancy in the region (Figure 47). These are clearly incremental: they start at around zero and go up progressively. The effect is also clear to increase over time (Figure 48) as life expectancy and population ageing increase. Both phenomena could reflect the same rationale, namely that CCIs have a particularly relevant potential to improve the health of older people. They are usually more sedentary, lonely and have fewer social contacts and less cognitive stimulation, so cultural participation may be especially beneficial for them.

Looking at territorial patterns, it can be seen that the regions with the largest positive effects are located in France, Ireland, Scotland, Estonia, Slovenia and northern Italy, among others. In contrast, some regions in Greece, southern Spain, southern Italy, the Netherlands and Poland experience negative effects (Figure 56).

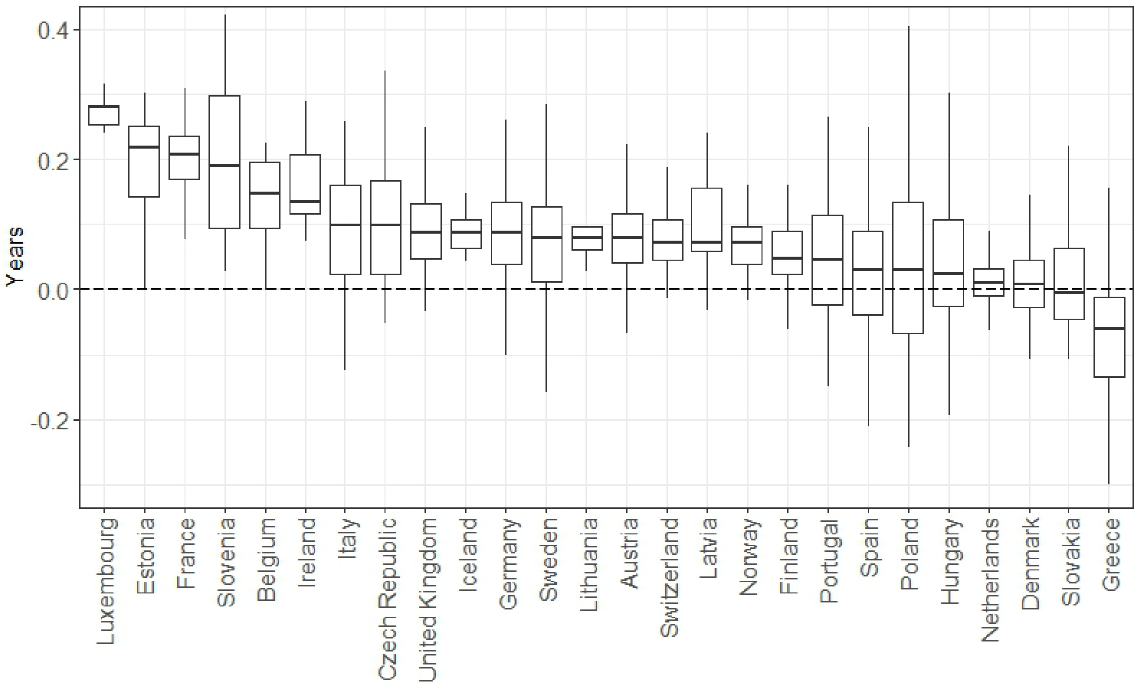
When grouped by country, those experiencing the greatest median impacts are, in this order, Luxembourg, Estonia, France, Slovenia and Belgium. While the only two countries with predominantly negative effects are Greece and Slovakia, followed with low positive impacts by Denmark, the Netherlands and Hungary (Figure 57).

Figure 56. *Map of individual treatment effects of CCIs on Health (life expectancy, years), average 2009-2019*



Source: Own elaboration

Figure 57. *Box plot of individual treatment effects of CCIs on Health (life expectancy, years) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.6.5. Community

A positive average effect, with an elasticity of 0.023, is also reported for the community indicator. This is mainly due to IP+R&D. For CCS, the effect is positive but rather weaker (average elasticity of 0.006). This is somewhat shocking because one would expect CCS to involve more social interaction and to be able to weave larger social support networks. However, one would also expect large internal differences between sectors, as some activities (e.g. performing arts) may be much more prone to social interaction than others (e.g. television or radio, publishing, advertising, or jewellery). The latter may therefore moderate the impact of the former. Instead, it seems that the effects are clearer in IP+R&D activities (Table 15).

On average, a one percentage point increase in employment in CCIs results in a 0.445 point increase in the percentage of people who feel they have someone to rely on in case of need. Over the total population of European OECD countries, this is 2.1 million more people with social support networks. In Estonia, for example, this would mean 6,000 more people with someone to rely on.

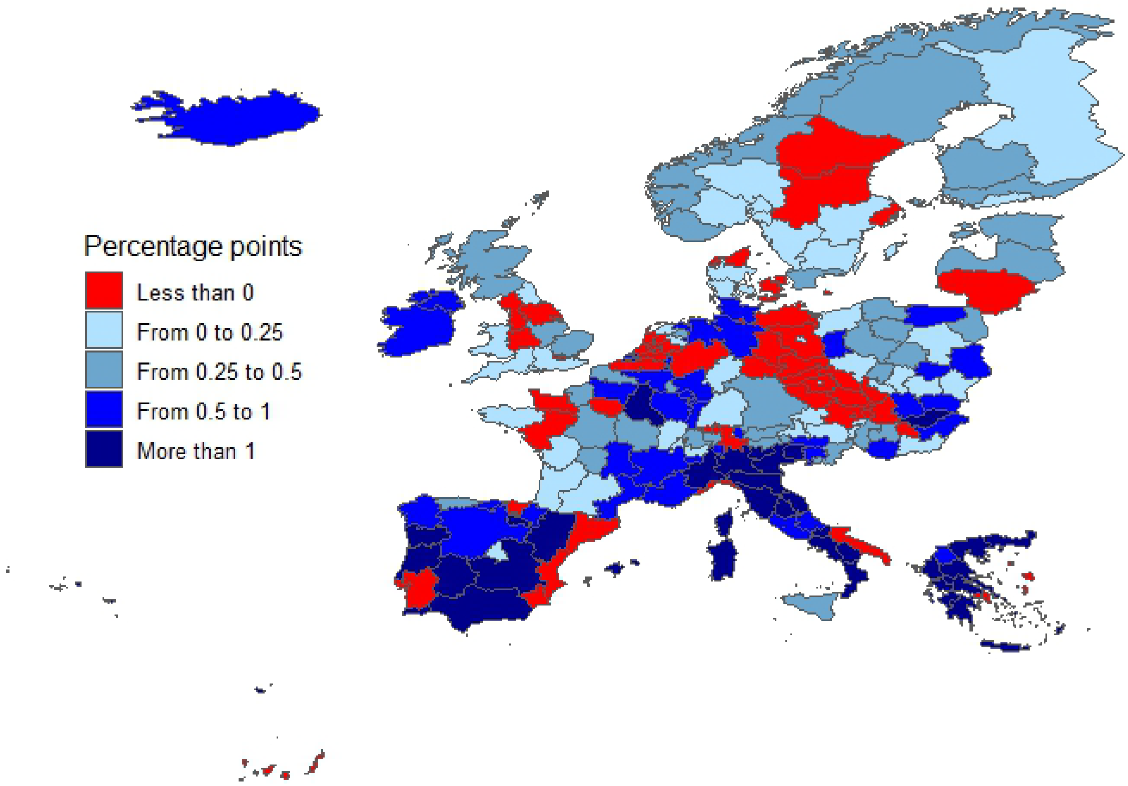
The greatest effects occur mainly in regions with few CCIs. Thereafter, the effect declines quite rapidly and, from about 7%, tends to zero (Figure 46). In other words, CCIs primarily have an igniting effect on social support. But once they reach a certain weight, the marginal gain in community terms of further increasing them is minimal. With respect to the value of the indicator itself (Figure 47), the largest effects are experienced in regions with medium values (around 80% of community involvement). This may be due to the fact that, for regions with very high levels of social support close to 100%, the room for improvement is very narrow and it is increasingly difficult to establish links between the few people who remain on the margins. In contrast, in regions with very weak social fabrics, some pre-existing connections are required before new ones can be established. For example, it is easier to meet new people or strengthen friendships at a music concert if you have acquaintances to attend with, as many people will probably not want to go alone.

In terms of time trends, the effects of the CCIs on the community have evolved inversely to the economic cycle, growing and peaking in 2014, and declining thereafter (Figure 48). This is reasonable given that in the years of greatest economic hardship, when many people were at greater risk of social exclusion (job loss, evictions, etc.), CCIs could have played a role in preserving social cohesion.

The regions with the most positive impacts are mainly concentrated in Spain, Portugal, Italy and Greece (Figure 58), i.e. in the countries of Mediterranean and Southern Europe (albeit with some exceptions within these countries, e.g. in eastern Spain). These areas have in common that they have relatively low levels of CCI employment (at least in comparative terms). And at the same time they share certain social relational dynamics (e.g. more contact with the extended family, more interaction in the street due to culture and climate, etc.). In these cultural contexts, it is possible that CCIs are more linked to social interaction and therefore have a greater impact on interpersonal bonding. In contrast, the north of England, parts of Sweden, eastern Germany, the Netherlands, Lithuania and the Czech Republic are the regions with the most negative impacts.

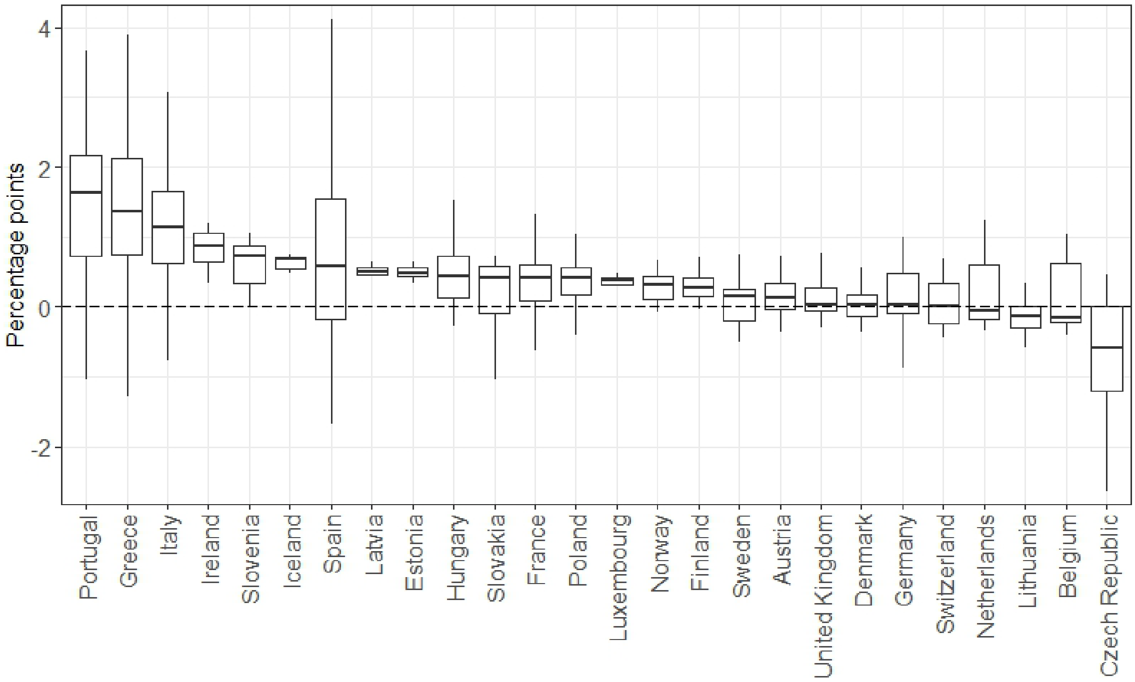
On the other hand, if a ranking of the median effects by country is established (Figure 59), it would be headed by Portugal, followed by Greece, Italy, Ireland and Slovenia. While the negative counterpart would be led by the Czech Republic, followed by Belgium, Lithuania and the Netherlands.

Figure 58. *Map of individual treatment effects of CCIs on Community (social network support, %), average 2009-2019*



Source: Own elaboration

Figure 59. *Box plot of individual treatment effects of CCIs on Community (social network support, %) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.6.6. Environment

Regarding the environment, the average effects are positive and quite relevant, with an average elasticity of 0.048 in reducing the presence of particulate matter ($PM_{2.5}$) in the air. That is, a one percentage point increase in the share of CCI employment leads to a reduction of 0.139 $\mu g/m^3$ in the average presence of particulate matter in the air. However, this reduction is only a consequence of IP+R&D activities, while CCS actually seems to be associated with worsening air pollution (Table 15).

This should make us rethink the initial argument that the positive effect on the environment would be caused by production and consumption being more focused on symbolic and experiential content, and therefore less intensive use of material resources, i.e. a process of dematerialisation. Given that CCS are also characterised by a strong symbolic value content (probably to a greater extent) but do not generate this effect, it is conceivable that the dematerialising effect is caused by the technological component that distinguishes IP+R&D. Innovations aimed at the digitalisation of the economy, or more efficient and sustainable solutions promoted by applied research, seem to be those that contribute to reducing the impact of human action on the environment. Sectors with a more traditional cultural and creative component generally do not, despite the findings of the qualitative study by Laima Gerlitz and Gunnar Klaus Prause (2021) or others that address related issues (Alessandro Crociata et al., 2015; Davide Quaglione et al., 2017, 2019; Miriam Burke et al., 2018; Bo Li et al., 2022). In this respect, and as indicated in section 3.3.2, it should be noted that CCS include some activities such as fashion or advertising that do encourage consumerist behaviour and a greater waste of resources that can still be used but are no longer trendy. Or even heritage, festivals and other cultural assets that attract tourism cause damage to the environment through overexploitation of territories and polluting travel.

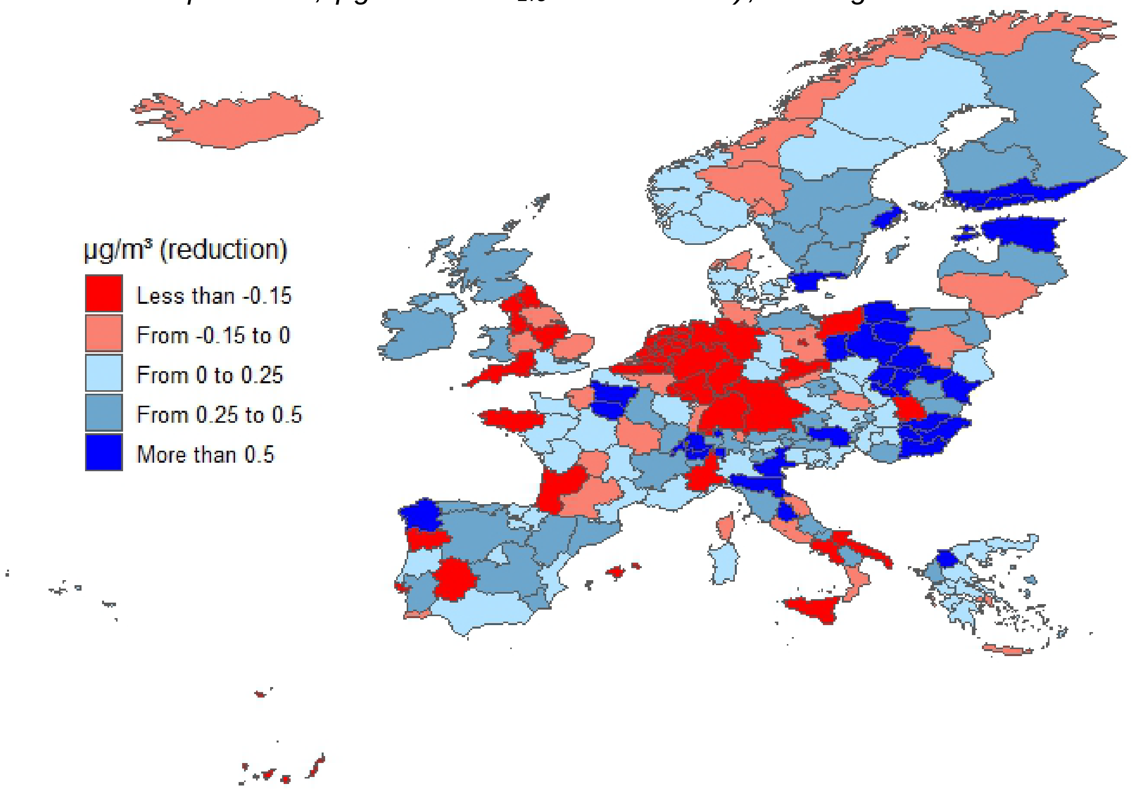
In any case, the overall average effect for the environment of CCIs as a whole is positive. Moreover, the effects continue to be felt also in the medium and long term, in fact to a greater extent (Table 14). Though the positive impact has been decreasing over the years (Figure 48).

The largest positive effects occur in regions with low or high CCI employment, not in those in between (Figure 46). The effects are also much larger in the most polluted regions (Figure 47), i.e. where the problem is most pressing, generates more concern and CCIs may be most committed to contributing to its solution.

More specifically, the regions experiencing the greatest positive average impacts are distributed in Estonia, Poland, Hungary, southern Finland, Paris and surroundings, Switzerland, etc. Conversely, regions with average negative effects are notable in Germany, England, southern Italy, Belgium or the Netherlands (Figure 60).

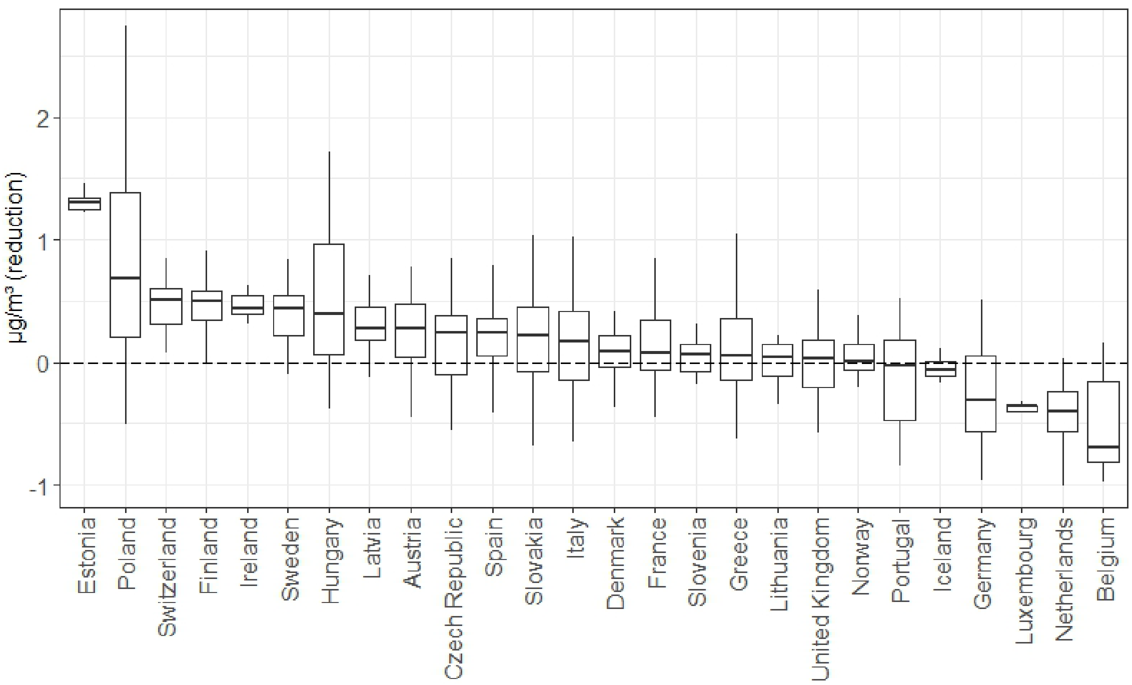
If we group all the regional effects for each country, the biggest beneficiaries are, in this order of medium effect, Estonia, Poland, Switzerland, Finland and Ireland. At the opposite end of the spectrum, the worst hit are Belgium, the Netherlands, Luxembourg, Germany and Iceland (Figure 61).

Figure 60. *Map of individual treatment effects of CCIs on Environment (air pollution, µg/m³ of $PM_{2.5}$ –reduction–), average 2009-2019*



Source: Own elaboration

Figure 61. *Box plot of individual treatment effects of CCIs on Environment (air pollution, µg/m³ of $PM_{2.5}$ –reduction–) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.6.7. Access to services

The impact of CCIs on access to services, or rather on access to broadband connection, has not been studied before, nor is the relationship immediate or intuitive. Therefore, the somewhat unexpected positive average effect, with an elasticity of 0.076, may come as a surprise. A large part of the explanation lies in the fact that the impact corresponds almost exclusively to IP+R&D activities, while the more traditional CCS have no statistically significant effect (Table 15).

The fact that the activities included in IP+R&D (telecommunications, computer programming, consultancy, information services, R&D, etc.) have an effect on the percentage of households with broadband connection seems more understandable. These activities require good internet connections. In addition, they drive technological innovation by interlinking with other sectors, which enhances the development of the necessary digital infrastructure. In turn, these activities are more prone to teleworking, so households need good internet networks.

