CULTURE-BASED ECONOMIC DEVELOPMENT: THE EMPIRICAL EVIDENCE

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ABSTRACT

This paper aims to propose strategies for evaluating the impact of culture on socio-economic development and provide empirical evidence through an econometric model.

Nowadays socio-economic development relies on diverse factors, extending beyond the conventional growth model. Culture, often underestimated, plays a crucial role, though its intricate nature poses challenges in definition and evaluation. This article proposes the notions of culture and strategies for assessing its impact on socio-economic development. Empirical evidence complements theoretical analysis, introducing a cultural index to quantify impact. Utilising a panel data model with instrumental variables, the article estimates the cultural impact, drawing on a dataset spanning 28 European countries from 2005 to 2019.

The main results show, that a constructed panel data model with instrumental variables captures the positive indirect effects of culture on economic growth. The human capital channel serves as the mechanism through which culture contributes to economic growth.

Keywords: Culture, Cultural and creative industries, Socio-economic development, Instrumental variables model.

JEL Codes: Z10, Z13, E71.

1. INTRODUCTION

The question of quantifying culture and its impact has gained increasing attention in recent decades (Bucci et al., 2014; Taras et al., 2012a; Tubadji and Pelzel, 2015). Scholars have individually examined the influence of culture on various aspects such as the economy, social capital, regional development, and individual well-being (Alesina and Giuliano, 2010; Anheier et al., 2017; Azevedo, 2016; Fujiwara et al., 2014a; Granato et al., 1996; Grossi et al., 2011; Kregždaitė, 2017; Laužikas et al., 2020; Romer et al., 2009; Tubadji, 2013). However, measuring culture and quantifying its benefits can be challenging due to limited data availability, the complexity of converting qualitative content into numerical values, and the broad nature of the cultural concept (Alves et al., 2022). While there is a

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consensus that culture impacts both economic and social spheres, benefiting every member of society (Lehman, Fillis and Wickham, 2021), the theoretical and empirical research in this field remains disjointed, with individual studies lacking a cohesive framework (Pusevaitė et al., 2021; Tubadji, 2014; Tubadji and Pelzel, 2015).

Scholars widely acknowledge that contemporary socio-economic development is influenced by numerous factors beyond those proposed by modern growth theory, with the cultural dimension being notably underestimated (Bucci, Sacco and Segre, 2014; Tubadji, 2014). Recognising the significance of cultural production and its socio-economic impact on non-market aspects, such as innovation, sustainable development, and the cultivation of local identity to attract foreign direct investment, is crucial within the framework of growth theory (Bucci *et al*., 2014). Empirical studies applying the culture-based development model have demonstrated the positive effects of culture on various dimensions. For instance, these studies indicate positive impacts on labour market flexibility, societal well-being, and happiness (Tubadji and Pelzel, 2015). Such findings underscore the crucial role of cultural factors in shaping socio-economic outcomes and emphasise the importance of a comprehensive understanding of their influence.

The purpose of this study is to present strategies for evaluating the impact of culture on both social and economic domains. Furthermore, the article seeks to provide empirical evidence focusing on assessing the impact of culture on European economic growth using an econometric model.

Following an extensive theoretical analysis, this article suggests four distinct strategies for assessing the impact of culture on socio-economic development. The selection of each strategy relies on how culture is defined in the literature. For scholars defining culture as cultural capital (Tubadji, 2013, 2020; Tubadji and Gnezdilova, 2014; Tubadji and Pelzel, 2015), the impact is typically analysed through culture-based economic growth models. Conversely, when culture is defined in terms of cultural and creative industries (Pusevaitė et al., 2021), calculations involving variables such as value-added or multipliers are employed. Lastly, when culture is assessed based on participation in cultural activities, the focus is on its impact on social capital and personal well-being (Evrensel, 2015; Fujiwara, Kudrna and Dolan, 2014a; Kim and Kim, 2009).