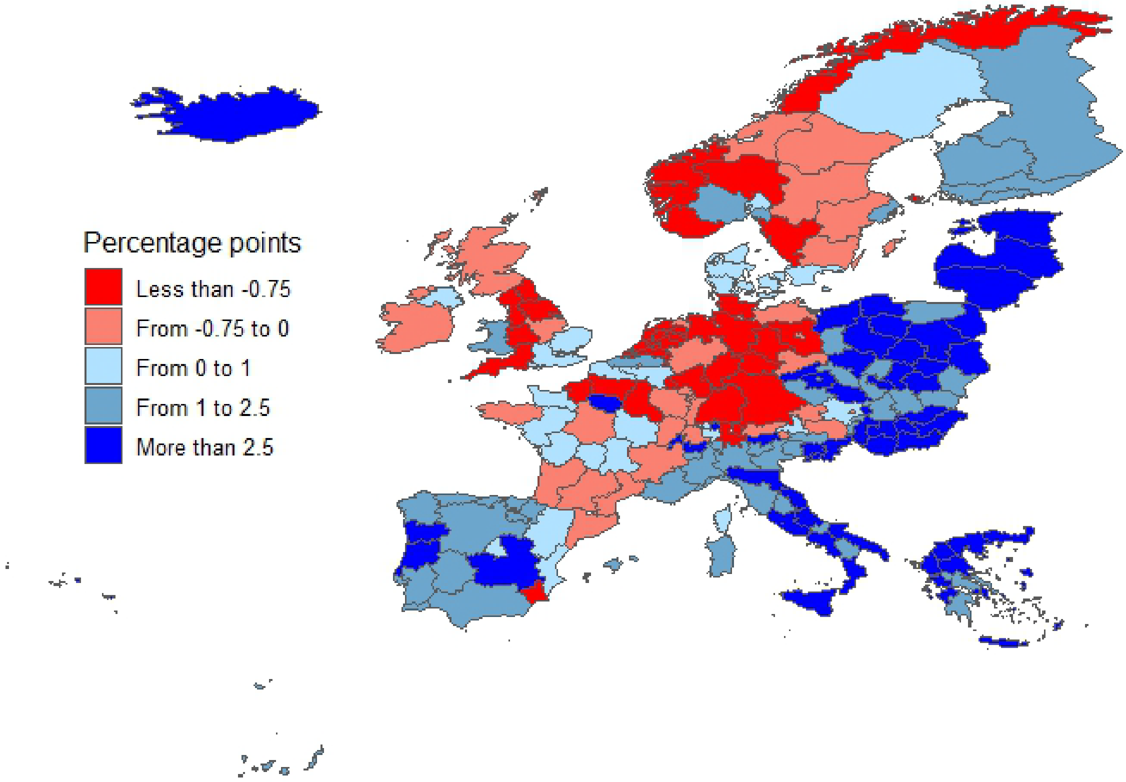
Either way, taken together with CCS (i.e. CCIs), a one percentage point increase in the share of employment in CCIs increases the percentage of households with a broadband connection by 1.218 points. If we translate this to the OECD European regions as a whole, it would mean that 5.8 million more people would have a broadband connection at home. In a region like Prague or others of similar population, this would amount to about 15,800 people.

Their effect is greater in regions where the share of CCIs in employment is low, where a small introduction of these sectors into the economy can make a big difference (Figure 46). Similarly, the impact is also higher when starting from low levels of access to broadband connection, and the effect progressively decreases and tends to zero when access is already close to 100% (Figure 47). This is logical and to be expected. In a region with few CCIs and little digitisation, the growth of CCIs (more specifically, IP+R&D) provides a greater boost to the regional structure than in others whose effects are already almost fully exploited and where there is little room for improvement. In line with this, there is also a slight decline in the effect over the years (Figure 48), probably due to the increasing spread of broadband connection.

By region, those with the greatest effects are mainly in the east of Europe, the Baltic countries, most of Greece, Italy and northern Portugal (Figure 62). That is, in those areas where the roll-out of broadband networks may have occurred later. The opposite is true if we look at those with negative impacts, mainly located in Germany, the Netherlands, Norway or part of England.

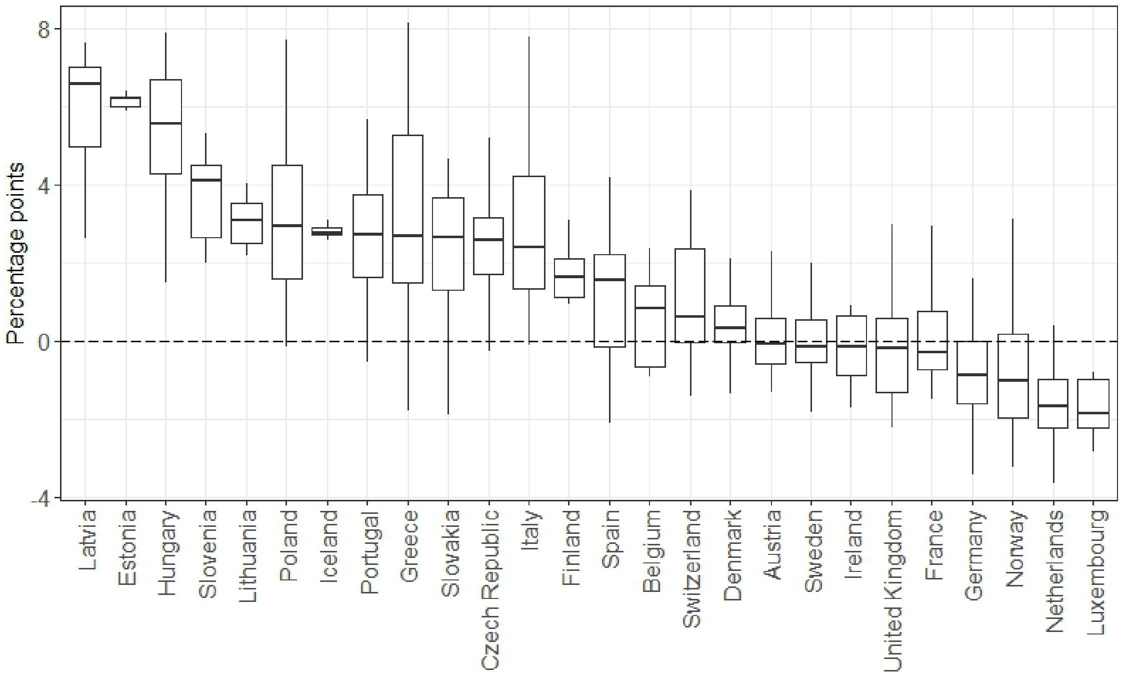
Grouped and ordered by country, the largest median effects are in Latvia, Estonia, Hungary, Slovenia and Lithuania, while at the bottom are Luxembourg, the Netherlands, Norway, Germany and France (Figure 63).

Figure 62. *Map of individual treatment effects of CCIs on Access to services (households with broadband access, %), average 2009-2019*



Source: Own elaboration

Figure 63. *Box plot of individual treatment effects of CCIs on Access to services (households with broadband access, %) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.6.8. Civic engagement

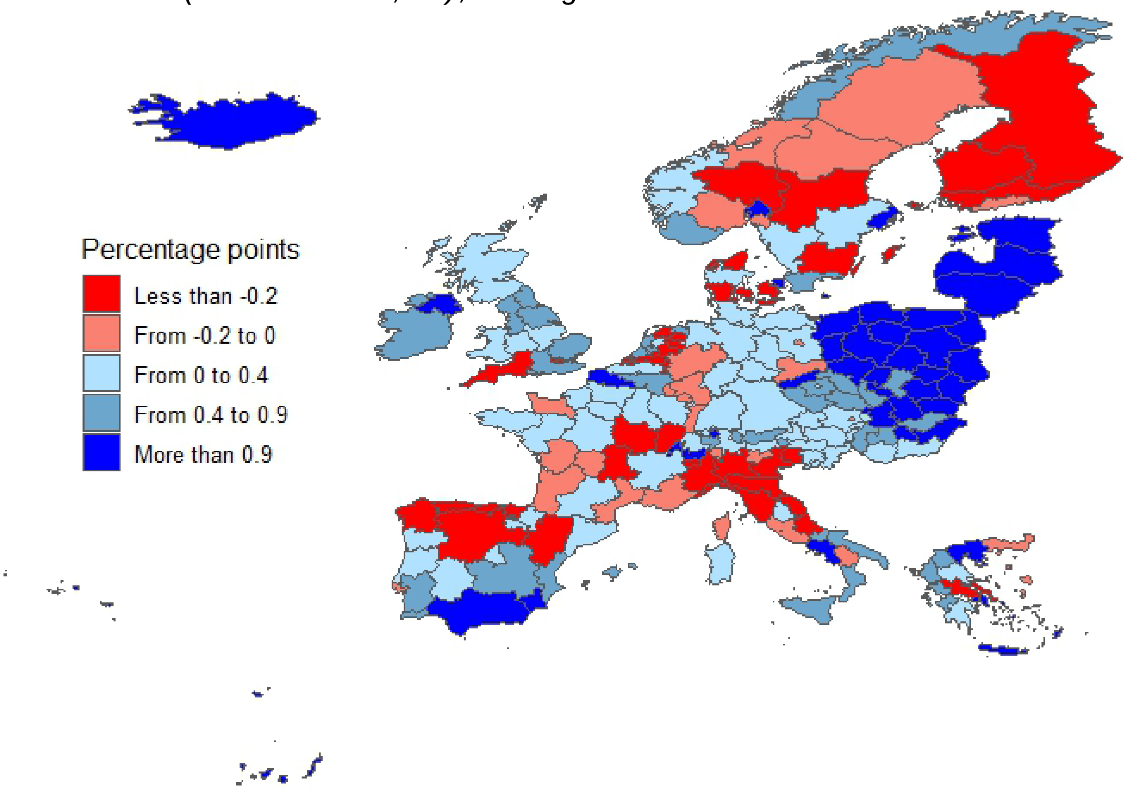
Similarly, the impact is also positive for civic engagement (with a more moderate average elasticity of 0.02), but if a distinction is made between CCS and IP+R&D, the effect is only on the latter (Table 15). On average, a one percentage point increase in employment in CCIs results in an increase in voter turnout of 0.299 points. For OECD Europe as a whole, this would mean about 1.2 million more people going to the polls. In a region like Lorraine, it could increase turnout by just over 5,500 people.

The main effects occur in regions with low CCI employment, or in the upper middle (Figure 46). Beyond a certain point around 8% or 9% of share of CCIs in employment, the effect decreases. With respect to the level of voter turnout, CCIs have very positive effects in regions with very low voter turnout (Figure 47). After that, however, it drops significantly and, from around 70%, the effect is null. It makes sense, given that the space for improvement is already very narrow. People who do not vote in contexts of very high voter turnout are either very convinced not to do so for ideological reasons, or they are completely disenchanted with institutional politics and it is extremely challenging to connect with them through CCIs. The impact has also decreased over time (Figure 48), possibly because of the same growing difficulty.

Geographically, Eastern Europe, the Baltic countries, Iceland and Southern Spain concentrate a large part of the regions with the most positive average effects, while the opposite is true for Finland, northern Spain and northern Italy (Figure 64).

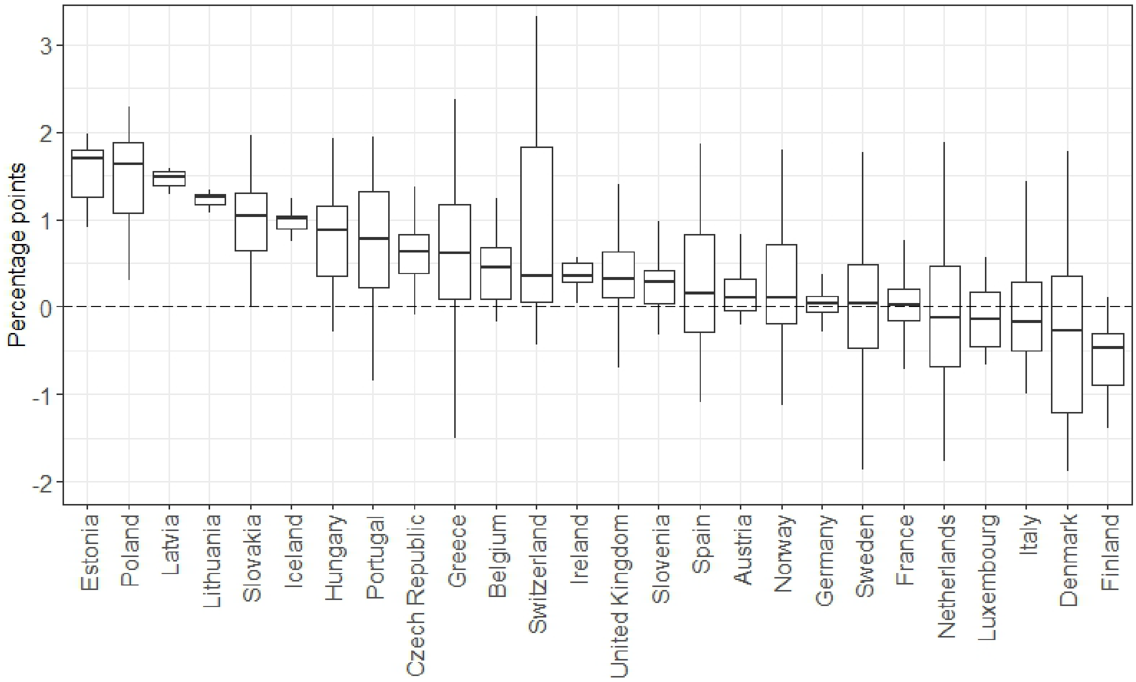
If we take the median effects grouped by country, Estonia, Poland, Latvia, Lithuania and Slovakia benefit the most, while Finland, Denmark, Italy, Luxembourg and the Netherlands are the worst off (Figure 65).

Figure 64. *Map of individual treatment effects of CCIs on Civic engagement (voter turnout, %), average 2009-2019*



Source: Own elaboration

Figure 65. *Box plot of individual treatment effects of CCIs on Civic engagement (voter turnout, %) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.6.9. Housing

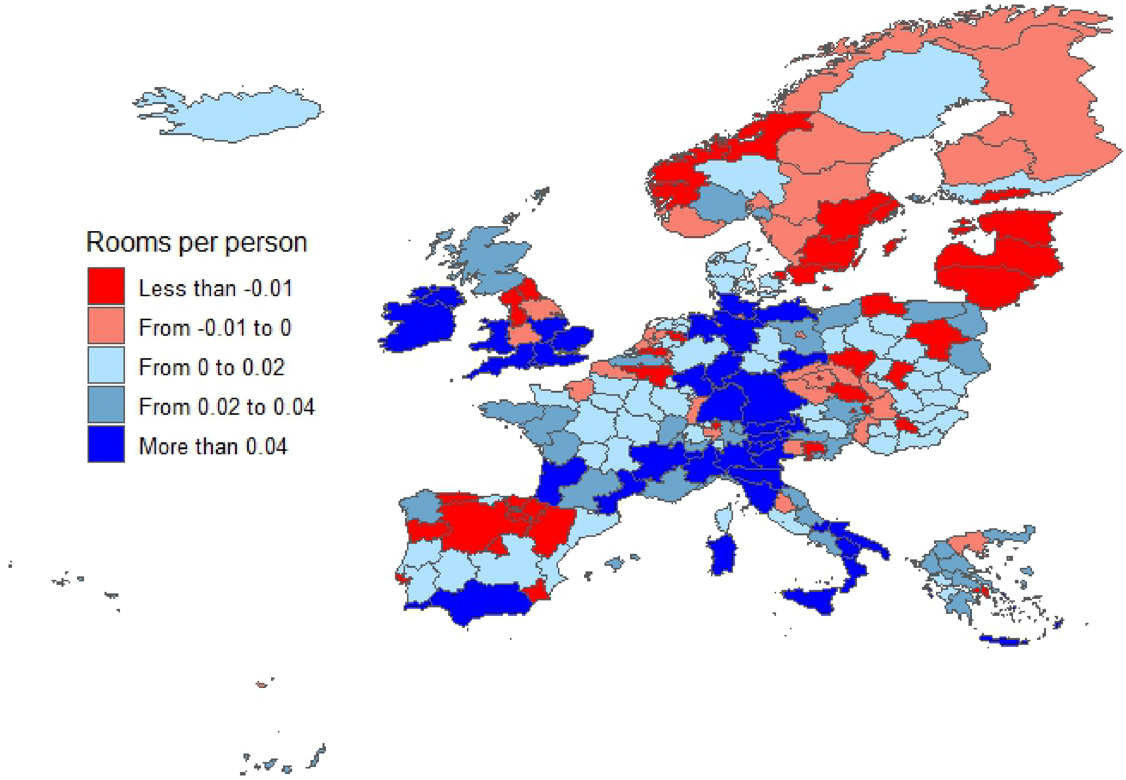
Turning to housing, it should be noted at the outset that the fit of the model is not particularly good (see Table 13 and Figure 43), so any results should be taken with heightened caution. Still, the average effect is positive (average elasticity of 0.042), and occurs in both CCS and IP+R&D (Table 15), although it has been declining over time (with a small upturn at the end) (Figure 48). On average, a one percentage point increase in the share of employment in CCIs represents an increase of 0.015 rooms per person. To understand this result, it is crucial to revisit Figure 46. It shows that the positive effect only occurs when the CCI level is low. From a saturation point of around 7.5% of employment in CCI, the effect actually becomes negative. Similarly, if we extend the time horizon from the short to the medium or long term, the effect also becomes negative (Table 14).

The explanation for this phenomenon can probably be found in the processes of gentrification or, in general, death by success. The presence of large volumes of artists, creative workers, tourists and people who are attracted by a vibrant cultural and creative atmosphere causes areas to appreciate in value and consequently makes housing more expensive. In addition, we have seen that CCIs have positive effects on income and jobs, resulting in a pressure on land and housing prices. In this context, new dwellings tend to be built smaller due to higher land prices, existing dwellings redistribute their space to accommodate more rooms and tenants, small previously uninhabited spaces are incorporated as dwellings, the best dwellings are destined for tourist use (more lucrative), flat-sharing becomes increasingly common even at older ages, etc., so that there are fewer rooms per person to live in.

This argument is reinforced by the fact that the average impact of CCI on housing tends to be negative in regions where large European cities are located, such as Athens, Lisbon, Madrid, Prague, Helsinki, Stockholm, Budapest, Zurich, Vienna, etc. (see Figure 66). That is, precisely where there is the highest concentration of CCI and where the housing market may be most saturated. The other regions with mostly negative impacts include the Baltic countries, southern Sweden, northern England and Spain, parts of Norway and some regions of Poland. In contrast, Ireland, Scotland and southern England, northern and southern Italy, western Austria and parts of Germany experience the most positive effects.

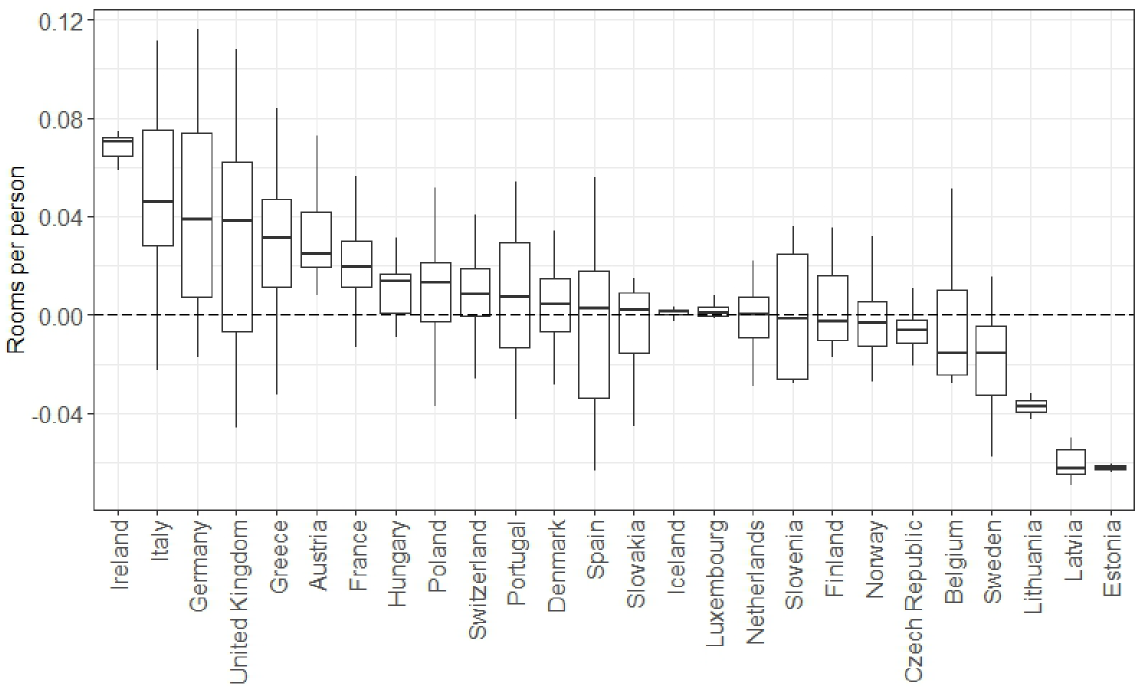
By country, Ireland, Italy, Germany, the United Kingdom and Greece stand out among those with median negative effects, while Estonia, Latvia, Lithuania, Sweden and Belgium are the worst affected (Figure 67).

Figure 66. *Map of individual treatment effects of CCIs on Housing (average number of rooms per person), average 2009-2019*



Source: Own elaboration

Figure 67. *Box plot of individual treatment effects of CCIs on Housing (average number of rooms per person) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.6.10. Safety

The effects of CCIs on safety are small and show low statistical significance. Both in the short, medium and medium-long term (Table 14). Allowing for this, a one percentage point increase in the share of CCIs in employment would reduce the homicide rate per 100,000 inhabitants by 0.017. This is, for OECD Europe as a whole, a reduction of 82 homicides. And for a region like Scotland, one homicide less.

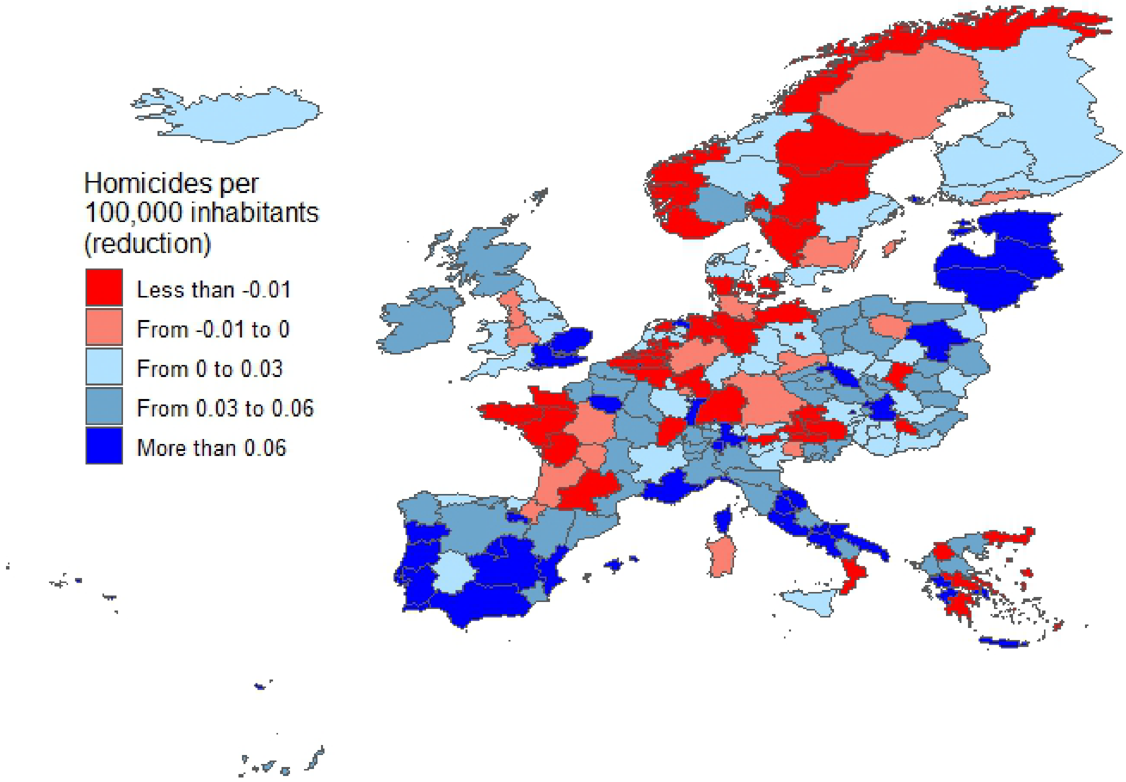
Despite positive indications from some studies on arts and cultural interventions to reduce crime at the micro level in individuals with a criminal or at-risk background (Peter Taylor et al., 2015), it is not surprising that there are little notable effects at the macro level. The result is consistent with that reported by Margarida Azevedo (2016) for the European Capital of Culture in Guimarães (Portugal). While she identified effects on so-called “crimes against property”, she did not identify any effect on “crimes against persons”, including homicides (which is the indicator used here). Overall, the low effects of CCIs on the homicide rate is consistent with the low variability of this rate across European regions.

However, a couple of interesting phenomena can be observed. Firstly, although there is no overall effect, Figure 47 suggests that there could be a positive impact on homicide reduction in regions with high crime rates. Secondly, unlike CCS or CCI as a whole, IP+R&D activities do have a crime-reducing effect (Table 15), although the reasons are not entirely clear.

On the other hand, while bearing in mind that the overall effect of CCIs shows low statistical significance and therefore local effects should be treated with extreme caution, it is interesting to look at regional heterogeneous effects because it is indeed possible that certain regions, due to their characteristics, benefit from higher shares of employment in CCIs. That said, the regions with the largest positive effects are in Portugal, the Baltic countries, southern Spain, south-east England, part of Italy, city regions such as Vienna, Brussels or Paris, and some regions of Switzerland, Greece, Slovakia, the Czech Republic and Poland (the region including Warsaw). In contrast, the largest negative effects occur in Norway, Sweden, the Netherlands, Belgium, north-western France, western Austria, parts of Greece, Germany and Denmark, and certain regions of Poland, Hungary (Budapest) and Italy (Calabria) (Figure 68), although the increase in the number of homicides per 100,000 inhabitants is actually low.

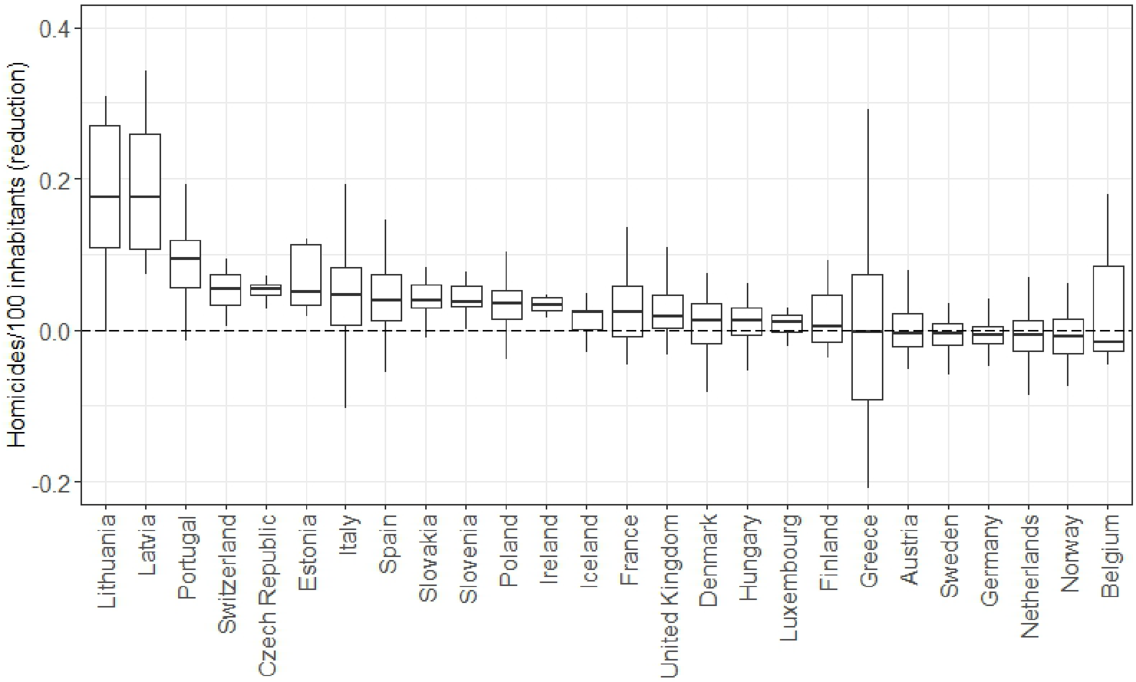
Grouped by country, those with the greatest median homicide reduction effect are Lithuania, Latvia, Portugal, Switzerland and the Czech Republic. At the bottom, with negative median effects, are Belgium, Norway, the Netherlands, Germany and Sweden (Figure 69).

Figure 68. *Map of individual treatment effects of CCIs on Safety (homicide rate, homicides/100,000 inhabitants –reduction–), average 2009-2019*



Source: Own elaboration

Figure 69. *Box plot of individual treatment effects of CCIs on Safety (homicide rate, homicides/100,000 inhabitants –reduction–) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.6.11. Life satisfaction

The effect of the share of CCIs in employment on life satisfaction is positive, albeit moderate (elasticity of 0.014). It takes into account both the direct effect and the indirect effect through the improvement of the different dimensions of objective well-being. This implies that a one percentage point increase in the share of CCIs in employment improves average life satisfaction by 0.023 on a scale of 0 to 10. However, this effect only occurs for IP+R&D activities, while it is virtually zero for CCS (Table 15). The effect is also concentrated mainly in the short term (Table 14), which is logical given that subjective perception tends to value immediate circumstances more than past ones.

These macro-level findings are consistent with those of numerous micro-level studies on the effects of cultural participation on subjective well-being (Enzo Grossi et al., 2011, 2012, 2019; Giorgio Tavano Blessi et al., 2016; Alex Bryson & George MacKerron, 2017; Chris Hand, 2018; Daniel Wheatley

& Craig Bickerton, 2019; Dorota Węziak-Białowolska et al., 2019; Victoria Ateca-Amestoy et al., 2021). Therefore, not only does culture improve the subjective well-being of each individual, but a territory with a greater presence of cultural and creative activities also leads to a higher average life satisfaction. This is not a minor issue, nor is it just another dimension. Life satisfaction is a cross-cutting dimension that captures subjective well-being. That is, whether improvements in the quality of life are actually positively valued by the citizens who experience them, which allows us to speak of well-being in the proper sense (recall the discussion in section 2.1.2).

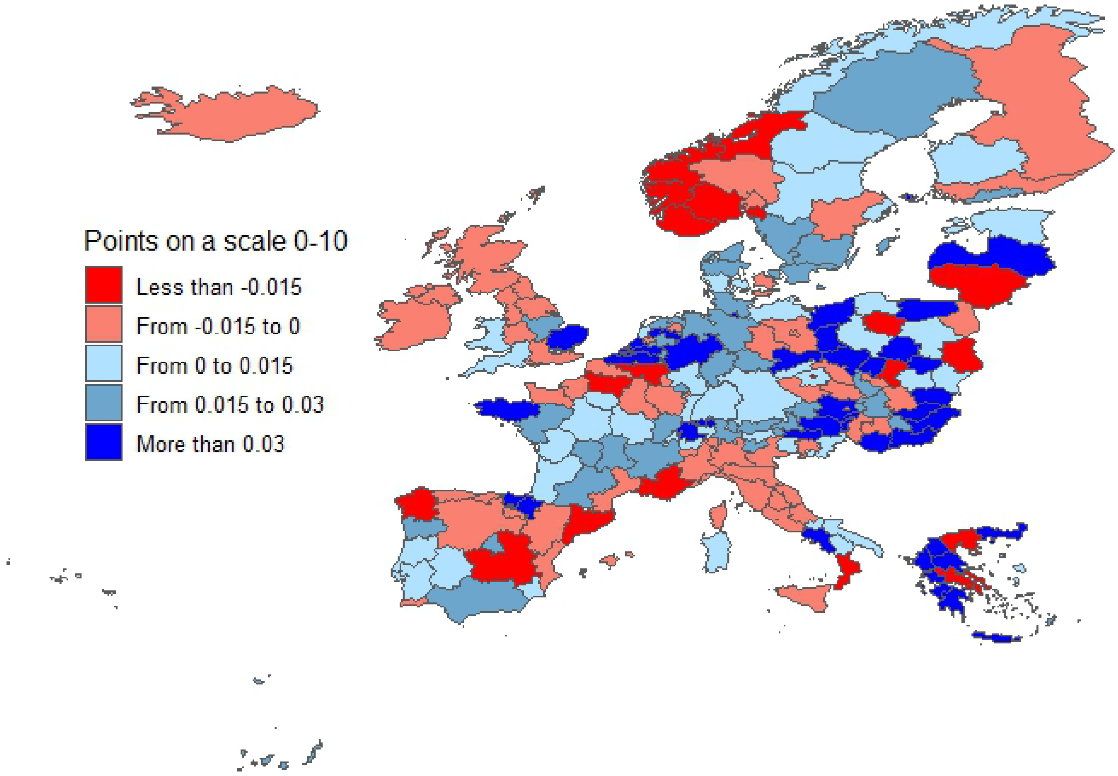
The results on life satisfaction also give rise to other interesting readings. On the one hand, the effects are concentrated both in regions with low average life satisfaction (where CCIs have more room for improvement) (Figure 47) and in regions starting from low shares of employment in CCIs (Figure 46). Once a certain level of both employment in CCIs and life satisfaction has been reached, the effects tend to zero. On the other hand, the effects of CCIs on life satisfaction apparently follow a counter-cyclical behaviour with respect to the economic cycle. That is, they were more intense during the hardest years of the economic crisis and decreased with the recovery, from 2013 (Figure 48). This may reflect, in part, the aforementioned tendency towards greater impact when life satisfaction is lower, but also that, in contexts of precarious material well-being, life satisfaction may depend to a greater extent on factors that rely on symbolic inputs. Thus, the emotional, aesthetic, cognitive and social impacts of cultural participation (Pau Rausell-Köster & Sendy Ghirardi, 2021) generated by CCIs would become more relevant.

All in all, as was the case for the other dimensions, the effects are not homogeneous across regions and there are important differences. Not all regions benefit equally in terms of life satisfaction, and in some it actually worsens. Looking at specific regions, the most positive impacts are mainly concentrated in Eastern Europe. Several regions in Poland, Hungary, Latvia, Greece or eastern Austria stand out, but also in Switzerland and the Netherlands, and some particular regions in Germany (North Rhine-

Westphalia and Saxony), Belgium (Flanders), France (Brittany), England (East), Italy (Campania) and Spain (Basque Country and Navarre) (Figure 70). In the case of Eastern Europe and Greece, this corresponds to regions with comparatively low levels of both CCI employment and life satisfaction (see Figure 73 in Annex III), which is consistent with the findings discussed above. However, these countries also present a great deal of internal heterogeneity as they also contain several of the regions with the most negative impacts. In addition to some regions in Poland, Greece and Lithuania, Norwegian regions stand out with negative impacts, as well as some regions in Spain, France, Italy (Calabria) and Belgium (Wallonia).

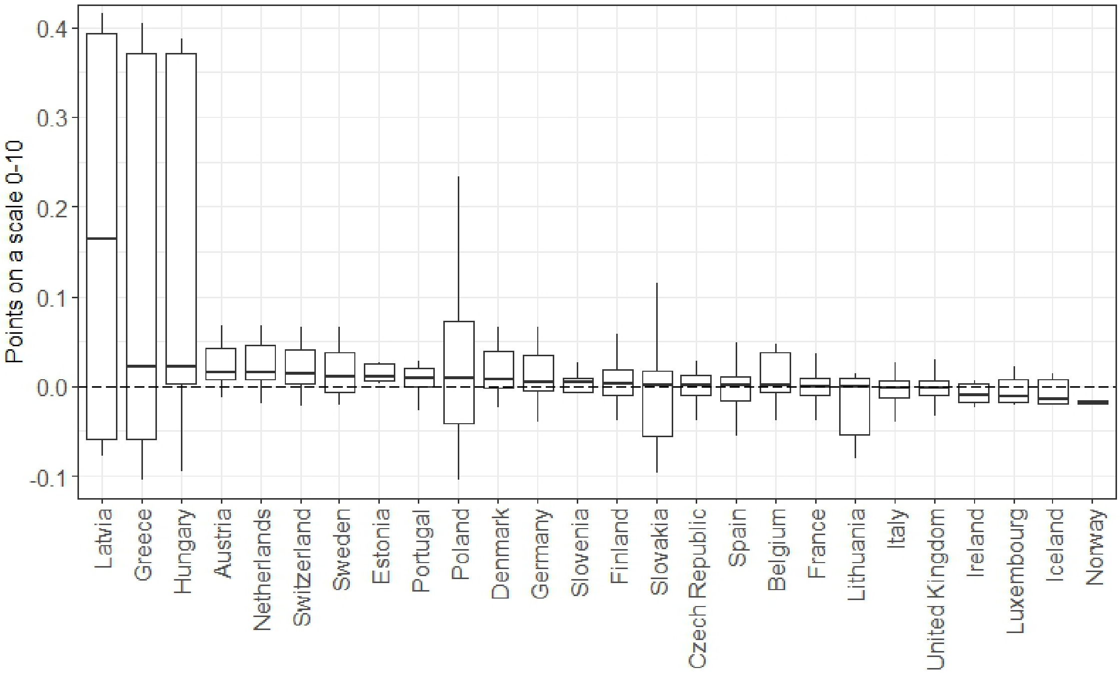
When grouped by country, the great internal heterogeneity within Eastern European countries and Greece is once again striking. Apart from that, the most positive median effects occur, from highest to lowest, in Latvia, Greece, Hungary, Austria and the Netherlands. In contrast, Norway, Iceland, Luxembourg, Ireland and the United Kingdom have negative median effects (Figure 71).

Figure 70. *Map of individual treatment effects of CCIs on Life satisfaction (0-10), average 2009-2019*



Source: Own elaboration

Figure 71. *Box plot of individual treatment effects of CCIs on Life satisfaction (0-10) by country, 2009-2019*



Source: Own elaboration. *Note:* The line inside each box marks the median

7.7. An overview of the regional distribution of impacts

Although some territorial patterns have already been noted in the analysis by dimensions, it remains to be seen which regions benefit most from the effects of CCIs on their overall well-being. Of course, a detailed analysis for each region is not possible within the limits of this dissertation. We will instead outline, at a general level, in which regions positive effects predominate over negative ones, and vice versa. Simply by counting both positive and negative impacts, without going into the intensity and composition of these impacts. However, in order to carry out concrete and rigorous regional diagnoses, a more detailed analysis would be appropriate, given that, as we have seen, the effects can differ greatly between neighbouring regions, even with opposite effects in different dimensions.

Overall, there are more positive than negative effects in the vast majority of regions (196 out of 209 regions). Still, a first point to note is that there are only 14 regions where the effects are beneficial for each and every one of the eleven dimensions. In other words, even though the average effects are positive for all dimensions, CCIs are not a magic solution to all problems in any given context and can generate adverse effects. These negative effects should be monitored.

Conversely, even in those regions where negative effects are predominant, there are several dimensions that experience positive effects. In these contexts, therefore, CCIs can also contribute to certain aspects of well-being. There are only 13 regions in this situation. Berlin, Bremen, Utrecht, Vienna have the fewest dimensions with positive effects of CCIs, with only four compared to seven with negative effects. Nine other regions follow with five dimensions with positive effects compared to six with negative effects.

The majority, on the other hand, are in a medium-high position in terms of the number of dimensions with negative effects. Almost two thirds of the regions (135 out of 209) have between seven and nine dimensions where CCI employment generates positive impacts.

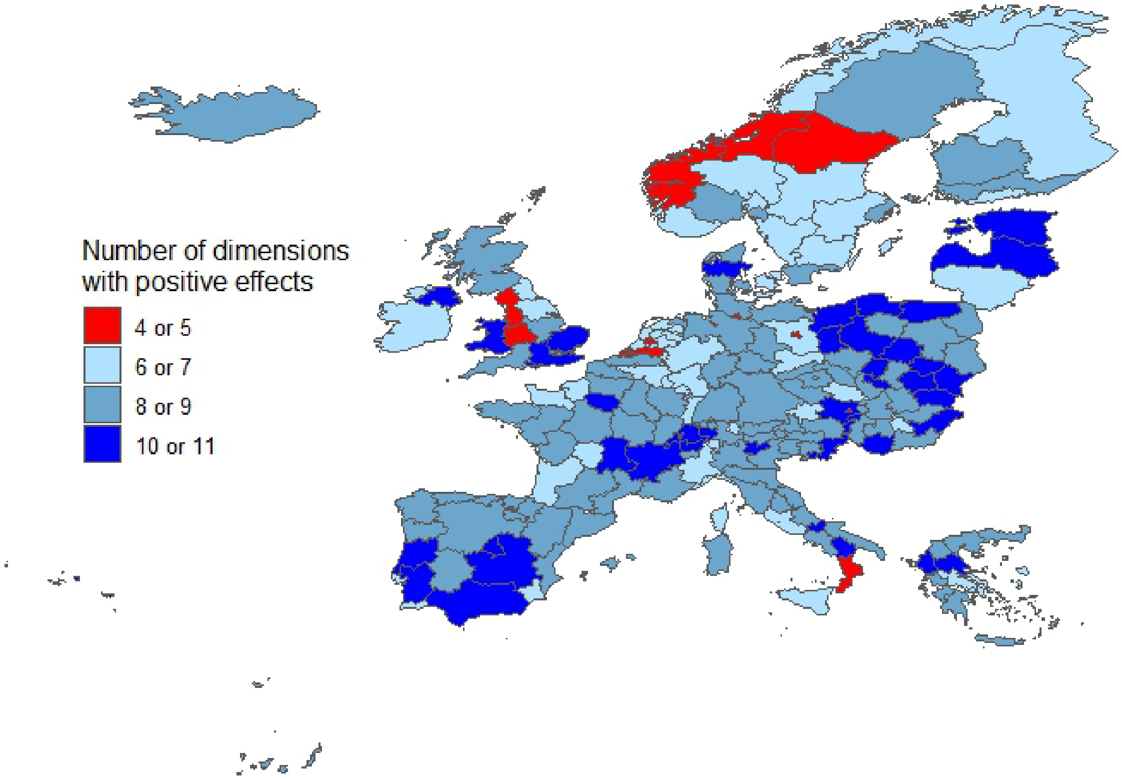
Figure 72 shows how they are distributed. Most of the regions with predominantly negative average effects are concentrated in Central and Northern Europe, with the exception of Calabria. In particular, several Norwegian regions (Zeeland, North Brabant, Western Norway and Trøndelag), a couple of English regions (North West and West Midlands) some German city regions (Berlin, Bremen, Hamburg), Middle Norrland, Vienna and Utrecht, as well as the aforementioned Calabria. By contrast, the biggest beneficiaries are to be found in some parts of Poland, Hungary, Latvia, Estonia, Slovenia, Slovakia, Portugal, Spain, France, Italy, Greece, Switzerland, Northern Ireland, Wales, South East England and Denmark. More specifically, focusing just on those regions that report positive effects in absolutely all dimensions, 6 out of 14 are located in Poland: Lesser Poland, Greater Poland, Lubusz, Opole, Warmia-Masuria and Lódzkie. Hungary follows with two regions: Southern Transdanubia and Northern Great Plain. The remaining ones are Eastern Slovenia, Eastern Slovakia, Burgenland (Austria), Lake Geneva region (Switzerland), Central Jutland (Denmark) and Wales.