To support the theoretical analysis, this paper introduces an econometric model, offering empirical evidence. The model employs a panel data approach with instrumental variables. Additionally, principal component analysis is used to approximate the set of cultural variables into a single culture index. The main finding indicates a positive indirect influence of culture on economic growth, with human capital serving as the channel of impact. The empirical model validates the conclusions drawn from the theoretical analysis.

The paper is structured as follows: Section 2 offers a comprehensive literature review, presenting the four strategies for assessing the impact of culture along with theoretical examples. Section 3 outlines the data used in the study, elaborates on the construction of the cultural index and explains the models employed. Finally, Section 4 concludes the paper, summarising the key findings and implications.

2. LITERATURE REVIEW

The literature review reviels that the variations among studies primarily arise from differences in cultural concepts. Based on these conceptual differences and the impact strands they address, the studies can be categorised into four distinct groups: the impact of cultural capital on economic growth, the assessment of value generated by cultural and creative industries, the influence of cultural participation on social capital, and the effects of cultural participation on individual well-being. Each of these groups is further discussed in greater detail below.

2.1. Culture-based development

Scholars argue that the growth model theory, which describes socio-economic development, should be extended to include important omitted variables in contemporary society (Bucci, Sacco and Segre, 2014; Tubadji, 2014; Tubadji and Pelzel, 2015). One such omitted variable is the cultural component, often referred to as cultural capital. Cultural capital, as described in the reviewed literature (Alesina and Giuliano, 2010; Bakas *et al*., 2020; Castellani, 2019; Dangelico *et al.*, 2020; Evrensel, 2015; Granato *et al.*, 1996; Maridal, 2013; Pruskus, 2005; Stojanova *et al.*, 2018; Tabellini, 2010; Tubadji, 2014; Tubadji and Nijkamp, 2015) can be characterised as: 1) a set of cultural traditions, values and norms transmitted from one generation to the next by ethnic, religious or social groups, 2) cultural heritage (material and unmaterial), and 3) local culture/living culture, reflecting the existing cultural environment in terms of infrastructure and population characteristics (ethnic diversity, cultural class, cultural activism/participation).

The initial assumptions regarding the relationship between cultural capital and socio-economic development were introduced by Max Weber, an economist-sociologist, at the beginning of the 20th century. In his book "The Protestant Ethic and the Spirit of Capitalism" (1905), Weber argued that the Protestant Reformation played a pivotal role in the development of capitalism by encouraging individuals to pursue personal wealth (Castellani, 2019; Tubadji, 2014; Tubadji and Pelzel, 2015). In other words, a causal link between religion and economics has been identified. This link is based on the idea that the development of capitalism required common moral drivers that Protestant religion could provide (Vilkas, Vasiliauskas and Kuodis, 2002). Scholars seeking to incorporate a cultural component into economic growth models typically rely on the principles outlined by Weber's theory (Tabellini, 2010; Tubadji, 2014; Tubadji and Nijkamp, 2015). However, in contemporary contexts, the cultural component should be defined more broadly, encompassing not only religion but also cultural

infrastructure, cultural class size, cultural heritage, and other relevant aspects beyond Weber's original proposition.

Authors investigating the significance of culture as an omitted parameter in growth theory often rely on Romer's endogenous growth model (Tubadji, 2014). However, they make three primary arguments highlighting why Romer's model fails to fully explain economic growth. Firstly, the assumptions of Romer's growth model overlook the impact of population changes resulting from human capital migration. It is emphasized that population migration, labour migration, and the segmentation of human capital inflows can have both positive and negative effects on the economy, for both the country of emigration and the country receiving immigrants. Knowledge creation is inherently intertwined with human capital, and in reality, it is generally easier to attract human capital than to create it, resulting in competition for human capital. Secondly, population differences between countries, such as variations in age distributions, can lead to disparities in economic growth. Lastly, even if human capital were static, the environment in which it operates varies across regions. These environmental differences are attributed to cultural attitudes, which can significantly impact the acceptance or rejection of new instructions or innovations (Dakhli & De Clercq, 2007). Thus, while the necessary human capital may exist for accessing knowledge, the ability to embrace new ideas generated by human capital depends on the local cultural context. As a result, Tubadji (2014) argues that the main weakness of Romer's assumptions lies in ignoring the influence of local culture and cultural attitudes, and suggests incorporating a cultural component into the model for a more comprehensive understanding of economic growth.

When empirically examining the impact of culture on the economy, researchers typically adopt two approaches. Firstly, they build upon Weber's notion of cultural attitudes and their influence on the economy. However, instead of directly quantifying the impact of culture on the economy, they assess it indirectly through its effects on human capital (Tubadji, 2013, 2014, 2020; Tubadji and Gnezdilova, 2014; Tubadji and Nijkamp, 2015; Tubadji and Pelzel, 2015) (Figure 1.).

Figure 1. Principle scheme of the culture-based development model
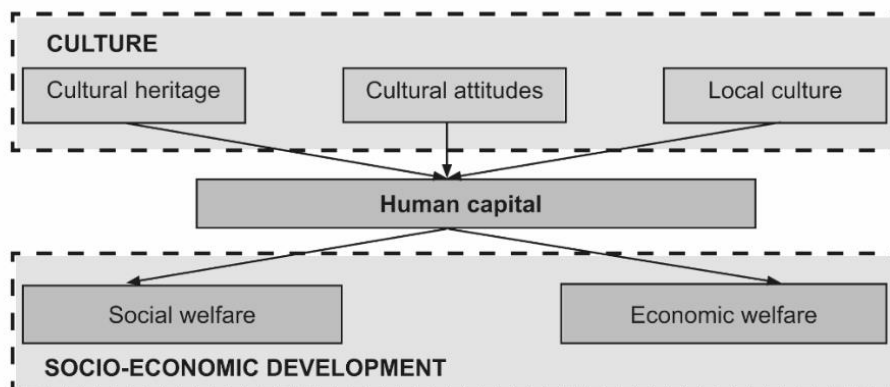
Source: compiled by the author based on Tubadji and Pelzel, 2015.

One illustrative example is Tubadji's (2012) two-level model, which examines the impact of culture on regional development (1–2 equations). At the first level, culture affects human capital, including its structure, quality, and quantity, potentially influenced by migration. This level is known as the attraction level, where culture influences the formation of a highly productive labor force (equation 1). At the second level (interaction level), culture-dependent local human capital becomes a factor that determines the utilization of productive capital within the local environment (equation 2).

$$lnHC_r = \beta_0 + \beta_1 lnIHC_r + \beta_2 lnM_r + \beta_3 lnOCC_r + \beta_4 lnCC1_r + \beta_5 lnCONT_r + e, \quad (1)$$

$$lnY_r = \beta_6 + \beta_7 lnHC_r + \sum_i \beta_i X_r + \beta_9 lnCC2_r + e \quad (2)$$

where:

r – region/ location,

HC_r – the share of human capital (i.e. the share of highly skilled workers),

IHC_r – the share of investment in local human capital formation (represented by the number of doctors per capita),

M_r – the share of highly skilled immigrants arriving in the area r,

OCC_r – the share of mathematics-related professions: occupational structure

$CONT_r$ – environmental variables (e.g. ecological capital and social capital),

Y_r – local productivity, measured as GDP per capita,

$CC1_r$ – cultural capital in an area r (measured by the average of the following: castles and defensive walls, historic parks, cemeteries and churches, and telephone lines for cinemas, theatres, libraries and restoration institutions),

$CC2_r$ – cultural capital in location r (represented by tangible cultural heritage (defensive walls, historical parks, cemeteries and churches) as an exogenous variable to the current economic situation),

X_r – a group of standard socio-economic variables that affect productivity (e.g. land price and unemployment/employment rate).

The study utilizes data from various regions in Germany. The researcher discovers that cultural capital has a statistically significant and negative impact on human capital. This suggests that the prevailing culture is more traditional and closed, leading to adverse effects on both human capital and economic growth.