Disparities between regions can have multiple causes. First, differences in the internal composition of activities within CCIs. As has been seen, different subsets of CCIs may have differential impacts on some dimensions. Secondly, the structural characteristics of regions (economic, socio-demographic, political, etc.) influence the impacts and may intensify or moderate them. Finally, and partly as a consequence of the previous two, the ways in which CCIs interrelate with the environment vary from one region to another.

In general, and not without notable exceptions, it appears that the regions that benefit most from an increase in the share of employment in CCIs are those that start from relatively low levels of employment in CCIs and whose performance in several dimensions of well-being is comparatively lower (at least among the regions in the territorial context analysed). Conversely, regions that experience few positive effects are generally those enjoying good levels of well-being (hence there is less room for improvement and marginal increases become more challenging) and very high shares of employment in CCIs (e.g. 14.2% in Berlin or 11.1% in Vienna in 2019), so that they have already reached saturation levels in several dimensions.

This raises very interesting implications for regional convergence. That is, the promotion of CCIs is not only a policy for large and dynamic urban areas, but precisely those starting from lower well-being levels and with less developed CCI fabrics are generally those that can expect the highest marginal return from an increase in CCIs.

Figure 72. *Map of the number of well-being dimensions (out of 11) on which CCIs generate positive effects on average (2009-2019)*



Source: Own elaboration

CHAPTER 8
Conclusions

8.1. Some general insights

It has become clear that the effects of CCIs on the well-being of regions are mostly positive, although not without many nuances. Indeed, they are positive, in aggregate terms and with varying intensity, for all dimensions: education, income, jobs, access to services, environment, community, civic engagement, health, life satisfaction and safety, the latter showing a low statistical significance (Table 13). For most dimensions, these findings are novel. While in education and income (two of the dimensions with the clearest and strongest effects), where previous studies on the regional effects of CCIs did exist (Filippo Berti Mecocci et al., 2022; Rafael Boix-Domènech et al., 2022), their findings are corroborated. However, the average effects are only a miniscule part of the much juicier results, which contain a great deal of information that deserves to be exploited and reflected upon.

One aspect that will not escape the reader is the relevance of the CCI classification used. The great diversity of activities that fall under CCIs may have quite different, and even opposite, effects. Therefore, the approach adopted, the definition of which determines which activities are included, is not neutral and can substantially alter the results. This was already noted in section 1.2.

In particular, differences in performance have been observed above between two subdivisions of what we mean by CCI: CCS and IP+R&D. The former representing those cultural and creative activities in a narrower and more conventional sense (those considered as CCS by Manuel Vilares et al. (2022)) and the latter including other industries strongly based on intellectual property and research and development, with a generally more technological and market-driven orientation (the rest of the cultural and creative ecosystem, according to Manuel Vilares et al. (2022)).

In some dimensions, the two groupings of activities act in parallel, complement or even reinforce each other (education, health, housing and income). In others, it is only one of them that generates statistically significant impacts (access to services, civic engagement, community, jobs, life satisfaction and safety). Only in one case (environment) do CCS and IP+R&D act in opposite directions and counteract each other.

However, it should be recalled at this point that these activities are highly interrelated, as they are part of the same cultural and creative ecosystem. They therefore tend to appear together and to be distributed very similarly across regions (see Figure 24), with a correlation of 0.757. Consequently, it makes perfect sense to observe their joint effects (i.e. those of CCI) and, in case of divergences, to verify which ones prevail in the aggregate. For example, in the case of the environment, IP+R&D improve it and CCS worse it, but for the CCI as a whole it is the former effect that predominates.

Anyhow, the criticism made by some authors (e.g. Nicholas Garnham, 2005; Susan Galloway & Stewart Dunlop, 2007) that the economic and employment generation impacts attributed to CCIs are actually due to the inclusion of technological sectors is not borne out by the evidence. Precisely in the more purely economic dimensions, the effect of CCS outweighs that of IP+R&D. This is the case for both income and jobs. As already mentioned, this underlines that the primary role of CCIs in the economy is precisely the generation of ideas as catalysts of innovation in the whole productive structure. Therefore, those CCIs that directly apply this creative process to market-oriented functional products will not necessarily have a greater economic impact than those whose function is to disseminate ideas, messages and symbolic content of purely artistic expression. Nonetheless, it remains to be verified to what extent this conclusion can be generalised or is limited only to regions in highly developed countries such as those in the sample. It should be borne in mind that these countries are affected by a series of circumstances such as greater access to cultural goods and services by the population (and therefore to the ideas they disseminate), more mature CCIs and the presence of highly innovative sectors that can be intertwined with the CCIs, enhancing their economic effects.

Conversely, an interesting and unexpected phenomenon is that IP+R&D activities seem to have a greater impact on some social dimensions, such as community and civic engagement. Also in terms of subjective perception (life satisfaction) where we would expect a greater impact of intrinsically symbolic content-creating activities such as CCS. These *a priori* striking findings will require further reflection to come up with possible explanations.

Beyond the classification used and their average effects, there is a very wide heterogeneity of individual effects. It is therefore of utmost importance to adapt the diagnosis to the specific regional reality. Even if the treatment, i.e. CCI, is effective on average, it may not be so for a region given its particular features, or may even be detrimental. Or vice versa. Fortunately, the analysis of heterogeneous individual treatment effects (ITE) with causal forest makes it possible to identify in which regions and under which circumstances CCIs can be most effective and beneficial, thus better targeting efforts and making more efficient use of resources in policy making.

Another interesting aspect has to do with the time dimension. In general, the effects do not tend to be spread over time, as they appear in the following year. In some dimensions such as education, environment, health, income or jobs, the effects are also long-lasting and continue to have an impact in the long term. But this works on an additive basis, as they also occur over shorter time horizons. Consequently, a policy that envisages the instrumental use of increasing CCIs to obtain higher well-being can expect a relatively prompt return in terms of well-being. And in some dimensions, also long-lasting. Housing deserves a separate comment, which, despite the CCI effect being positive in the short term (albeit with a poor adjustment that suggests being cautious with the results), turns negative in the medium and long term.

Overall, CCIs show great potential to improve people's lives in many respects, thus triggering regional well-being-enhancing processes. Therefore, the hypothesis initially put forward can be generally confirmed and the research question answered in the affirmative.

Moreover, it is conceivable that improvements in different dimensions of well-being may have further positive effects on others, thus generating indirect second-round effects. For example, improvements in different facets of objective well-being (education, income, jobs, health, etc.) will result in higher life satisfaction. This applies not only to life satisfaction, but to all dimensions that are affected by other dimensions. Improvements in education have further effects on civic engagement, community, health, jobs, etc. Increases in income have an impact on access to services, education, health, housing, etc. The list goes on and on. Thus, a virtuous circle begins between the components of well-being that does not end there. Since, as we argued theoretically in section 3.3.1 (see Figure 13) and tested empirically in section 7.1 through the Granger causality test, greater well-being also has an impact again on CCIs (see Figure 30), reinforcing them, feeding them back and starting the circle again.

However, we cannot affirm these conjectures, nor quantify them, with the estimates obtained so far. Keep in mind that, as explained in section 6.2.1, and following Judea Pearl's logic of causal paths, the coefficients of the control variables do not have a causal interpretation (hence the coefficients are not even reported in Causal Forest), only that of the treatment variable (Judea Pearl & Dana Mackenzie, 2018). Yet, it would be interesting to explore this area in future research, thus analysing the interactions between the different dimensions and their cross effects over time. For example, through dynamic systems modelling.

8.2. Recommendations for public policy

CCI-oriented policies have become central to all public policies worldwide, as most international organisations recognise the growing role of culture and creativity in development processes (Cumbre Iberoamericana, 2006;

European Commission, 2010; UNESCO, 2013; OECD, 2018a). It is not only an issue for western countries but emerging territories such as Brazil and China have significantly transformed the view of the cultural and creative field in large-scale development processes. In 2010, China's government decided to promote cultural industries as a key economic sector in its 12th five-year strategic plan, offering abundant opportunities for the industry (Yang Jianfei, 2011).

In Europe as a whole, though, there is another important strategic reason. There is a more or less informed intuition that cultural and creative activity is one of the strategic elements that makes Europe a socio-economically attractive space and underpins its global geo-strategic competitiveness in a world that is redefining its polarities. This is no longer mere cosmetics, but affects the very foundations on which the future of the European project rests.

> *"Europe's rich cultural Heritage and dynamic cultural and creative sectors strengthen European identity, creating a sense of belonging. Culture promotes active citizenship, common values, inclusion and intercultural dialogue within Europe and across the globe. It brings people together, including newly arrived refugees and other migrants, and helps us feel part of communities. Culture and creative industries also have the power to improve lives, transform communities, generate jobs and growth, and create spill over effects in other economic sectors*." (European Commission, 2018, p. 1)

As we have demonstrated in previous chapters, culture and creativity were consolidated as a kind of broad-spectrum antibiotic to therapeutically address the various social and economic challenges facing the European Union, including the "twin transitions" (Stefan Muench et al., 2022). The conceptualisation of culture and creativity as a core element and driver of European competitiveness is here to stay.

This process finds its closest expression in the formulation of the diffuse New European Bauhaus project embedded in the post-pandemic recovery programmes. In her 2020 State of the Union address, European Commission President Ursula von der Leyen (2020) declared: “I want NextGenerationEU to kickstart a European renovation wave and make our Union a leader in the circular economy. But this is not just an environmental or economic project: it needs to be a new cultural project for Europe” (p. 11).

As we have seen, CCIs can potentially enhance the quality of life and well-being in European OECD regions, in dimensions as varied as education, income, jobs, health, environment or community building, among others. Consequently, they should be placed as a strategic element in public policies and specific plans should be drawn up for their promotion, given their broad economic, social and environmental return. As stated by Victoria Ateca-Amestoy (2021), any policy aimed at planning for future well-being must give culture a central role. By setting the right targets, CCIs can be a very effective tool to foster regional development. Moreover, the returns in terms of well-being of these policies are quite fast, and they are also very long-lasting in some dimensions such as education, environment, health, income or jobs.

This view does not overlook the fact that the intrinsic objective of a cultural policy is the fulfilment of cultural rights. The strategic and integral activation of symbolic resources in the processes of urban and territorial development finds its source of legitimacy in the cultural rights of citizenship. Their effective realisation in turn determines the real possibilities of people to achieve those goals that enable them to lead a valuable life (Antonio Ramos Murphy, 2021). In this integral conception of development, social cohesion is shaped through shared values and, consequently, affecting perceptions that have much to do with wellbeing and happiness, such as the sense of belonging, self-esteem, identity, etc. But culture and creativity also generate economic growth (as seen in the impacts on income and jobs) and contribute to quality of life through the generation of environments where people can fully manifest themselves as human beings and satisfy their needs to express themselves artistically and to communicate, share and feel aesthetic and cognitive emotions.

What is not stated in this work is what are the appropriate interventions to increase employment in CCIs. Given the heterogeneity of activities, it is apparent that policies that increase employment in the field of heritage are not the same as those that can increase employment in video games or R&D activities. Nor can we deduce whether demand-side or supply-side policies are more effective for this purpose. And it is clear that the required policies go beyond the conventional cultural policy model of "cultural democratisation", since the instrumental logic that governs the model only involves increasing the provision of cultural goods and services (supply-side policy) and their dissemination among the population as a whole and the territory (Lluís Bonet & Emmanuel Négrier, 2018; Antonio Ramos Murphy, 2021).

The limitations of cultural policies are numerous and not only lie in the failure of cultural democratisation, but also extend to aspects such as instrumentalisation for electoral purposes (Jordi Sanjuán et al., 2020), the maintenance of obsolete institutions, the growing precariousness of cultural workers, the inability to detect and control the growing digital uses of culture, or the dysphoria between national policies and global dynamics (Per Mangset, 2020). Generally speaking, we can say that, in the European context, there are neither clear formulas nor consolidated and directly transferable recipes in the catalogue of available public policies.

Coherent proposals obviously go far beyond the scope of this thesis. But in a means-ends framework, what this thesis does provide are proven causal relationships that can increase instrumental rationality based on relevant, reliable and standardised data and techniques. It can thus contribute to improving decision-making and the technical quality of the policy planning process at regional level.

Nevertheless, many aspects of policy design and implementation must be taken care of in order to be truly effective and achieve the expected impacts. On the one hand, it must be thoroughly stipulated which specific industries are targeted by policies, as they may lead to different outcomes.

Indeed, important differences between the effects of CCS and IP+R&D activities have been highlighted here.

In addition, the occurrence of potential harmful effects must be anticipated and not underestimated. For example, in housing above a certain concentration of CCI employment, or in the environment in the case of CCS. It should be borne in mind that CCIs are not the magic solution to all problems and that they can also create other drawbacks. This does not mean that CCIs should be renounced as a way to improve other well-being dimensions, but rather that ways should be found to prevent, avoid or counteract harmful effects. Both from the very design of the policy itself, as well as in coordination with other complementary policies. For instance, policies to promote CCIs can incorporate ecological sustainability criteria in order to receive public funding. And if they are expected to strain access to housing in urban areas, they should be accompanied by policies to regulate the housing market, social renting, public housing promotion, etc.

Furthermore, it has become more than clear that the territorial framework is crucial, given the wide heterogeneity of effects across regions. This also challenges the territorial level of policy design and implementation. Although general policy lines can be drawn up at the national or supranational level, given that the effects between regions are very heterogeneous, they should be implemented at sub-central levels of government, based on proximity and better knowledge of the regional reality. The particularities of each region and its own CCIs should be taken into account in order to strengthen those areas of action in which they have the greatest potential to have an impact. This is further grounded in the principle of subsidiarity (whereby a policy should be carried out by the lowest appropriate level of government) which guides multi-level governance, particularly in the EU, in the interests of greater economic and resource management efficiency (Yishai Blank, 2010; Aurélian Portuese, 2012; Serafín Pazos-Vidal, 2019).

When these policies are promoted from levels above the regional level, and in particular from the national sphere, it is important to avoid the tendency to concentrate resources towards the so-called “Big Culture”, which ends up reinforcing one or two spatial hotspots in each country (Stuart Cunningham, 2002). This is the case, for example, of the Spanish film, television or publishing industries, which are largely concentrated around Madrid and Barcelona. In addition to the centralising and draining effect of cultural and creative employment in the rest of the regions, we now know that in some dimensions (e.g. housing or community) there is a saturation level, from which a greater concentration of employment in CCIs has no effect or is even pernicious. Therefore, concentrating resources in these large urban areas not only acts to the detriment of the other territories, but can also be ineffective or even counterproductive for these same leading regions. A more decentralised and more equitably distributed policy across the territory will achieve generally higher marginal effects and contribute, in turn, to greater regional convergence.

Considering the limitations of conventional policies and these new contributions that demonstrate with considerable precision the connections between culture and creativity and different dimensions of well-being (that go beyond the generic considerations of culture and development, understood in a holistic manner), it seems appropriate to think that it is time to consider a reformulation of policies oriented towards CCIs.

8.3. Limitations and future research steps

Finally, the limitations of the results discussed here should not be overlooked. These are mainly due to the very nature of the data and the multiplicity of dimensions of well-being.

On the one hand, the available indicators are not perfect, and the adequacy with which they reflect the dimension represented may be debatable. There is room for questioning whether broadband connection is a true reflection of access to services. Also whether voter turnout is a sufficient proxy for civic engagement, or whether the number of rooms per person is a good indicator of housing. These are probably not the best indicators imaginable, but they are what we have so far. The progressive availability of new data will probably allow for improved analysis in the future with indicators that represent well-being more satisfactorily. But in the meantime, what must always be kept in mind when analysing data is what exactly is being measured. For example, CCIs could reduce other crimes even if they do not reduce homicides. Or, for high levels of CCI employment and for high levels of voter turnout, the effects of CCI on voter turnout tended to be zero. But we should not rule out the possibility that they generate other impacts on civic engagement beyond voter turnout, which we are not yet able to measure.

On the other hand, the results are confined to a very specific context: European OECD countries. In other words, highly developed and territorially close countries. Therefore, values for some indicators start from generally optimal levels with low variability across regions (e.g. homicide rate). Moreover, the CCIs in these territories tend to have reached higher levels of maturity, as well as the rest of the productive structure that is imbricated with them. This makes it necessary to be cautious about extrapolating the conclusions to different contexts. The effects of CCIs may vary significantly in low-developed or emerging countries, or in other continents with different cultural and socio-economic characteristics. These gaps should be filled in future research to obtain more generalisable results that allow for adaptation to different contexts.

This leads us to talk about the future lines of research opened up by these findings and that will be pursued from now on. Firstly, as just mentioned, the database should be broadened and extended to other contexts. In particular, to countries at different stages of development and more heterogeneous countries. Although this is not without difficulties due to the lack of quality and comparable data, mainly on employment in CCIs. For the time being, it could be considered for the USA, Canada and Mexico, and will be expanded if access to data from other countries becomes feasible in the future. In addition, the database will be extended over time to observe possible changes and trends as the available indicators are updated.

Other lines of research, beyond our willingness, will depend on data availability. But this is growing rapidly, so it is not out of the question that work that is not technically feasible right now with the data at our disposal may soon become so. On the one hand, to the extent that more detailed sectoral breakdowns can be obtained, it will be enriching to observe more differences in the effects across sectors, given the enormous heterogeneity between CCIs that has become apparent. On the other hand, the regional version of the BLI lacks one of the dimensions of its national counterpart: work-life balance. This is due to the unavailability of sufficient and comparable data at the regional level. At the national level, the indicators for this dimension are the time devoted to leisure and personal care (average number of hours per day) and the percentage of employees working very long hours (fifty hours or more a week). It would have been extremely interesting to observe the impact on this dimension, and if the data is ever available, we will do so. CCIs are providers of different forms of entertainment and leisure for the population and often involve project-based work with more flexible working schedules. Moreover, on average, it is considered the fourth priority among the dimensions of well-being by people around the world, behind only health, life satisfaction and education (see Figure 10).

Furthermore, it has already been mentioned that some of the indicators (e.g. access to services, civic engagement, housing or safety) are questionable or, at best, incomplete. At present, we cannot use better indicators but we may be able to in the future and, if we do, we will of course replicate the analysis with them. As well as with new dimensions of well-being that may be considered relevant.

Not all limitations are related to the nature or availability of the data. This thesis is ambitious and has set out to cover broad purposes, considering many different dimensions of well-being. We are aware that, in this situation, there is a trade-off between comprehensiveness and specialisation. Between laying the general foundations for a holistic understanding of the impact of CCIs on well-being as a whole (even assuming some operational simplifications in the models), or restricting the scope of analysis to a single dimension and defining a much more complex, precise and well-founded model (but refraining from analysing the other areas). Faced with this dilemma, the first option was consciously chosen. Given the novel nature of this thesis, which aims to open up new lines of research, we considered it more appropriate to lay the general foundations that would later allow going deeper into each of the dimensions, perfecting the models and reaching higher levels of technical specialisation and understanding of the results.

Accordingly, further work should be done to improve and refine the specification of the models. Ideally, we would like to obtain analytical models that include CCIs, relying on specialists in each of these dimensions for their development, something that is currently beyond our reach.

On the other hand, we need to look more closely at the causes and mechanisms by which the effects of CCIs are produced. In this regard, we have already started to explore the use of “explainers” to provide better interpretations of the outputs of ML algorithms (recall the discussion in section 6.2). Explainers, such as Shapley additive explanations, can be combined with the Causal Forest (Werner Kristjanpoller et al., 2021) in order to obtain, both locally and globally, how much each feature contributes to the estimate of the algorithm. Thus, it can be observed to what extent each variable contributes to intensifying or moderating the effect of the CCIs and, thereby, a deeper understanding of how these variables are interrelated with the CCIs and condition their effects on well-being can be gained.

Another area where it is important to look at is the distribution of outcomes. In this thesis, although factors such as inequality and poverty have been taken into account as explanatory factors, we have used aggregate indicators for the region as a whole as outcomes. However, CCIs could have differential impacts on different population groups, and even contribute to widening inequality (Orian Brook et al., 2020) despite positive effects on average. The distribution of cultural participation and access to cultural and creative employment is key to understanding who benefits from the effects produced, although access to such data is not always straightforward. However, income or life expectancy can be adjusted for inequality (i.e. for a given average indicator, those that are inequitably distributed are penalised). There are also several indicators that allow for disaggregation between men and women, such as education, employment rate, life expectancy or income. In these cases, we will analyse whether there is a differential gender impact. Likewise, it is also possible to cross-reference some of these dimensions with each other, distinguishing some indicators by levels of education, income, etc. Yet this is not possible for all indicators, only for those that are more standardised in official statistics, where it will be explored. For these cases, it will also be explored whether there are important differences in impacts.