On the other hand, individual authors (Tubadji, 2014) employ Romer's simple, culturally augmented specification as shown in the 3rd equation.

$$lnY_r = \beta_1 lnA_r + \beta_2 lnHa_r + \beta_3 lnL_r + \beta_4 lnK_r + \beta_5 lnC_r \qquad (3)$$

where:

r – region/ location,

Y − GDP per capita,

A− knowledge (share of patents in the region),

Ha – human capital (employees with higher education),

L – share of the labour force,

K− share of physical capital in the region,

C – cultural variable.

In this case, a statistically significant effect of the cultural variable is also captured (Tubadji, 2014).

2.2. Calculating the economic value of the cultural and creative industries

To evaluate the economic value of cultural and creative industries (CCIs), the researchers introduce a model illustrating the overall economic impact of CCIs. Proposed models identify four groups of CCI impacts (Alves et al., 2022; Pusevaitė et al., 2021):

1. Direct impact: This refers to the economic value and jobs directly created by CCIs. It can be measured using indicators such as the percentage of GDP, value-added, employment (number of workers in CCI industries and occupations), and wages. For instance, in Lithuania, the share of value-added generated by CCIs in the total value-added is estimated to be around 2-2.2% (LSD, 2021, 2022).

2. Indirect impact: This refers to the increase in economic output and labour supply resulting from the demand for goods and services from other sectors generated by CCIs. For instance, tourism activities may create additional demand for the restaurant and accommodation sectors, which, in turn, increases purchases from the retail sectors that provide goods and services to them. In Lithuania, the intermediate consumption generated by the production of CCI products was around 4.4% and amounted to 1.7 billion EUR in 2018 (authors' compilation, data from Statistics Lithuania).

3. Induced impact: This refers to the increase in economic value and labor supply due to population spending resulting from the direct and indirect economic impact of CCIs. It represents the effect of workers in CCIs and the sectors that provide them with goods and services spending their income in the local economy. For instance, workers in tourism activities and the catering and

accommodation sectors spend their income in the local restaurant sector. Indirect and induced effects can be calculated using multipliers, which indicate the extent to which a one-unit increase in a given CCI indicator leads to a one-unit increase in the indicators of other sectors of economic activity. Multipliers can be calculated using models such as the Leontief input-output analysis model and social accounting matrices. However, these multiplier methods have certain limitations due to strict assumptions, assuming that prices, interest rates, and other variables that normally respond to economic cycles remain constant.

4. Spill-over benefit: This refers to the broader effects of CCIs on the economy and other areas with economic consequences. For instance, the influence of cultural institutions is estimated to have a positive impact on the health of the population, which, in turn, leads to longer and more productive participation in the labor market. Consequently, the positive impact of CCIs on health is considered to have an economic benefit in the long run (CEBR, 2019; Pusevaitė *et al*., 2021).

The sum of direct, indirect, and induced impact indicators provides an estimate of the total economic impact (Pusevaitė *et al*., 2021). However, the authors note that there is a lack of a unified methodology to comprehensively assess the overall spill-over effects (Pusevaitė *et al*., 2021).

2.3. The social impact of culture

According to the authors (Jeannotte, 2017; Pusevaitė *et al*., 2021), the social impacts of culture can be divided into four overlapping groups:

1. The impact of culture on sustainability and community development: In this type of research, culture is typically considered one of the four interconnected components (alongside social, economic, and environmental factors) that determine the sustainability of society. Some studies aim to identify areas where social and cultural factors overlap or can work together, often related to the creation of identity, social cohesion, participation, and community involvement.

2. The impact of culture on well-being and social cohesion: The social impact of culture is described in terms of participation, public voice, identity and value creation, social connections, the growth of social capital, improved health, personal safety, and more effective schools.

3. The influence of culture in promoting interconnection and participation: Culture is analysed as a factor that promotes connectedness (Laužikas *et al*., 2020) and participation.

4. The impact of culture on citizenship: Culture contributes to civic participation by providing citizens with the resources for a better understanding of their community.

Authors typically use data from population surveys to examine the social impact of culture. They measure how participation in culture contributes to different social domains such as health, civic engagement, the strength of social networks or the creation of social groups (Fujiwara, Kudrna and Dolan, 2014b; Anheier et al., 2017, Laužikas et al., 2020). One method used to measure the impact of

cultural participation is simulation modeling, where groups of agents are formed based on characteristics of cultural participation. The behaviour of these agents is then monitored to observe how the social structure of society changes and social capital is formed (Laužikas *et al.*, 2020).

2.4. The impact of culture on individual well-being

When assessing the impact of culture on individual well-being, authors often rely on data from population surveys regarding participation in cultural events, such as attendance frequency or engagement in various cultural activities. The measurement of individual well-being encompasses various factors, including economic variables like income and housing, as well as subjective assessments of life satisfaction (Evrensel, 2015; Fujiwara, Kudrna and Dolan, 2014a; Lau et al., 2005; Kim and Kim, 2009).

When examining the relevant literature, it is evident that strong correlations exist between cultural participation and individual well-being (Grossi *et al.*, 2011; Kim and Kim, 2009). Among these studies, the multi-stage regression model proposed by Fujiwara, Kudrna and Dolan (2014a) stands out. The authors (Fujiwara, Kudrna and Dolan, 2014a) aim to identify the effects of participation in cultural and sports activities on individual well-being and estimate the economic value of these effects. Fujiwara, Kudrna and Dolan (2014a) employ a modified welfare measurement approach based on individuals' self-reported levels of well-being. According to the authors, the monetary value assigned to a good should reflect the change in an individual's well-being as a result of experiencing or consuming that good. The value is considered as a compensating surplus (CS) – the amount of money paid or received that leaves a person in the same position of well-being after a change in the quantity of a good (Fujiwara, Kudrna and Dolan, 2014a).

By calculating welfare in this manner, researchers can determine the marginal rate of substitution between money and good, essentially estimating how much money is needed to maintain subjective well-being at a constant level. The study assesses the impact of participation in arts and sports on subjective well-being, considering different levels of engagement in cultural and sports activities. The authors estimate the monetary amount that individuals would be willing to pay while still maintaining the same level of well-being. To calculate the value of participation in culture and sports, the researchers consider the effects of participation and income on individual well-being. Well-being is measured using the Life Satisfaction Index, which quantifies satisfaction on a scale from 1 to 7, encompassing aspects such as household income, health status, work status, children, housing, etc.

The study relies on two models: a model of participation in cultural and sports activities and a two-stage least squares income model (4–7 equations). The decision to employ two systems of equations is motivated by the endogeneity of the income variable in the life satisfaction model, as well as the effects of choice and measurement error. The researchers' overall strategy is to control for as many

determinants of the outcome as possible through regression analysis. Therefore, an additional instrumental variable model is constructed by linking income to lottery data.

1) A model of participation in cultural and sports activities:

$$LS_i = \alpha + \beta_1 M_i + \beta_2 Q_i + \beta_3 X_{1i} + \varepsilon_i, \quad (4)$$

$$CS = M^0 - e^{\left(\ln(M^0) - \frac{\beta_2}{\beta_1^*}\right)}, \quad (5)$$

where:

LS – life satisfaction,

β_1 *– income effect (derived from the second model),*

β_2 *– non-market good effect,*

Q_i *– a vector of variables of participation in culture and sport,*

X_{1i} *– a vector of life satisfaction variables,*

CS – the compensating surplus that measures the monetary value of participation in culture and sport,

M^0 *– the mean income of the sample (25,700 pounds).*

2) Two-stage least squares income model:

$$LS_i = \pi + \beta_1^* \ln(M_i) + \beta_2 X_{2i} + \varepsilon_i, \quad (6)$$

$$\ln(M_i) = \pi + \gamma z_i + \vartheta_i, \quad (7)$$

where:

X_{2i} *– is a vector of socio-economic variables that define the frequency of playing in the lottery,*

z_i *– the lottery instrumental variable (two-dimensional, 1 if the annual winnings are between 200 and 10,000 pounds, 0 if the annual winnings are positive but below 200 pounds),*

β_1^* *– the coefficient of the income effect.*

All data used in the study is taken from the 2013 *Understanding Society Study* of British households. The results provide support for the positive impact of participation in culture and sport on personal well-being and offer monetary estimates of these effects. One noteworthy finding is the association between engagement in the arts and higher well-being. The authors estimate that the value of this increased well-being is £1,084 per year per person (Fujiwara, Kudrna and Dolan, 2014a).

2.5. Summary of the methods used to investigate the socio-economic impact of culture

A literature review highlights several trends in cultural impact studies. Firstly, there is a strong emphasis on the construction of the dataset, the description, and the specification of model assumptions

(Fujiwara, Kudrna and Dolan, 2014a; Laužikas et al., 2020). In some cases, after the dataset is collected or a culture index is constructed, the economic and social impact of culture is not further assessed, and only certain assumptions are made based on correlation analysis (e.g., Kregždaitė (2017)).

Secondly, survey data is the predominant source of information in cultural impact studies. Commonly used surveys include existing ones, which reduce costs for researchers, e.g., *The World Values Survey*. These surveys often include questions not only about cultural consumption but also about social capital and individual well-being. Survey data is convenient for cultural impact studies and can be further analysed through econometric methods. However, survey data may have limitations leading to measurement inaccuracies. These limitations include translation issues, respondents' environmental and conditional influences on answers, and a tendency to provide socially desirable responses, particularly concerning values (Castellani, 2019).

Thirdly, cultural impact studies frequently involve large datasets and latent variables are created to describe groups of variables or indices (Tubadji and Nijkamp, 2015). Despite the inclusion of large datasets, the analysis is often conducted for a single country. Comparisons across countries would add meaningful insights to cultural impact assessments. In some cases, culture and sports variables are considered together (Fujiwara, Kudrna and Dolan, 2014a; Laužikas *et al.*, 2020). Tables 1 and 2 provide a summary of specific studies reviewed, including key characteristics such as findings, methods, and data utilised. Table 1 focuses on the impact of culture on the economy, and Table 2 on the impact of culture on social outcomes.

Table 1. Summary of studies on the impact of culture on the economy, representing different methodologies

Method	Key findings	Dataset	Study region, year	Authors
Partial Least Squares Path Modelling	Culture affects not only human capital but also the overall structure of the workforce.	134 economic, social and cultural indicators, represented by 9 latent variables: living culture, cultural heritage, cultural diversity, local amenities, human capital, labour, physical capital, economic well-being and social well-being.	Greece, 2001	Tubadji & Nijkamp, 2015
	Cultural capital in more traditional societies tends to have a negative impact on local economic development.	20 variables representing cultural heritage, local culture, human capital, economic and social well-being.	Germany, 2006	Tubadji, 2012; Tubadji and Pelzel, 2015
Regression analysis, factor analysis	Cultural capital affects economic growth.	Cultural attitudes variables, socio-economic variables (GDP, employment, number of patents, human capital, number of research and experimental development staff and researchers).	Germany, Italy, Portugal, Greece, United Kingdom, 2005	Tubadji, 2014
Regression analysis	The cultural environment has a positive impact on productivity.	3 main groups of variables: labour productivity, culture (represented by the 7 cultural capital variables), control variables (macroeconomic, institutional)	34 OECD countries (3 decades: 1980–2000)	Bakas, Kostis & Petrakis, 2020
	Strong family ties lead to lower labour market participation and mobility of women and young people.	Family ties are identified by: the significance of the family in the individual's life, the responsibilities and duties of parents and children, the presence of love and respect for parents. The role of women in society is measured through the following questions: in situations of job scarcity, should men be prioritized over women for employment opportunities, and is being a homemaker as fulfilling as having a paid job.	81 countries (World Value Survey's 4 waves 1994–2004)	Alesina & Giuliano, 2010

Source: compiled by the author, based on the sources listed in the table.