As explained at the end of chapter 5, we will also seek to bring the different models together, albeit with additional simplifications, in a system of equations interrelating all the dimensions of well-being. In addition, given the dynamic nature of the data, the possibility of using dynamic systems modelling to integrate system feedback with the study of public policy will be explored.

In short, this thesis, while offering new knowledge of both academic and policy relevance, opens up many new avenues and possibilities for further research. It is, therefore, not a closed and detached research, but a living and forward-looking research.

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Annexes

Annex I. List of regions

Table 16. *Regions included in the database*

Country	Code	Region name
Austria	AT11	Burgenland
	AT12	Lower Austria
	AT13	Vienna
	AT21	Carinthia
	AT22	Styria
	AT31	Upper Austria
	AT32	Salzburg
	AT33	Tyrol
	AT34	Vorarlberg
Belgium(1)	BE1	Brussels
	BE2	Flanders
	BE3	Wallonia
Czech Republic	CZ01	Prague
	CZ02	Central Bohemia
	CZ03	Southwest
	CZ04	Northwest
	CZ05	Northeast
	CZ06	Southeast
	CZ07	Central Moravia
	CZ08	Moravian-Silesian
Denmark	DK01	Capital Region of Denmark
	DK02	Zealand
	DK03	Southern Denmark
	DK04	Central Jutland
	DK05	North Jutland
Estonia	EE00	Estonia
Finland	FI19	West Finland
	FI1B	Helsinki-Uusimaa
	FI1C	South Finland
	FI1D	North & East Finland
	FI20	Åland
France(2)	FR10	Île de France
	FRB0	Centre-Val de Loire
	FRC1	Burgundy

Country	**Code**	**Region name**
	FRC2	Franche-Comté
	FRD1	Lower Normandy
	FRD2	Upper Normandy
	FRE1	Nord-Pas de Calais
	FRE2	Picardy
	FRF1	Alsace
	FRF2	Champagne-Ardenne
	FRF3	Lorraine
	FRG0	Pays de la Loire
	FRH0	Brittany
	FRI1	Aquitaine
	FRI2	Limousin
	FRI3	Poitou-Charentes
	FRJ1	Languedoc-Roussillon
	FRJ2	Midi-Pyrénées
	FRK1	Auvergne
	FRK2	Rhône-Alpes
	FRL0	Provence-Alpes-Côte d'Azur
	FRM0	Corsica
Germany(1)	DE1	Baden-Württemberg
	DE2	Bavaria
	DE3	Berlin
	DE4	Brandenburg
	DE5	Bremen
	DE6	Hamburg
	DE7	Hesse
	DE8	Mecklenburg-Vorpommern
	DE9	Lower Saxony
	DEA	North Rhine-Westphalia
	DEB	Rhineland-Palatinate
	DEC	Saarland
	DED	Saxony
	DEE	Saxony-Anhalt
	DEF	Schleswig-Holstein
	DEG	Thuringia
Greece	EL30	Attica
	EL41	North Aegean
	EL42	South Aegean
	EL43	Crete
	EL51	Eastern Macedonia and Thrace
	EL52	Central Macedonia
	EL53	Western Macedonia
	EL54	Epirus

Country	Code	Region name
	EL61	Thessaly
	EL62	Ionian Islands
	EL63	Western Greece
	EL64	Central Greece
	EL65	Peloponnese
Hungary	HU1	Central Hungary (1)
	HU21	Central Transdanubia
	HU22	Western Transdanubia
	HU23	Southern Transdanubia
	HU31	Northern Hungary
	HU32	Northern Great Plain
	HU33	Southern Great Plain
Iceland	IS00	Iceland
Ireland(1)	IE0	Ireland
Italy	ITC1	Piedmont
	ITC2	Aosta Valley
	ITC3	Liguria
	ITC4	Lombardy
	ITF1	Abruzzo
	ITF2	Molise
	ITF3	Campania
	ITF4	Apulia
	ITF5	Basilicata
	ITF6	Calabria
	ITG1	Sicily
	ITG2	Sardinia
	ITH1	Autonomous Province of Bolzano / Bozen
	ITH2	Autonomous Province of Trento
	ITH3	Veneto
	ITH4	Friuli-Venezia Giulia
	ITH5	Emilia-Romagna
	ITI1	Tuscany
	ITI2	Umbria
	ITI3	Marche
	ITI4	Lazio
Latvia	LV00	Latvia
Lithuania(1)	LT0	Lithuania
Luxembourg	LU00	Luxembourg
Netherlands	NL11	Groningen
	NL12	Friesland
	NL13	Drenthe
	NL21	Overijssel
	NL22	Gelderland

Country	**Code**	**Region name**
	NL23	Flevoland
	NL31	Utrecht
	NL32	North Holland
	NL33	South Holland
	NL34	Zeeland
	NL41	North Brabant
	NL42	Limburg
Norway	NO01	Oslo and Akershus
	NO02	Hedmark and Oppland
	NO03	South-East Norway
	NO04	Agder and Rogaland
	NO05	Western Norway
	NO06	Trøndelag
	NO07	Northern Norway
Poland	PL21	Lesser Poland
	PL22	Silesia
	PL41	Greater Poland
	PL42	West Pomeranian
	PL43	Lubusz
	PL51	Lower Silesia
	PL52	Opole
	PL61	Kujawy-Pomerania
	PL62	Warmia-Masuria
	PL63	Pomerania
	PL71	Lódzkie
	PL72	Swietokrzyskie
	PL81	Lublin
	PL82	Podkarpackie
	PL84	Podlaskie
	PL9	Mazovia (1)
Portugal	PT11	Northern Portugal
	PT15	Algarve
	PT16	Central Portugal
	PT17	Lisbon Metropolitan Area
	PT18	Alentejo
	PT20	Autonomous Region of the Azores
	PT30	Autonomous Region of Madeira
Slovakia	SK01	Bratislava Region
	SK02	Western Slovakia
	SK03	Central Slovakia
	SK04	Eastern Slovakia
Slovenia	SI03	Eastern Slovenia
	SI04	Western Slovenia

Country	Code	Region name
Spain	ES11	Galicia
	ES12	Principality of Asturias
	ES13	Cantabria
	ES21	Basque Country
	ES22	Navarre
	ES23	La Rioja
	ES24	Aragon
	ES30	Madrid
	ES41	Castile-Leon
	ES42	Castile-La Mancha
	ES43	Extremadura
	ES51	Catalonia
	ES52	Valencian Country
	ES53	Balearic Islands
	ES61	Andalusia
	ES62	Region of Murcia
	ES63	Ceuta
	ES64	Melilla
	ES70	Canary Islands
Sweden	SE11	Stockholm
	SE12	East Middle Sweden
	SE21	Småland and the islands
	SE22	South Sweden
	SE23	West Sweden
	SE31	North Middle Sweden
	SE32	Middle Norrland
	SE33	Upper Norrland
Switzerland	CH01	Lake Geneva region
	CH02	Espace Mittelland
	CH03	Northwestern Switzerland
	CH04	Zurich
	CH05	Eastern Switzerland
	CH06	Central Switzerland
	CH07	Ticino
United Kingdom(1)	UKC	North East
	UKD	North West
	UKE	Yorkshire and the Humber
	UKF	East Midlands
	UKG	West Midlands
	UKH	East of England
	UKI	London
	UKJ	South East
	UKK	South West

Country	**Code**	**Region name**
	UKL	Wales
	UKM	Scotland
	UKN	Northern Ireland

Notes:

(1) NUTS 1.

- In Ireland, changes over time in NUTS 2 regions do not have common divisions.
- HU1 is equivalent to the former NUTS 2 region HU10, now subdivided into Budapest (HU11) and Pest (HU12).
- LT0 is equivalent to the former NUTS 2 region LT00, now subdivided into Vilnius county (LT01) and Central and western Lithuania region (LT02).
- PL9 is equivalent to the former NUTS 2 region PL12, now subdivided into PL91 (Warsaw capital city) and PL92 (Masovian region).
- In Belgium, Germany and United Kingdom, no data are available at the NUTS 2 level for the OECD regional wellbeing indicators.

(2) No data is available for overseas regions.

Annex II. Comments on data processing

Employment in CCIs:

The gaps not available due to representativeness or anonymity problems were filled by subtracting "other sectors" from the total (in the case of CCIs), or by applying the percentages of nearby years to the total of CCIs in the case of the two subdivisions. In the case of a few small regions (Åland, Aosta Valley, Madeira, the Azores, Ceuta and Melilla), where the subdivisions between CCS and IP+R&D were not available for any year, the share was inferred from that of the NUTS 1 region of which they are part (except in Åland, Madeira and the Azores, which are NUTS 1 regions on their own, where the share of the country as a whole was taken).

Well-being indicators:

- Access to services

The EU survey on the use of ICT is conducted for households having at least at least one member in the age group 16 to 74 years. Some missing data estimated from nearby years or from the region's trend. For Åland (FI20) only 2013 and 2014 data were available (from OECD) and the rest is estimated by applying the general trend of the country. In France, data from 2008 to 2012 are missing for all regions. Also for Switzerland, with some additional gaps. In these cases, the general trend of the country is applied on the regional differences of the years available. In Greece and Poland, the data are for NUTS 1 regions. In Greece the data of the corresponding NUTS 1 region is applied for each NUTS 2 region. For Poland, as NUTS 2 data are available from the OECD in some single years, these differences are applied to the annual data at NUTS 1 level.

- Civic engagement

Although in the OECD the data provided in each country correspond to different elections, we decided to unify the criterion elections, we decided to unify the criterion to parliamentary elections since all countries have them. The exception is France as it is a very presidential republic and, while in the other countries where turnout is generally higher in legislative elections, the opposite is true in France and quite considerably so. Obviously, there are not elections every year, so we fill in the gaps with averages and linear trends from the nearby values in the missing years (those without elections). Towards the extremes (both early and late years), we take the nearest value; and in between two values, we take the linear trend between them. Country specifics:

- Belgium, Denmark, Estonia, Finland, France, Greece, Iceland, Ireland, Poland and Switzerland: the 2008 value corresponds to the 2007 elections (for completeness).
- Ireland and Slovakia: Similarly, we consider the 2020 elections as the 2019 data to gain one more value.
- Spain: given that there are two general elections in 2019, we take the first (April) for the 2018 value and the second (November) as the 2019 value.
- Greece: the same as in Spain occurs with the two elections of 2012 (the first one is counted as 2012 and the second one as 2013) and 2015 (the first one is taken for 2015 and the second one for 2016).
- Slovakia: No regional results were found, but since the 2012 and 2016 results were available from the OECD, these results have been used to weight the turnout of the four regions with the national data for the 2010 elections and the 2020 elections (used for 2019).

- Community

In the OECD regional files, a single value per region is available for the 2006-2014 average. There is no data for Åland (FI20), so the data is taken for the country as a whole. In the national data, the 2010-2012 and 2016-2018 averages are available. Therefore, the regional value (average 2006-2014) has been left from 2008 to 2014, and in the remaining five years, the national growth rate between 2010-2012 and 2016-2018 is applied to this value. We therefore have a value from 2008 to 2014, and another from 2015 to 2019.

However, it is considered to be a fairly stable indicator in which the important differences are not over time (in a short period) but between territories.

- Education

No specific comments for educational attainment.

- Environment

Annual data are available from 2010 to 2019. Before that, only every five years. For 2008 and 2009, we take the average between the 2005 value and the 2010 value. For France, the data are at NUTS 1 level. We take for each NUTS 2 region the value of the corresponding NUTS 1 region in which they are contained. For the regions HU1 and PL9, which we have at NUTS 1 due to breaks in the series (they split in two in the middle of the period), we take the average value of H11 and H12 and of PL91 and PL92, respectively.

- Health

Age-adjusted mortality rate: It has been recalculated for all years with mortality and population data by 5-year age ranges (see method in Nyi Nyi Naing, 2000) taking as reference population the population of the countries in our sample instead of all OECD countries. The only missing data are the 2019 for the UK, the German regions for 2018 and 2019 and the Polish PL71, PL72, PL81, PL82 and PL84 between 2008 and 2013. The German and Polish regions for the missing years are estimated from the national average value in that year and the divergence of each of the regions from the national average in the nearest year. For the UK 2019 values, the linear forecast has been applied to each region.

Life expectancy at birth: The Polish regions PL71, PL72, PL81, PL82, PL84 and PL9 had no data for 2008-2012 (prior to the NUTS 2013 classification). They have been estimated on the basis of the national figure and the divergence of each region from it in the nearest year (2013). There is no regional data for 2019 in the UK. Estimated by applying the 2018-2019 year-on-year growth rate for the whole country to the 2018 regional value.

- Housing

The original indicator comes from the statistics of each country and it is not possible to complete the time series. Some are OECD estimates and some are from the census, which is not updated year by year. Since it is in any case a fairly stable indicator over time, we complete the data as described: towards the extremes of the time series (both in the early and late years), we take the closest value available; and in between two values, we apply the linear trend between the two.

- Income

Data for Iceland and Switzerland, for the United Kingdom in 2019 and for Norway from 2008 to 2010 are not available from Eurostat. To fill in the missing years for these countries, we use the evolution of gross disposable income at the national level and apply it to the values we have. There are some years for Iceland (2015-2019) for which we also do not have data on gross disposable income and we use the evolution of GDP per capita as a proxy.

- Jobs

Employment rate: No specific comments.

Unemployment rate: Estimated for Corsica (FRM0) in 2009 (taking the average between 2008 and 2010 values) and 2011 (average of 2010 and 2012). For Åland (FI20), official Finnish statistics have been used because Eurostat did not provide the data (for statistical reliability, given that it is a very small region).

- Life satisfaction

A single value per region is available in the regional BLI files, which corresponds to the 2006-2014 average. Thus, differences between regions can be observed but not dynamic effects, e.g. of the economic crisis. For Åland (FI20) there is no data so we assume the same value as in the rest of Finland. We use micro data from the European Value Survey, which includes a question on life satisfaction, but only two waves are available: 2008 and 2017. In contrast, the European Social Survey has data every two years. It does not include that question, but it does include “How happy are you?”, which we use as a proxy. From these data, we estimate the missing years (with mean values, proximate values and trends).

- Safety

In the regional BLI files, there is a different source for each country and very few years are available, so the aim is to compensate and unify criteria by using Eurostat. However, the data on intentional homicides at the regional level (with which we calculate the ratio) are only available for the years 2008, 2009 and 2010. In addition, some countries are missing: Greece, the Netherlands, Sweden (missing 2008 and 2009), Switzerland (missing 2008), England and Wales. On the other hand, the ratios are available at the national level until 2019 (except Belgium, Portugal and the United Kingdom until 2018, where we apply the linear forecast to 2019). We apply this national trend with respect to the dispersion of each region to the national average in the years known to us. In countries where Eurostat information at regional level was missing, we took the dispersion of each region with respect to the average from the OECD data, considering the nearest year. Special mention should be made of the case of Oslo og Akershus (NO01) in 2011. This year saw the attacks in Oslo and Utøya. Consequently, Norway's homicide rate skyrocketed that year. With the general criterion adopted, this would trigger the indicator for all regions, but we know that these homicides occurred in one particular region (NO01). Therefore, we consider the usual murders plus 77 deaths from attacks for that region and do not alter the other regions. However, this causes the value for that region in that year to become an extreme outlier, so we finally choose to replace it with the average between the 2010 value and the 2012 value.

<u>Other variables:</u>

- AROPE

The AROPE rate includes the population either at risk of poverty (share of people whose equivalised disposable income after social transfers is less than 60% of the national median), or severely materially and socially deprived, or living in a household with a very low work intensity. For UK regional data, we also rely on UK statistics. Some countries only have data for national or NUTS 1 regions in some years. For these years, the dispersion of each NUTS 2 region to the national average (or to the value of the NUTS 1 region to which it belongs, where available) in the years available is applied to the supra-regional trend.

- Capital per worker

To obtain the capital stock for each region, we start by calculating the stock for an initial year (1995, due to data availability). To do this, the regional averages of GFCF from 1980 to 1995 are used, obtaining the long-term average percentage share of the region in the country and multiplying it by the national capital stock (from AMECO) in 1995. From the initial stock, for 1996 the regional GFCF (from ARDECO) is added to the 1995 initial stock and the depreciation (worked out from the national data) is subtracted. The same process is repeated for successive years. For Switzerland, it was not possible to regionalise the data and the same national indicator has been imputed to all regions.

- Foreigners

The data for France are for NUTS 1 regions, so each NUTS 2 region has been assigned the value of the NUTS 1 region to which it belongs. Some gaps in the data for a few regions, notably Poland, have been filled with averages from nearby years.

- Growth rate of ideas (g_A)

g_A is the result of the arithmetic mean between the ten-year growth rate of EPO patent applications and that of EUTM applications. For a region *i* in period *t*, it is calculated as follows:

$$g_{A\,i,t} = \frac{\frac{log\left(\frac{Patents_{i,t}}{Patents_{i,t-10}}\right)}{10} + \frac{log\left(\frac{Trademarks_{i,t}}{Trademarks_{i,t-10}}\right)}{10}}{2}$$

- Industry

For UK and Swiss data, national statistical sources have been used.

- Inequality

The Gini coefficient is defined on a scale from 0 to 100 where 100 means maximum inequality and 0 means maximum equality. Eurostat has the complete time series at the national level, while the OECD has regional data but only for a few years. Values for the remaining years are estimated by combining both sources.

- Labour-to-population ratio (*L/P*)

No specific comments for L/P.

- Median age

Regional data are missing for some regions in Poland at the beginning of the series and have been estimated on the basis of national values and the divergence of each region from these in the remaining years.

- $n + g_A + d$

The ten-year growth rate of the population aged 15-64 (n), for a region i in period t, is the result of the following formula:

$$n_{i,t} = \frac{log\left(\frac{Population_{i,t}}{Population_{i,t-10}}\right)}{10}$$

Comments on the growth rate of ideas (g_A) can be found above. The depreciation rate (d) is only available at country level so the same value is applied to all regions of a given country.

- Objective well-being

To obtain the composite indicator of objective well-being (i.e. all dimensions of the BLI minus life satisfaction), since each indicator has a different unit and scale, the standardised scores are used. These are defined, in a range from 0 to 10, on the basis of the minimum and maximum values between all regions in each year. To obtain these scores, the methodology used by the OECD (2008) is reproduced.

This method consists of 1) identifying the regions in our sample with the minimum and maximum values of each variable in a given year; 2) normalising each indicator with the min-max formula; and 3) aggregating the scores (i.e. arithmetic mean) when a dimension includes more than one indicator (in the regional version of the BLI, only health and jobs).

First, for each indicator in a given year, the 209 regions are ordered from the region with the lowest value to the region with the highest value. To reduce the skewness of the distribution and to avoid distortions caused by extreme values, a threshold is applied below the 4th percentile and above the 96th percentile. Thus, all these extreme values are assigned the score 0 and 10 respectively, and the rest are assigned intermediate scores (x_i). In the case of the homicide rate, given that most regions are at low values and only a few stand out, the cut-off points are the 10th percentile and the 90th percentile, respectively. Otherwise, a large proportion of regions would rank between 9 and 10. Indicators that correspond to lower well-being outcomes (air pollution, age adjusted mortality rate, unemployment rate and homicide rate) are inversely coded ($\check{x}_i$). The min-max formula for the values between the thresholds (considered as minimum and maximum), for positive (1) and negative (2) indicators, is as follows:

$$\hat{x}_i = \left(\frac{x_i - \min(x)}{\max(x) - \min(x)}\right) \cdot 10 \qquad (1)$$

$$\check{x}_i = \left(\frac{\max(x) - x_i}{\max(x) - \min(x)}\right) \cdot 10 \qquad (2)$$

Once the standardised scores are calculated, the composite indicator of objective well-being is obtained as the arithmetic mean of the scores of all dimensions excluding life satisfaction.

- Perceived corruption

Scale from 0 to 10 where 0 means extremely corrupt and 10 the opposite. Data only available at national level (i.e. equal value for all regions of a country).

- Population density

The Polish regions PL71, PL72, PL81, PL82, PL84 and PL9 had no data for 2008-2012 (prior to the NUTS 2013 classification). They have been estimated on the basis of the national figure and the divergence of each region from it in the nearest year (2013).

- Rest of employment

The primary sector and construction are excluded to avoid perfect collinearity with employment in CCIs. Some gaps in the employment in these sectors for a few regions have been filled with averages from nearby years.

- Students

It is expressed as a relative measure with respect to young people in order to avoid the distortion of population ageing. The percentages may be higher than 100 since not all students are between these ages and not necessarily all reside in the region (e.g. capital cities with large universities), but this expresses precisely that those are regions with a high attraction of students (and consequent student lifestyle).

- Total employment

No specific comments for total employment.

- Tourist arrivals

Some gaps in the data for a few regions have been filled with averages from nearby years.

- Tourist overnights

Some gaps in the data for a few regions have been filled with averages from nearby years.

- Urban

The Local Administrative Units (LAU) are classified, according to a number of criteria, in cities (DEGURBA 1), towns and suburbs (DEGURBA 2) and rural areas (DEGURBA 3) (see https://ec.europa.eu/eurostat/web/degree-of-urbanisation/background for more information). Based on this, and on local population data from the 2011 census, the percentage of the region's population living in urban, semi-urban and rural areas has been derived. There is a single value for the whole series in each region, as there is no complete year-by-year local population data.

- Urban and semi-urban

The same comments as for the previous indicator apply.

- Youth

No specific comments for youth.

Annex III. Well-being indicators summary figures

Figure 73. *Comparison of well-being indicators between 2008 and 2019*

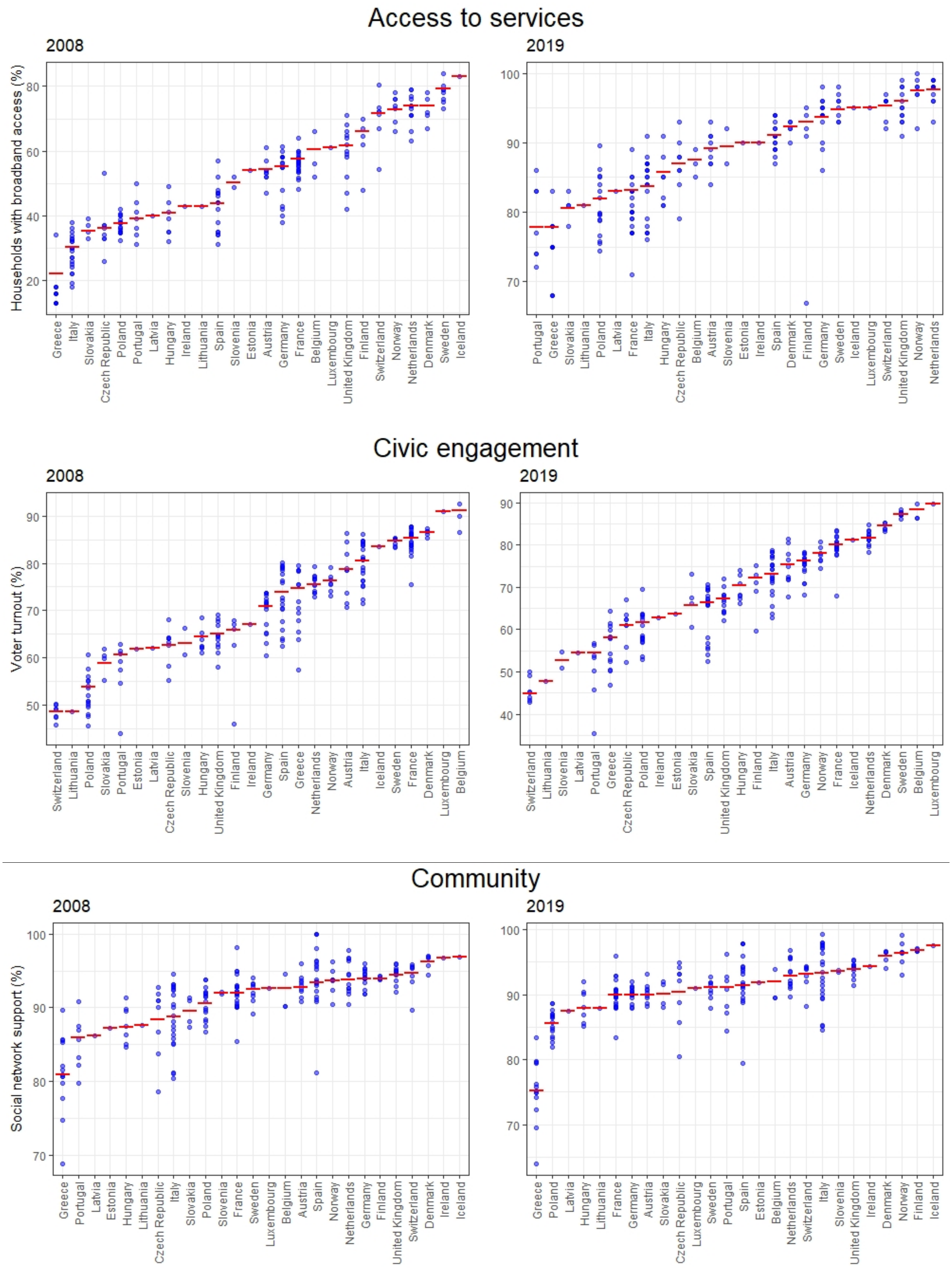
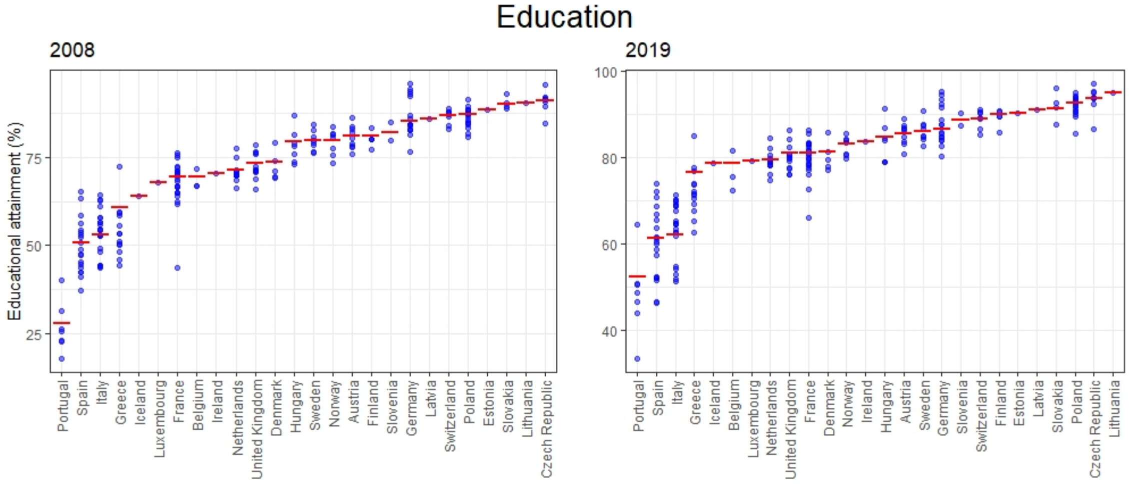
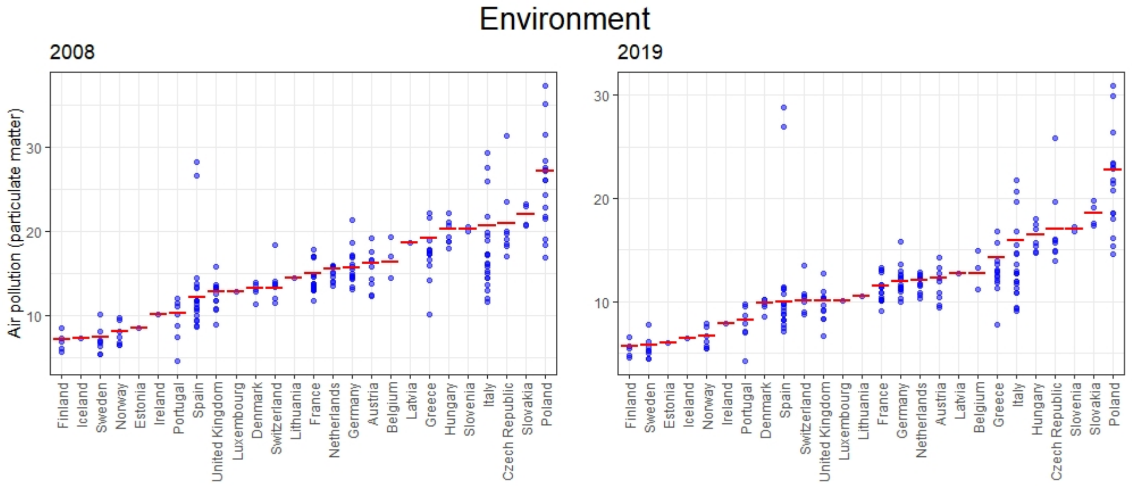


Figure 73. (cont.)





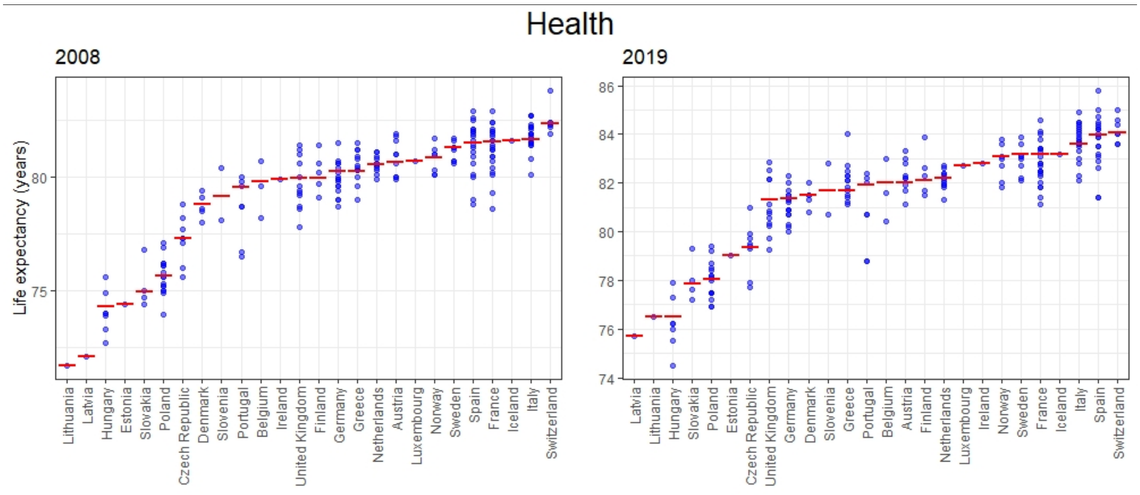
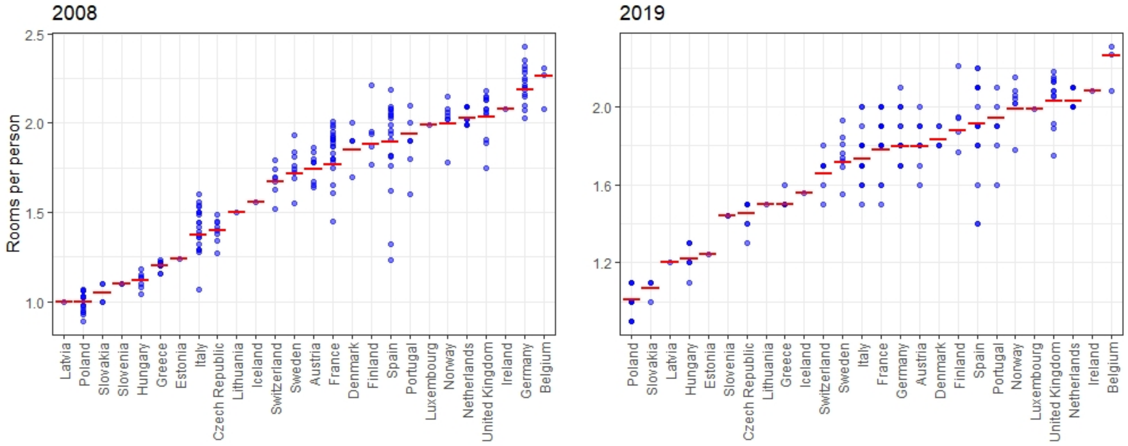
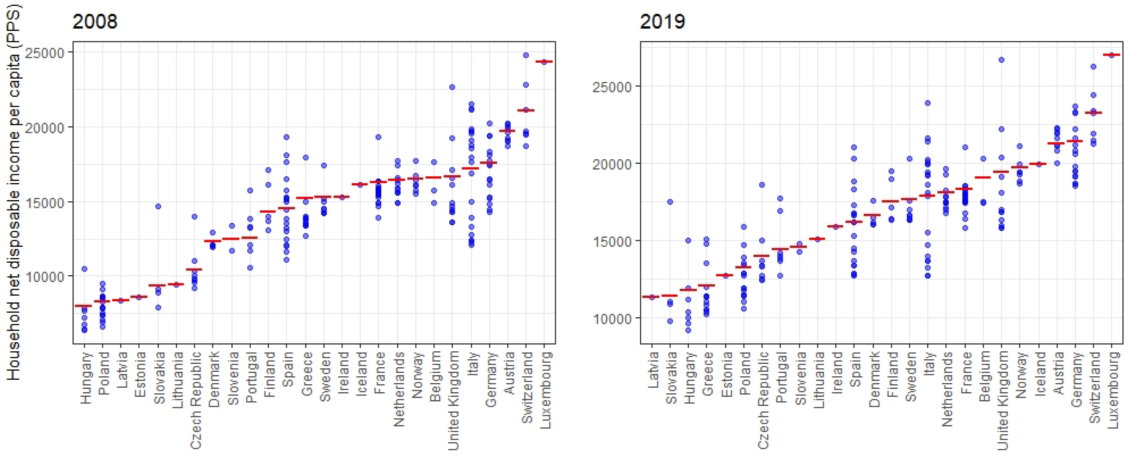


Figure 73. (cont.)

Housing



Income



Jobs

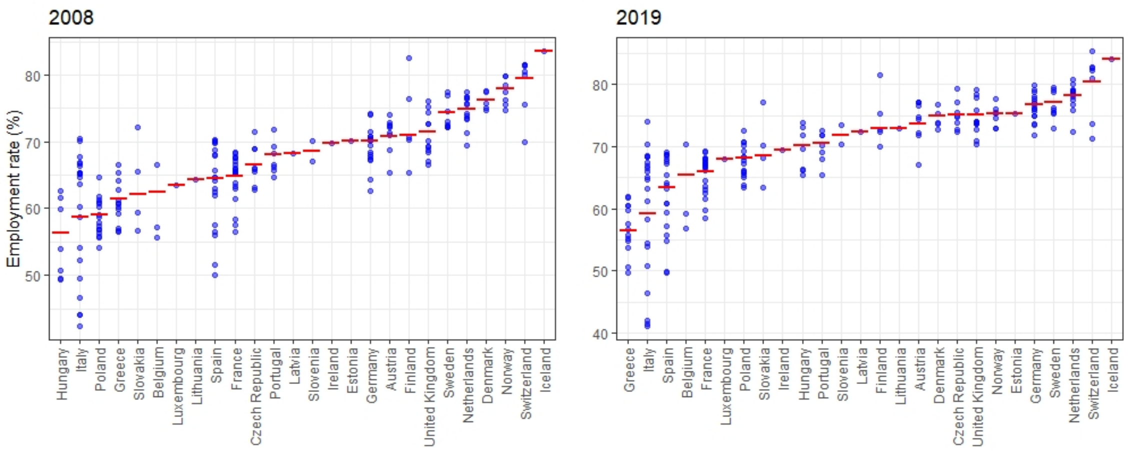
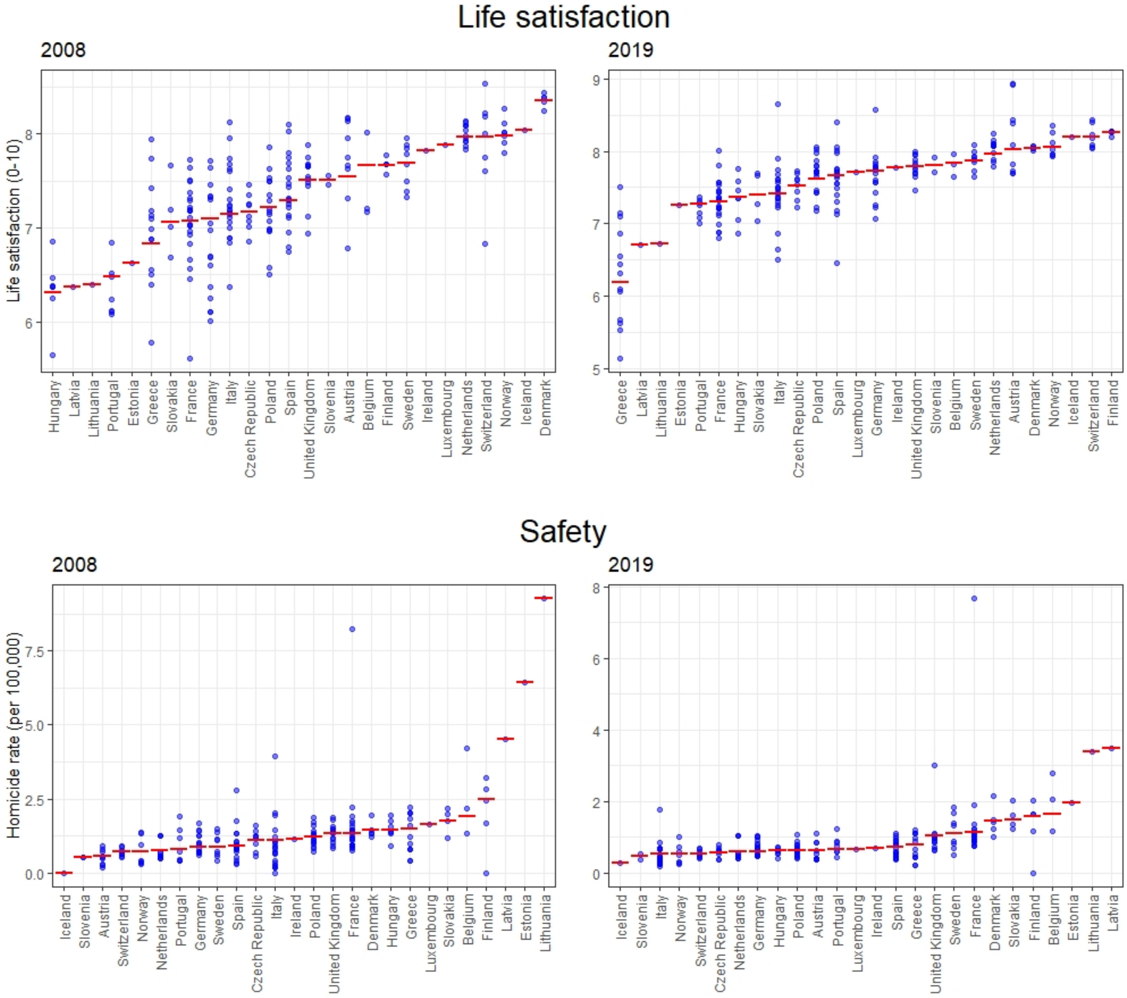


Figure 73. (cont.)



Source: Own elaboration. *Note:* Each dot represents a region, and the horizontal line represents the national average (average of the regional values weighted by their population)

Annex IV. Extended tables

Table 17. *Causal Forest results of the effect of CCIs in the short (1 year), medium (5 years) and long term (11 years), with p-values*

				Goodness of fit		
Dimension	**Lag**	**Estimate**	**Elasticity**	**Mean forest prediction**	**Diff. forest prediction**	**N obs.**
Access to services	1 year	1.218	0.076 *** (0.000)	0.980 *** (0.000)	1.282 *** (0.000)	2,299
	5 years	1.155	0.065 *** (0.000)	1.213 *** (0.000)	1.236 *** (0.000)	1,463
	11 years	1.148	0.058 ** (0.002)	1.020 . (0.982)	0.571 (0.334)	209
Civic engagement	1 year	0.299	0.020 ** (0.001)	1.020 *** (0.000)	2.140 *** (0.000)	2,299
	5 years	0.315	0.021 ** (0.002)	0.896 *** (0.000)	2.012 *** (0.000)	1,463
	11 years	0.490	0.031 (0.121)	1.298 ** (0.004)	-1.138 (0.821)	209
Community	1 year	0.445	0.023 *** (0.000)	1.208 *** (0.000)	1.739 *** (0.000)	2,299
	5 years	0.448	0.023 *** (0.000)	1.269 *** (0.000)	1.608 *** (0.000)	1,463
	11 years	0.388	0.019 (0.117)	-1.680 (0.560)	-0.039 (0.521)	209
Education	1 year	2.877	0.178 *** (0.000)	0.993 *** (0.000)	1.460 *** (0.000)	2,299
	5 years	2.460	0.147 *** (0.000)	1.025 *** (0.000)	1.664 *** (0.000)	1,463
	11 years	2.450	0.138 *** (0.000)	1.208 *** (0.000)	1.814 *** (0.000)	209
Environment	1 year	0.139	0.048 ** (0.001)	0.866 *** (0.000)	1.970 *** (0.000)	2,299
	5 years	0.204	0.074 *** (0.000)	0.667 *** (0.000)	1.900 *** (0.000)	1,463
	11 years	0.380	0.139 ** (0.004)	1.002 ** (0.008)	0.774 (0.163)	209
Health	1 year	0.065	0.004 *** (0.000)	0.998 *** (0.000)	1.908 *** (0.000)	2,299
	5 years	0.101	0.006 *** (0.000)	1.005 *** (0.000)	1.895 *** (0.000)	1,463
	11 years	0.142	0.008 ** (0.004)	0.807 * (0.014)	-0.711 (0.774)	209
Housing	1 year	0.015	0.042 *** (0.000)	1.660 *** (0.000)	1.844 *** (0.000)	2,299
	5 years	-0.017	-0.045 *** (0.000)	0.793 *** (0.000)	1.665 *** (0.000)	1,463
	11 years	-0.019	-0.049 . (0.060)	0.922 * (0.023)	1.192 (0.202)	209

Dimension	Lag	Estimate	Elasticity	Goodness of fit: Mean forest prediction	Goodness of fit: Diff. forest prediction	N obs.
Income	1 year	210.477	0.064 ***	1.095 ***	1.924 ***	2,299
			(0.000)	(0.000)	(0.000)	
	5 years	186.927	0.055 ***	1.449 ***	2.121 ***	1,463
			(0.000)	(0.000)	(0.000)	
	11 years	260.740	0.069 ***	1.131 ***	0.816 .	209
			(0.000)	(0.000)	(0.063)	
Jobs	1 year	0.450	0.032 ***	0.976 ***	1.684 ***	2,299
			(0.000)	(0.000)	(0.000)	
	5 years	0.815	0.056 ***	0.981 ***	1.799 ***	1,463
			(0.000)	(0.000)	(0.000)	
	11 years	1.204	0.077 ***	0.980 ***	1.174	209
			(0.000)	(0.000)	(0.131)	
Life satisfaction	1 year	0.023	0.014 *	0.908 ***	0.889 ***	2,299
			(0.010)	(0.000)	(0.000)	
	5 years	0.015	0.009	0.881 ***	0.891 ***	1,463
			(0.225)	(0.000)	(0.000)	
	11 years	-0.019	-0.011	27.272 *	-45.246	209
			(0.645)	(0.012)	(1.000)	
Safety	1 year	0.017	0.078	0.693 *	1.177 *	2,299
			(0.208)	(0.022)	(0.021)	
	5 years	0.007	0.035	0.701	0.681 *	1,463
			(0.727)	(0.260)	(0.038)	
	11 years	-0.017	-0.089	3.870	-88.531	209
			(0.569)	(0.304)	(0.959)	

Source: Own elaboration. *Note:* Signif. codes: '.' .1 '*' .05 '**' .01 '***' .001. p-values in brackets.