Table 2. Summary of studies on the impact of culture on social outcomes, representing different methodologies

Method	Key findings	Dataset	Study region, year	Authors
Regression analysis	Participation in culture and sports has a positive impact on individual well-being (life satisfaction).	3 groups of variables: representing individual well-being, cultural participation, and participation in sports.	United Kingdom, 2013	Fujiwara, Kudrna & Dolan, 2014a
	Depending on cultural differences, there can be both positive and negative effects on subjective well-being.	4 groups of variables: demographic, cultural capital, social capital, and economic variables.	86 world countries, 1990–2005	Evrensel, 2015
Agent-based modeling	Culture has an impact on social structure.	4 groups of variables describing: agents, number of cultural events, participation of agents in cultural events, social capital.	Lithuania, 2017	Laužikas et al., 2020
Correlation analysis	There is a positive correlation between cultural participation and social capital.	Indicators identifying social capital: trust and tolerance, and participation in culture.	Europe countries, 2014	Anheier et al., 2017
Regression analysis	Participation in culture and sports positively contributes to social outcomes.	3 groups of variables: social results, cultural participation, and sport participation.	United Kingdom, 2013	Fujiwara, Kudrna & Dolan, 2014b

Source: compiled by the author, based on the sources listed in the table.

The studies reviewed predominantly employ correlational methods (Kim and Kim, 2009; Grossi et al., 2011; Anheier et al., 2017; Kregždaitė, 2017; Dzemydaitė, 2019) and regression analyses (Granato, Inglehart and Leblang, 1996; Romer, Jamieson and Pasek, 2009; Fujiwara, Kudrna and Dolan, 2014a; Tubadji and Nijkamp, 2015) to examine the relationship between culture and various societal factors. Table 3 summarises the statistical methods used in the reviewed studies. However, correlation analysis does not establish causal relationships and is insufficient tool to explain the impact of culture on society. Ordinary least squares (OLS) regression analysis, commonly employed, should consider that both culture and the economy can influence each other. OLS regression, without accounting for endogeneity, cannot evaluate this two-way causality. To address this limitation, instrumental variables can be employed (Castellani, 2019). Surveys are often conducted to investigate the impact of culture on individual well-being (Kim and Kim, 2009; Grossi et al., 2011), but findings based on respondents' answers do not establish causality and can be influenced by other factors. Finally, the composition of indexes is a relatively common statistical method (Granato, Inglehart and Leblang, 1996; Grossi et al., 2011; Taras et al., 2012b), allowing for a more precise description of the cultural context under examination (Tang and Koveos, 2008; Uz, 2014). It is worth noting that the majority of studies analysed a single period of time, potentially overlooking delayed impacts of culture. However, the impact of culture is likely to be delayed, and researchers may not assess its full impact.

Table 3. A summary of research and methods on the impact of culture

Relationships analysed	Methods and frequency used by authors						
	Regression analysis	Agent-based modelling	Correlation analysis	Factor analysis	Index construction	Descriptive statistics	Surveys
Impact of culture on social and/or economic development/ relationship between culture and socio-economic variables/ impact of culture on labour productivity	+ + + + + + + +		+		+		
The economic impact of the cultural and creative industries			+		+		
Impact of culture on the social sphere/social capital	+ +	+	+			+	
Impact of culture on individual well-being	+ + +		+ +		+ +	+ +	+ +

Source: compiled by the author.
Note: sign "+" represents different authors.

The possibility of assessing the causal effects of culture is most limited by the lack of longitudinal data (Pusevaitė *et al*., 2021). The data problem also contributes to a lack of a unified methodology for estimating the overall impact of culture. Even in cases where the same author examines the impact of culture on the economy (e.g. Tubadji, 2012, 2013, 2014; Tubadji and Gnezdilova, 2014; Tubadji and Pelzel, 2015), slightly different variables or methods are employed. Authors, due to data accessibility, often focus on regional data, analysing one country rather than adopting an international perpective.