Table 18. *Causal forest estimates for average treatment effect using different definitions of CCIs, with p-values*

Dimension	Definition	Estimate	Elasticity	Goodness of fit: Mean forest prediction	Goodness of fit: Diff. forest prediction
Access to services	CCI	1.218	0.076 ***	0.980 ***	1.282 ***
			(0.000)	(0.000)	(0.000)
	CCS	0.386	0.013	1.065 *	1.478 ***
			(0.302)	(0.023)	(0.000)
	IP+R&D	2.814	0.081 ***	0.992 ***	1.308 ***
			(0.000)	(0.000)	(0.000)
Civic engagement	CCI	0.299	0.020 **	1.020 ***	2.140 ***
			(0.001)	(0.000)	(0.000)
	CCS	0.024	0.001	-0.055	2.103 ***
			(0.875)	(0.523)	(0.000)
	IP+R&D	0.992	0.031 ***	1.129 ***	2.044 ***
			(0.000)	(0.000)	(0.000)
Community	CCI	0.445	0.023 ***	1.208 ***	1.739 ***
			(0.000)	(0.000)	(0.000)
	CCS	0.208	0.006 .	1.577 **	2.185 ***
			(0.082)	(0.002)	(0.000)
	IP+R&D	0.898	0.021 ***	1.223 ***	1.950 ***
			(0.000)	(0.000)	(0.000)
Education	CCI	2.877	0.178 ***	0.993 ***	1.460 ***
			(0.000)	(0.000)	(0.000)
	CCS	3.860	0.128 ***	1.053 ***	1.500 ***
			(0.000)	(0.000)	(0.000)
	IP+R&D	4.342	0.125 ***	0.961 ***	1.543 ***
			(0.000)	(0.000)	(0.000)
Environment	CCI	0.139	0.048 **	0.866 ***	1.970 ***
			(0.001)	(0.000)	(0.000)
	CCS	-0.193	-0.036 **	1.604 ***	1.681 ***
			(0.008)	(0.000)	(0.000)
	IP+R&D	0.499	0.080 ***	0.957 ***	2.358 ***
			(0.000)	(0.000)	(0.000)
Health	CCI	0.065	0.004 ***	0.998 ***	1.908 ***
			(0.000)	(0.000)	(0.000)
	CCS	0.081	0.002 ***	1.016 ***	2.280 ***
			(0.001)	(0.000)	(0.000)
	IP+R&D	0.130	0.003 ***	0.928 ***	1.680 ***
			(0.000)	(0.000)	(0.000)
Housing	CCI	0.015	0.042 ***	1.660 ***	1.844 ***
			(0.000)	(0.000)	(0.000)
	CCS	0.014	0.020 *	2.428 ***	2.109 ***
			(0.023)	(0.000)	(0.000)
	IP+R&D	0.020	0.025 ***	1.377 ***	2.218 ***
			(0.000)	(0.000)	(0.000)

				Goodness of fit	
Dimension	**Definition**	**Estimate**	**Elasticity**	**Mean forest prediction**	**Diff. forest prediction**
Income	CCI	210.477	0.064 *** (0.000)	1.095 *** (0.000)	1.924 *** (0.000)
	CCS	348.135	0.057 *** (0.000)	1.059 *** (0.000)	2.093 *** (0.000)
	IP+R&D	204.777	0.029 *** (0.000)	0.934 *** (0.000)	1.534 *** (0.000)
Jobs	CCI	0.450	0.032 *** (0.000)	0.976 *** (0.000)	1.684 *** (0.000)
	CCS	1.309	0.049 *** (0.000)	1.290 *** (0.000)	1.867 *** (0.000)
	IP+R&D	0.190	0.006 (0.219)	0.913 . (0.098)	1.709 *** (0.000)
Life satisfaction	CCI	0.023	0.014 * (0.010)	0.908 *** (0.000)	0.889 *** (0.000)
	CCS	-0.001	0.000 (0.957)	0.562 (0.245)	0.814 *** (0.000)
	IP+R&D	0.059	0.017 *** (0.000)	0.931 *** (0.000)	0.883 *** (0.000)
Safety	CCI	0.017	0.078 (0.208)	0.693 * (0.022)	1.177 * (0.021)
	CCS	-0.001	-0.003 (0.953)	0.798 (0.000)	0.881 * (0.000)
	IP+R&D	0.075	0.161 *** (0.001)	0.902 *** (0.000)	1.455 *** (0.000)
N. observations = 2,299					

Source: Own elaboration. *Note:* Signif. codes: '.' .1 '*' .05 '**' .01 '***' .001. The activities included in each of the definitions are listed in Figure 17. p-values in brackets.

Annex V. Resum ampliat en valencià

Atenent la normativa per a tesis amb menció internacional del Reial Decret 99/2011, de 28 de gener, pel qual es regulen els ensenyaments oficials de doctorat (art. 15).

Les indústries culturals i creatives i el benestar de les regions

Introducció

Esdeveniments com la Gran Recessió, la crisi de la Covid-19 o la crisi climàtica han deixat palès alguns dels desequilibris del sistema econòmic actual i els efectes perjudicials per al benestar de la població present i futura. Això ha afectat especialment algunes regions europees que han vist estancada (o amb risc de quedar-se estancada) la seua prosperitat, amb conseqüències tant per a la qualitat de vida de la població com per a l'estabilitat política (Andreas Diemer et al., 2022).

En el context europeu, a més, s'observa amb preocupació la pèrdua de l'hegemonia i l'aparent estancament dels EUA i el món occidental que, junt a l'emergència de noves potències asiàtiques com la Xina i l'Índia, conformen un món multipolar que és ja més present que futur. En aquest nou escenari, resulta imprescindible configurar una nova estratègia d'especialització europea. Això planteja la necessitat de reorientar les economies regionals cap a nous models productius capaços d'afrontar els reptes de les societats postindustrials i del coneixement i de la transició ecològica, procurant no sols el creixement econòmic sinó també la generació de benestar per a la població en sentit ampli, sense comprometre el de les generacions futures. En definitiva, una economia al servei de la comunitat que la fa funcionar.

Les indústries culturals i creatives (ICC) han despertat un creixent interés en eixe sentit i han estat assenyalades, tant des de l'àmbit acadèmic (Phil Cooke & Lisa De Propris, 2011; Pau Rausell-Köster, 2017; Christer Gustafsson & Elisabetta Lazzaro, 2021) com l'institucional (European Commission, 2018; European Commission & KEA European Affairs, 2019), com a un potencial vector d'especialització europea i de generació de benestar. S'argüeix que el seu paper com a creadores i difusores d'idees i continguts simbòlics fa prosperar la innovació en diferents àmbits. Així mateix, provoquen experiències culturals amb impactes emocionals, socials, estètics o cognitius sobre aquells que participen en elles. A més, en un context de creixent automatització i ràpida emergència de la intel·ligència artificial, s'assenyala que les activitats que impliquen un component creatiu més intens seran cada cop més importants en l'economia i adquiriran un paper central (Hasan Bakhshi et al., 2015).

Això no obstant, el coneixement empíric que s'ha aportat fins ara és encara escàs. Alguns estudis s'han centrat en el paper de les ICC en la renda per capita (Rafael Boix-Domènech et al., 2022) o l'educació (Filippo Berti Mecocci et al., 2022), però els efectes de les ICC sobre altres dimensions del benestar només s'han explorat indirectament, a través de diferents formes de participació cultural. Més enllà d'això, no hi ha encara evidència quantitativa generalitzada dels efectes causals de les ICC sobre múltiples dimensions del benestar.

Així doncs, aquesta tesi pretén suplir eixe buit de coneixement i respondre a la següent pregunta de recerca: tenen les ICC un efecte substancial sobre el benestar de les regions? La hipòtesi de partida és que les ICC sí que tenen un impacte causal positiu sobre diferents dimensiones del benestar, i que són capaces d'activar un cercle virtuós de benestar en aquells territoris on s'insereixen. L'objectiu de la investigació és, per tant, identificar i quantificar els impactes de les ICC sobre cadascun dels components del benestar. A partir de les evidències obtingudes, es proposen una sèrie de recomanacions de polítiques.

Aquesta tesi és el primer estudi que aborda els efectes de les ICC a nivell regional sobre un conjunt ampli d'indicadors de benestar. Com a resultat, s'aporten evidències generalitzades sobre la direcció i intensitat d'aquestos efectes sobre cadascuna de les dimensions del benestar estudiades. Contribueix així a una millor comprensió dels impactes de les ICC sobre el benestar de les regions. Això no és sols d'interés acadèmic, sinó que els resultats extrets dels models causals constitueixen una font profitosa per a les institucions públiques a l'hora d'adoptar polítiques. Especialment de cara a configurar una estratègia d'especialització europea basada les ICC sostenible i generadora de benestar.

D'altra banda, les noves tècniques que s'han desenvolupat en el camp de l'aprenentatge automàtic o *machine learning* ofereixen un enorme potencial i permeten abordar de forma més rigorosa problemes de gran complexitat com el que ens ocupa. Malgrat que recentment s'han fet algunes incursions en el càlcul dels efectes de les ICC sobre el PIB per capita (Rafael Boix-Domènech et al., 2022), encara no s'ha explotat el potencial de les tècniques més avançades. Aquesta tesi és també, de fet, una de les primeres aplicacions de mètodes avançats d'intel·ligència artificial a l'estudi dels impactes regionals de les ICC.

Aquesta recerca s'enfronta a tres grans reptes o dificultats: (1) obtindre indicadors per a mesurar adequadament el benestar regional, (2) definir de forma apropiada les vies causals a través de les quals les ICC afecten el benestar de les regions, i (3) calcular els impactes de les ICC sobre el benestar de les regions. El primer repte es resol recorrent a indicadors desenvolupats per organitzacions internacionals, en particular l'OCDE, que aporta solucions factibles des d'un enfocament satisfactori. El segon repte és el més complex de la tesi. Gran part de la complexitat recau en el fet que es treball amb múltiples dimensions diferents del benestar, la qual cosa dificulta afinar les explicacions causals per a cadascuna d'elles. Així doncs, s'adopten algunes simplificacions operatives i es realitzen comprovacions al respecte, tot i que hi haurà marge per a seguir millorant. Finalment, el tercer repte es supera fent servir noves eines analítiques més potents que les tradicionals, en concret aplicant tècniques d'aprenentatge automàtic per a la inferència causal.

La tesi s'estructura de la següent manera. Consta de huit capítols agrupats en tres parts. La primera part, el marc teòric, està formada pels tres primers capítols. Els capítols 1 i 2 tracten de definir i assentar les bases dels conceptes principals de la recerca: indústries culturals i creatives i benestar, respectivament, després de fer un repàs de les principals teories i aportacions de la literatura. El capítol 3 relaciona els dos conceptes prèviament definits i teoritza, sobre la base de la literatura teòrica i empírica existent, com i per què les ICC afecten el benestar. A continuació, es posa a prova empíricament. La part II, dedicada a la metodologia, consta d'altres tres capítols. El primer d'ells, el capítol 4, descriu les dades utilitzades i hi fa una primera exploració. El capítol 5 resumeix el procés d'obtenció dels models causals i especifica en cada cas quines variables hi intervenen i per què. El capítol 6 exposa les tècniques utilitzades per a estimar els impactes i els motius que en justifiquen l'elecció. Passant a la part III, sobre resultats i implicacions, el capítol 7 presenta els resultats, tant generals com detallats per a cada dimensió del benestar. Per últim, el capítol 8 destaca algunes de les implicacions i principals lliçons que poden extreure's dels resultats i esbossa recomanacions per a les polítiques basades en aquestos. Com és lògic, aquest resum segueix la mateixa estructura.

Part I: Marc teòric

1. Definició de les indústries culturals i creatives

Definir les ICC no és una tasca senzilla i ha suscitat importants debats des de fa dècades. Les primeres referències, sota la denominació d'indústria de la cultura, provenen de l'escola de Frankfurt (Theodor Adorno & Max Horkheimer, 1944). Aquestos autors tenien una visió pessimista, ja que opinaven que la indústria de la cultura conduïa a una progressiva mercantilització i estandardització de la cultura, concentrada en grans corporacions i amb els productors culturals alienats per la seua condició de treballadors assalariats. Eixe pessimisme inicial deixa pas a una nova perspectiva que contempla les indústries culturals (ara, en plural) com a una forma de democratització de l'accés a la cultura i de satisfacció dels drets culturals de la ciutadania (UNESCO, 1982; Nicholas Garnham, 1987). Alhora, aprofundeixen en l'anàlisi econòmica dels béns culturals i en les fallades de mercat que justifiquen diferents formes d'intervenció pública.

En els anys noranta, una nova revolució conceptual aplega amb la publicació de dos informes a Austràlia (DCA, 1994) i Regne Unit (DCMS, 1998). Substitueixen el concepte d'indústries culturals pel d'indústries creatives. Aquesta nova noció amplia el ventall d'activitats considerades (per exemple les relacionades amb les tecnologies de la informació) i posa l'èmfasi sobre la propietat intel·lectual i la seua contribució al creixement econòmic, no sense crítiques (Lily Kong, 2014). En les dues últimes dècades, però, s'ha expandit la denominació indústries culturals i creatives (ICC). Aquesta combina el focus en el factor creatiu i en la naturalesa cultural.

Si no és fàcil assolir un acord en la denominació, tampoc no ho és a l'hora de definir què s'entén per una indústria cultural i creativa. Hi ha diversos models que tracten de conceptualitzar-les, amb algunes diferències substancials segons la perspectiva adoptada. Alguns dels més influents són el model de cercles concèntrics (David Throsby, 2008b), els proposats pel DCMS (1998), NESTA (2006), o per organismes internacionals com la UNCTAD (2008), la UNESCO (2009), la Unió Europea (ESSnet-Culture, 2012), la WIPO (2003) o el Banc Iberoamericà de Desenvolupament (Felipe Buitrago & Iván Duque, 2013), entre altres. Tot i que les definicions difereixen, considerem que el mínim comú denominador i allò que en essència defineix les ICC és que produeixen béns i serveis amb un important contingut simbòlic que requereixen d'un fort component de creativitat humana per a la seua producció.

La següent qüestió és delimitar quines són les activitats que compleixen eixes característiques. Les agrupacions proposades fins ara depenen lògicament de la definició teòrica sobre la qual es fonamenten, amb algunes divergències significatives. En general, hi ha bastant consens a incloure activitats com les arts escèniques, la música, les arts visuals, el sector audiovisual, de emissió, la publicitat, el disseny, l'arquitectura i els mitjans interactius. Però hi apareixen diferències a l'hora d'incloure les activitats relacionades amb el patrimoni, l'educació cultural, el desenvolupament de programari o la recerca i el desenvolupament.

En aquest estudi, adoptem una recent revisió de la definició i classificació de les ICC proposada en el projecte “Measuring CCS in the EU” (Manuel Vilares et al., 2022), en el qual han participat l’autor i ambdós directors d’aquesta tesi, considerant l’agrupació de tot l’ecosistema cultural i creatiu complet.

2. Definició del benestar

Si adoptar una definició per a les ICC és una tasca complexa, no ho és menys definir el benestar. El benestar, *estar bé*, depén de molts factors i s’ha conceptualitzat des de diferents vessants. L’economia del benestar es remunta als orígens de l’utilitarisme amb Jeremy Bentham i James Mill, i naix com a escola de pensament de la mà d’Arthur Pigou, Vilfredo Pareto o Francis Edgeworth, entre altres. Parteixen d’un marc neoclàssic i adopten una perspectiva utilitarista i hedonista. Es considera òptim tot allò que maximitza la utilitat, sense establir cap criteri de justícia. En conseqüència, el benestar acaba reduït als ingressos, ja que cada individu els destinarà a allò que li genere més utilitat. Posteriorment, sorgiran crítiques com la de John Rawls (1971), màxim exponent del liberalisme igualitari, el qual, tot i guiar-se per principis de justícia distributiva, segueix mantenint una visió essencialment economicista del benestar.

A la darreria del segle XX, sorgeixen nous enfocaments que aborden el benestar en un sentit més ampli i multidimensional. Comença a parlar-se de necessitats humanes (Len Doyal & Ian Gough, 1991) i de capacitats humanes (Amartya Sen, 1985). L’enfocament de les capacitats és el que adquireix més rellevància i influència en les últimes dècades, i entén per benestar disposar de les capacitats necessàries per a viure una vida que meresca ser viscuda. Es basa en millorar les oportunitats de les persones (no es tracta de *tindre*, sinó de *ser* i *fer*) i atorga un rol central a les llibertats (cal garantir que tothom tinga les mateixes capacitats, però s’hi poden tractar d’assolir diferents resultats).

Basant-nos en els preceptes de l’enfocament de les capacitats, i concretament en allò exposat al primer informe del desenvolupament humà de les Nacions Unides (UNDP, 1990), adoptem una sèrie de criteris que constitueixen la nostra concepció del benestar. Inclou els “tres essencials” que enumera l’informe: una vida llarga i saludable, unes adequades condicions materials i l’accés al coneixement; a més d’un quart pilar que agrupa altres aspectes del benestar nomenats a l’informe, referits a la vida en comunitat. A banda, considerem que s’han de complir dues condicions transversals. La primera, que eixes condicions objectives siguen efectivament valorades pels individus i la comunitat, és a dir, tindre en compte el benestar subjectiu. I la segona, que el benestar actual no es base en el deteriorament del benestar futur, és a dir, incorporar el criteri de sostenibilitat.

Una vegada establert què entenem per benestar, el següent repte és com mesurar-lo. Tradicionalment, s’ha fet servir el PIB per capita com a una aproximació, si més no, del benestar material, i ha estat la mètrica més utilitzada. No obstant això, nombroses crítiques assenyalen que el PIBpc és una mesura reduccionista que no és capaç de representar fidelment el benestar de la societat (Joseph E. Stiglitz et al., 2010). No té en compte els danys provocats per l’activitat econòmica (com el deteriorament mediambiental), no inclou activitats generadores de benestar que ocorren al marge del mercat, no té en compte la distribució, ni fa cap distinció entre els seus components (compta el mateix fabricar armes que llibres o medicines), no mesura la qualitat ni la durabilitat del que es produeix, ni considera molts altres determinants del benestar al marge de la renda (com l’educació, la salut o la cohesió social). De fet, com assenyala la paradoxa de Richard Easterlin (1974), una vegada cobertes certes condicions materials bàsiques, increments de la renda mitjana d’un territori no impliquen augments equivalents de la felicitat.

Aquestes crítiques han anat acompanyades del sorgiment d’una sèrie d’indicadors alternatius que tracten de superar algunes de les limitacions del PIB a l’hora d’avaluar el progrés i la prosperitat d’una societat (remetem a la secció 2.2.2 per a una revisió detallada de les principals mètriques proposades). Alguns d’elles, com l’Índex de Desenvolupament Humà (IDH), s’han popularitzat enormement, malgrat no estar absents de crítiques.

Amb tot, la mesura que més fidelment representa la nostra concepció del benestar és l'Índex per a una Vida Millor (BLI, per les sigles en anglés: *Better Life Index*) desenvolupat per l'OCDE i basat en l'enfocament de les capacitats. El BLI, que malgrat el seu nom no és un índex sinó un panell d'indicadors, proposa onze dimensions del benestar que inclouen aspectes relacionats amb les condicions materials, la qualitat de vida i la sostenibilitat del benestar futur. Concretament, en la versió regional del BLI, s'inclouen: accés a serveis, comunitat, compromís cívic, educació, habitatge, ingressos, medi ambient, salut, satisfacció amb la vida, seguretat i treball. Aquestes dimensions cobreixen tots els pilars que havíem definit anteriorment, incloent-hi percepcions subjectives del benestar. A més, els indicadors compleixen una sèrie de característiques tècniques que els fan idonis per a la nostra investigació i justifiquen la seua tria: són comunament acceptats i utilitzats com a mesures de benestar per la comunitat acadèmica i estadística; són susceptibles de ser alterats amb intervencions públiques; estan basats, en la majoria dels casos, en dades oficials que s'actualitzen periòdicament; i poden ser comparats, en un marc bastant normalitzat, entre els països de l'OCDE (Martine Durand, 2015).

3. Desxifrant la relació entre ICC i benestar

La relació de la cultura, i de les ICC en particular, amb el benestar, ha suscitat l'interés de diversos autors. Més enllà dels possibles efectes instrumentals que puga tindre la cultura sobre múltiples dimensions, generalment es considera que la cultura té un valor intrínsec per sí mateixa, com a generadora de plaer i d'emocions, i moduladora de consciències. Amb tot, també afecta al seu entorn, per exemple, econòmic. Des de visions més pessimistes com la de William Baumol i William Bowen (1965), que consideraven algunes activitats culturals beneficioses per al benestar però un llast per a la productivitat, s'ha evolucionat cap a plantejaments que les situen com a una part essencial dels sistemes d'innovació (Jason Potts & Stuart Cunningham, 2008; Jason Potts, 2009; Pier Luigi Sacco et al., 2013). Així mateix, s'ha assenyalat el seu potencial per a afrontar nombrosos reptes socials i mediambientals (European Commission & KEA European Affairs, 2019; Christer Gustafsson & Elisabetta Lazzaro, 2021).

Molts d'aquests efectes atribuïts a la cultura s'han documentat en sengles estudis empírics. S'hi produeixen sobre àrees tan diverses com la salut (Daisy Fancourt & Saoirse Finn, 2019; Rarita Zbranca et al., 2022), el benestar psicològic (Enzo Grossi et al., 2012; Daniel Wheatley & Craig Bickerton, 2019), l'educació (Alessandro Crociata et al., 2020), la renda (Oliver Falck et al., 2018; Silvia Cerisola, 2019), la cohesió social (Hanka Otte, 2019), el compromís cívic (Desirée Campagna et al., 2020), el medi ambient (Miriam Burke et al., 2018; Bo Li et al., 2022) o una menor criminalitat (Peter Taylor et al., 2015).

Això no obstant, aquestos estudis fan referència als efectes de diferents formes de participació cultural, i no tant als de les ICC en particular. Els estudis que han tractat directament l'impacte de les ICC, en canvi, s'han centrat principalment en els seus efectes sobre l'economia (e.g. Francisco Marco-Serrano et al., 2014; Rafael Boix-Domènech & Vicent Soler-i-Marco, 2017; Niccolò Innocenti & Luciana Lazzeretti, 2019; Rafael Boix-Domènech et al., 2022), amb algunes incursions recents sobre altres esferes del benestar com l'educació (Filippo Berti Mecocci et al., 2022).

Al llarg del capítol es fa un repàs d'alguns dels principals efectes identificats en la literatura. Però també observem que en la major part dels casos es tracta d'estudis parcials i localitzats, i que l'impacte de les ICC sobre moltes dimensions del benestar encara no s'ha explorat. Això és el que es pretén abordar en aquesta tesi, començant per establir un marc conceptual unificat dels efectes de les ICC sobre el benestar des d'una mirada holística.

Desembolicar tot aquest embull d'efectes entre dos conceptes tan heterogenis com les ICC i el benestar requereix de cert nivell d'abstracció. En termes generals, considerem que els diferents efectes es produeixen tant en la fase de producció de béns i serveis culturals, com en el consum i participació cultural. D'una banda, hi ha una producció intensiva en contingut simbòlic, que té lloc a través d'un procés creatiu, d'experimentació i de generació d'idees. D'altra banda, hi ha la recepció i assimilació de l'acte cultural, dels béns i serveis generats. Això provoca quatre cadenes d'efectes:

1) El fet que aquestes indústries siguen intensives en contingut simbòlic té un efecte desmaterialitzador de la producció i el consum respecte d'altres indústries més intensives en recursos materials.

2) A través dels processos creatius, l'experimentació i la generació d'idees, es faciliten les condicions per a la innovació, que pot ser aplicada a molts àmbits més enllà dels estrictament econòmics.

3) Les experiències culturals generen una sèrie d'impactes socials, emocionals, cognitius i estètics en els usuaris.

4) El contingut simbòlic arriba al públic transmetent missatges i significats.

En presència d'una sèrie de factors habilitants, eixes vies de transmissió poden generar una sèrie de canvis que milloren diverses dimensions del benestar. Aquestes dimensions, alhora, es retroalimenten entre elles i, al seu torn, afecten les possibilitats de desenvolupament de les ICC. D'eixa forma, s'activa un cercle virtuós de benestar propiciat per les ICC.

Això no obstant, cal evitar caure en l'error de creure que les ICC són la solució miraculosa a tots els mals, ni que tindran sempre efectes positius sobre totes i cadascuna de les dimensions del benestar, i en tots els llocs. No totes les ICC desmaterialitzen, ni les experiències ni els missatges han de ser sempre positius, i la innovació pot aplicar-se amb finalitats pernicioses o tindre efectes adversos no esperats. La nostra hipòtesi és que els efectes positius són predominants, però poden no ser-ho en tots els casos ni per a totes les dimensions.

Part II: Metodologia

4. Dades

Per a dur a terme l'estudi, s'ha elaborat una base de dades de panell per a un conjunt de regions i amb observacions anuals de 2008 a 2019. S'inclouen les regions dels països europeus membres de l'OCDE. Tot i que el propòsit inicial era utilitzar regions a nivell NUTS 2, això s'ha hagut de reformular per a algunes regions a causa de canvis fronterers al llarg de la sèrie temporal o de disponibilitat de dades. En eixos casos, les regions utilitzades són d'un nivell superior: NUTS 1. S'obté així un conjunt de 209 regions (176 d'elles NUTS 2 i 33 NUTS 1) de 26 països (veure Annex I).

Les dades d'ocupació en ICC, provenen d'una extracció específica de la *Labour Force Survey* (LFS), és a dir de l'Enquesta de Població Activa estandarditzada a nivell europeu per Eurostat. S'inclouen els sectors proposats pel projecte "Measuring CCS" com a part de l'ecosistema cultural i creatiu complet, adaptats a 3 dígits de la classificació NACE Rev. 2. Però també distingirem, per a advertir possibles diferències, entre aquells sectors que es considera que formen part del nucli cultural i creatiu més estricte (SCC), i altres activitats de propietat intel·lectual i recerca i desenvolupament (PI + R&D).

Els SCC inclouen:

- Arts gràfiques i reproducció de suports gravats (CNAE 18);
- Fabricació d'articles de joieria, bijuteria i similars (CNAE 32.1);
- Fabricació d'instruments musicals (CNAE 32.2);
- Edició (CNAE 58);
- Activitats cinematogràfiques, de vídeo i de programes de televisió, gravació de so i edició musical (CNAE 59);
- Activitats de programació i emissió de ràdio i televisió (CNAE 60); Publicitat (CNAE 73.1);
- Activitats de disseny especialitzat (CNAE 74.1);
- Activitats de fotografia (CNAE 74.2);
- Activitats de traducció i interpretació (CNAE 74.3);
- Activitats de creació, artístiques i espectacles (CNAE 90); i
- Activitats de biblioteques, arxius, museus i altres activitats culturals (CNAE 91).

Al seu torn, les activitats de PI+R&D inclouen:

- Telecomunicacions (CNAE 61);
- Programació, consultoria i altres activitats relacionades amb la informàtica (CNAE 62);
- Serveis d'informació (CNAE 63);
- Recerca i desenvolupament (CNAE 72);
- Altres serveis de reserves i activitats relacionades amb els mateixos (CNAE 79.9); i
- Activitats recreatives i d'entreteniment (CNAE 93.2).

Les ICC reuneixen totes dues agrupacions.

Pel que fa als indicadors del benestar, s'utilitzen els de la versió regional del BLI. Concretament:

- percentatge de població amb accés a connexió de banda ampla (accés a serveis),
- participació electoral (compromís cívic),
- percentatge de gent que creu que té algú en qui podria confiar en cas de necessitat (comunitat),
- percentatge de persones entre 25 i 64 anys amb estudis postobligatoris (educació),
- nombre mitjà d'habitacions per persona (habitatge),
- ingrés disponible net per habitant en paritat del poder adquisitiu (ingressos),
- concentració de partícules en suspensió $PM_{2.5}$ en l'aire (medi ambient),
- esperança de vida en nàixer (salut),
- satisfacció mitjana amb la vida (satisfacció amb la vida),
- taxa d'homicidis per cada 100.000 habitants (seguretat), i
- taxa d'ocupació (treball).

Com que l'OCDE no proveeix sèries temporals completes, s'ha acudit a les fonts originals, principalment Eurostat, a més d'aplicar un procés d'emplenat per a imputar les dades mancants (veure Annex II).

Finalment, la base de dades es completa amb una sèrie de variables addicionals que són requerides per a l'ajust dels models causals. Inclouen el grau d'urbanització, la densitat poblacional, la corrupció percebuda, la quantitat de turisme rebut, l'acumulació de capital per treballador, el nombre total de treballadors, la proporció de treballadors sobre el total de la població, la taxa de creixement de les idees, un compost format per la mateixa taxa de creixement de les idees, la taxa de creixement de la població i la taxa de depreciació del capital, el percentatge de treballadors en activitats no culturals i creatives, el percentatge de població d'origen estranger, l'edat mediana de la regió, la desigualtat, la població en risc de pobresa i exclusió social, un indicador sintètic de benestar objectiu, la proporció de joves, la d'estudiants i la del sector industrial en l'economia de la regió. Provenen de fonts diverses, si bé s'ha procurat recórrer a institucions oficials com Eurostat sempre que fora possible.

Si fem una ullada a les dades, s'observa que les ICC es concentren sobretot en àrees urbanes i grans capitals, com ja s'havia apuntat en la literatura (Luciana Lazzeretti et al., 2008; Rafael Boix-Domènech et al., 2015, 2016; Caroline Chapain & Dominique Sagot-Duvauroux, 2020). La majoria de regions es situen en valors entre el 3% i el 6% de l'ocupació total, mentre només unes poques destaquen per damunt del 10%. S'observen importants diferències tant a nivell regional dins de cada país com entre països. També s'aprecia una tendència positiva de l'ocupació en ICC durant el període, superior al creixement de l'ocupació total. Finalment, es comprova que les ICC estan fortament correlacionades amb els indicadors del benestar, però cal aplicar models i tècniques més complexes per a poder extraure conclusions causals.

5. Models causals

Per a formular els models causals, hem de partir d'alguns preceptes simplificadors. Començarem considerant que cada dimensió del benestar depén de les ICC i de la resta de dimensions del benestar. Però els efectes no són immediats sinó que es produeixen amb cert retard.

Seguint aquest esquema general, desgranem cada model tenint en compte, per a cada dimensió, les restants dimensions que tenen un impacte causal, així com altres variables de confusió (*confounders*). Les potencials variables a tindre en compte s'obtenen, lògicament, de la literatura acadèmica i del raonament teòric. Fem servir la tècnica d'inferència causal dels gràfics acíclics dirigits (DAG, per les sigles en anglés) per a esbrinar l'ajust mínim necessari per al càlcul de l'impacte causal de la variable tractament, és a dir, de les ICC. Això ens permet identificar quines variables cal incloure al model i quines no per la major part de dimensions del benestar. Per al model d'ingressos, donat que ja hi ha un model analític sòlid i contrastat en la literatura que inclou les ICC, no formulem un nou model sinó que fem servir el model proposat per Rafael Boix-Domènech i Vicent Soler-i-Marco (2017).

6. Mètodes

Per a verificar la doble direcció causal entre ICC i benestar i l'estructura de retards temporals, ho fem en diverses etapes, anant del model més simple al més detallat. En primer lloc, agreguem les diferents dimensions del benestar en un sol indicador compost. Per a tal fi, fem servir l'anàlisi factorial com a tècnica de reducció de dades, donat que els indicadors tenen escales molt diferents i estan correlacionats entre sí, per la qual cosa no podem fer una mitjana aritmètica simple. Els factors obtinguts s'agreguen ponderant-los en funció de la proporció de variabilitat total explicada.

Amb aquest indicador agregat del benestar, comprovem l'estructura temporal d'impactes entre les ICC i el benestar a través del test de causalitat de Granger, en particular per la versió desenvolupada per Elena-Ivona Dumitrescu i Cristophe Hurlin (2012) per a dades de panell.

Per a les estimacions dels impactes causals de les ICC, s'utilitza un innovador algoritme d'aprenentatge automàtic causal anomenat *Causal Forest* (bosc causal) (Stefan Wager & Susan Athey, 2018). Reuneix una sèrie de característiques que el fan idoni. Principalment, que combina uns elevats nivells d'ajust i precisió alhora que permet una interpretabilitat directa i transparent dels resultats. Dels quals, a més, es pot inferir impacte causal si els models estan correctament especificats. A més, permet obtindre no sols els efectes mitjans sinó els efectes individuals en cadascuna de les regions.

Per a aplicar els diferents mètodes, es fan servir diversos paquets estadístics en el programari estadístic d'accés obert R (Yves Croissant et al., 2008; R Core Team, 2013; William Revelle, 2018; John Fox et al., 2019; Julie Tibshirani et al., 2019).

Part III: Resultats i implicacions

7. Resultats

L'anàlisi factorial, després de les proves i comprovacions oportunes, dona lloc a cinc factors referents a:

- les condicions de vida (ingressos, salut i compromís cívic),
- capacitats de desenvolupament personal (educació, treball i accés a serveis),
- seguretat,
- percepcions (de satisfacció amb la vida i de suport social) i
- entorn (habitatge i medi ambient).

Amb l'indicador del benestar resultant de fer la mitjana ponderada (segons la proporció de variabilitat total explicada) dels cinc factors, els resultats del test de causalitat de Granger són significatius i suggereixen que hi ha impacte causal amb un any de retard tant de les ICC al benestar com del benestar a les ICC.

Pel que fa als impactes de les ICC sobre les diferents dimensions del benestar, s'obtenen bones prediccions en la majoria dels models, exceptuant el d'habitatge i el de seguretat, on cal ser més cautelosos en la interpretació dels resultats. S'evidencien efectes positius en la majoria de dimensions. Concretament, en educació (elasticitat de 17,8%), seguida de l'accés a serveis (7,6%), ingressos (6,4%), medi ambient (4,8%), habitatge (4,2%), treball (3,2%), comunitat (2,3%), compromís cívic (2,0%), satisfacció amb la vida (1,4%) i salut (0,4%). Per contra, els efectes sobre la seguretat no són estadísticament significatius.

Més enllà de l’efecte mitjà, els efectes són molt heterogenis entre regions. S’albiren alguns patrons regionals interessants, com que els principals efectes en l’accés a serveis o el compromís cívic es donen a les regions de l’Est, mentre que els efectes més grans en l’indicador de comunitat ocorren als països del sud. O que les regions més beneficiades en termes generals es concentren en bona mesura en els països de l’Est d’Europa.

Així mateix, alguns efectes varien en funció del nivell existent d’ICC en la regió. El cas més notable és el de l’habitatge, on els efectes són positius si el pes de les ICC sobre l’ocupació de la regió és baix, però es tornen negatius a partir d’un cert punt de saturació. També varien en funció de quin siga el nivell de la regió en la dimensió del benestar estudiada. Per exemple, els efectes en els ingressos o en el treball són superiors en regions amb renda elevada i amb taxes d’ocupació elevades, respectivament. També els efectes sobre la reducció de la contaminació i dels homicidis són més grans en contextos d’alta contaminació o d’elevades taxes d’homicidis. El contrari ocorre amb l’accés a serveis, el compromís cívic o l’educació, on l’efecte és superior si es parteix d’una situació més precària, i disminueix o fins i tot desapareix quan l’indicador ja es troba en valors més òptims.

També hi ha certes diferències al llarg del temps, i s’han analitzat horitzons temporals dels efectes més amplis (5 anys i 11 anys). En algunes dimensions, educació, ingressos, treball, medi ambient o salut, els efectes de les ICC són duradors i segueixen tenint impacte en el mitjà i llarg termini. En altres, com la satisfacció amb la vida, l’impacte només es percep en el curt termini. Cal destacar novament el cas de l’habitatge, on tot i l’efecte positiu en el curt termini, l’impacte es torna negatiu a mitjà i a llarg termini.

Per últim, s’analitza si els efectes són sensibles a la definició d’ICC utilitzada, fent servir els dos diferents subgrups: SCC, amb les activitats culturals i creatives més canòniques, i PI+R&D, amb altres activitats vinculades a la propietat intel·lectual i la recerca i el desenvolupament. En educació, salut i habitatge, l'efecte no canvia gaire. Però en la majoria de dimensions, l'elecció d'una o altra definició sí que resulta rellevant. Domina l'efecte dels SCC en el cas dels ingressos o el treball. En canvi, domina l'efecte de les activitats de PI+R&D en els casos de l'accés a serveis, el compromís cívic, la comunitat, la seguretat i la satisfacció amb la vida. Finalment, hi ha una única dimensió on el signe és fins i tot oposat: el medi ambient. Mentre que les activitats de PI+R&D contribueixen a reduir la contaminació, els SCC la incrementen.

8. Conclusions

Com s'ha pogut comprovar, els efectes de les ICC sobre el benestar regional són majoritàriament positius. Per tant, en termes generals, podem respondre a la pregunta d'investigació i a la hipòtesi de partida. Les ICC tenen impactes positius sobre el benestar de les regions, tant objectiu com subjectiu, però amb matisos:

1) Ha quedat palesa la rellevància de la definició de les ICC en els resultats obtinguts. No és una qüestió trivial i per tant cal de deixar sempre clar quines activitats es consideren part de les ICC, perquè els resultats poden diferir notablement. En qualsevol cas, els SCC i les activitats de PI+R&D són sectors molt interrelacionats, atès que formen part d'un mateix ecosistema cultural i creatiu (Manuel Vilares et al., 2022) i presenten patrons de localització regional conjunta elevats. Per tant, resulta coherent observar també el seu efecte conjunt (és a dir, el de les ICC), que és positiu en la major part dels casos. Però prestant especial atenció a aquells casos on puguen haver-hi divergències entre els efectes d'uns i altres sectors (particularment, en el medi ambient).
2) Més enllà dels efectes mitjans, hi ha una ampla heterogeneïtat dels efectes individuals entre regions a la qual cal prestar especial atenció. Cal adaptar el diagnòstic a la realitat regional específica. Fins i tot si el tractament (és a dir, les ICC) és efectiu de mitjana, pot no ser-ho per a una regió en particular per les seues característiques, o pot ser fins i tot negatiu. O a la inversa. Afortunadament, l'anàlisi dels efectes

individuals amb *causal forest* permet identificar en quines regions i sota quines circumstàncies les ICC poden ser més efectives i beneficioses, de forma que es puguen dirigir millor els esforços i fer un ús més eficient dels recursos en l'elaboració i aplicació de polítiques públiques.

En tot cas, queda clar que les ICC tenen una gran potencialitat per a activar processos generadors de benestar i, per tant, no poden ser menystingudes. Han d'adoptar un rol decisiu en les polítiques en tant que poden contribuir a la consecució de molts dels objectius principals d'aquestes, com promoure l'educació, els ingressos, el treball o la salut de la població. A banda, és clar, del seu valor intrínsec que és satisfer els drets culturals de la població.

Tot i això, cal no subestimar els potencials efectes adversos. Per exemple, en l'habitatge a partir de nivells elevats d'ICC o en el medi ambient en el cas dels SCC. Els possibles efectes perniciosos s'haurien d'incorporar en el disseny mateix de les polítiques de promoció de les ICC, però també en coordinació amb altres polítiques complementàries que puguen contribuir a previndre, minimitzar o revertir-los.

Tanmateix, l'estudi presenta algunes limitacions. D'una banda, els resultats poden estar condicionats per la selecció de la mostra. Es tracta de regions europees de l'OCDE, és a dir, amb un nivell de desenvolupament elevat, per la qual cosa les conclusions podrien no ser directament transferibles a altres contextos. D'altra banda, hi ha limitacions que responen a la naturalesa de les dades i dels indicadors, que poden ser qüestionables en algunes dimensions (per exemple, el nombre d'habitacions per persona com a indicador d'habitatge).

Per últim, s'assenyalen algunes de les futures línies de recerca, que inclouen l'ampliació de la base de dades amb altres països de diferents contextos en la mesura que siga possible, la cerca d'indicadors més apropiats per a substituir aquells més dubtosos o aprofundir en la contribució de la resta de variables dels models a fer que els efectes regionals de les ICC siguen més grans o més reduïts. Així doncs, també es tractarà d'incidir en la distribució del benestar, utilitzant en aquells casos on siga possible indicadors que permeten la desagregació per gènere (ingressos, educació, treball o salut) o altres dimensions d'interés.

En resum, aquesta tesi, alhora que ofereix nous coneixements de rellevància tant acadèmica com política que eixamplen la comprensió dels efectes de les ICC sobre el benestar de les regions, obri noves vies i possibilitats per a futures recerques. No es tracta, per tant, d'una recerca tancada i desconnectada, sinó d'una recerca viva i amb projecció futura.