Measuring the social impact of culture is even more challenging than measuring the economic impact. The main limitations in assessing social impact the absence of a standardised methodological framework, the unreliability of survey data, and the narrow focus on cultural participation alone. Relying solely on the measurement of cultural participation may not provide sufficient insights into the broader impact of the entire cultural field or cultural capital.

3. EMPIRICAL ANALYSIS

Many of the studies analysed above focus on a single country. This paper aims to assess whether a theoretical model of culture-based economic growth aligns with reality, employing a panel dataset of European countries. The annual data sample used in the analysis spans from 2005 to 2019 and covers 28 European countries (Austria, Belgium, Bulgaria, Cyprus, Czechia, Germany, Denmark, Estonia, Greece, Spain, Finland, France, Croatia, Hungary, Ireland, Iceland, Italy, Lithuania, Latvia, Netherlands, Norway, Poland, Portugal, Romania, Sweden, Slovenia, Slovakia, United Kingdom (the list of countries is limited by data availability)). The panel data is unbalanced due to the availability of time series data for cultural variables across countries.

Concerning the data, the main challenge is in approximating culture. Using only one or two cultural variables may inadequately represent the cultural landscape in a country, while incorporating too many variables could overload the model and hinder interpretation. To capture a comprehensive cultural perspective in each country, a cultural index is constructed. This approach is consitent with the literature review; for instance, Tubadji (2012) also employs cultural indices to approximate the cultural environment.

The cultural index is created using Principal Component Analysis (PCA), which allows for the extraction of data with multiple variables and provides an overview of the entire dataset. In this case, the cultural index encompasses 39 different variables, including aspects such as the population of active enterprises in the cultural sector, the number of births of cultural enterprises, employment in the cultural sector, and household expenditure on culture across various cultural activities. PCA is executed for each country. Although the number of Principal Components (PC) representing each country varies, the first PC generally accounts for more than half or even two-thirds of the dataset's variation (average: 57%, ranging from 40% to 72%). Additionally, the second PC typically represents 20% or less of the variation. Therefore, the first principal component is selected for further analysis.

Other variables selected for analysis encompass the GDP growth rate (%), the change in researchers per million inhabitants (%), representing human capital, the change in total employment (employed persons) per capita (%), the change in gross capital formation as a percentage of GDP (%), the change in expenditure on research and development (RD) per inhabitant (%), the change in wages as a percentage of GDP (%). The selection of variables is based on a literature review (Tubadji, 2013, 2020; Tubadji and Gnezdilova, 2014; Tubadji and Pelzel, 2015). Furthermore, all variables are included as changes or growth rates, ensuring stationarity. The same approach is applied to the cultural index, where the change in the cultural index is utilised for further analysis.

While culture can contribute to economic differences between the countries, it is essential to recognise that economic factors also influence culture (Castellani, 2019). In cases where two-way causality exists, OLS regression is insufficient. One possible approach to address this issue is to use a model with instrumental variables (IV). By employing IV, it becomes possible to evaluate the indirect impact of culture on the economy. Based on the culture-based economic growth theory (Tabellini, 2010; Tubadji, 2014; Tubadji and Nijkamp, 2015), the following model is obtained (8–9 equations):

$$HC_{it} = \beta_0 + \beta_1 Cult_{it} + \beta_2 RD_{it} + \beta_3 W_{it} + e_{it}, \qquad (8)$$

$$Y_{it} = \beta_4 + \beta_5 HC_{it} + \beta_6 L_{it} + \beta_7 GCF_{it} + e_{it} \qquad (9)$$

where:

$i - country,$

t – year,

HC_{it} – *the share of human capital (the change of researchers per million inhabitants (%)),*

$Cult_{it}$ – *the change of Culture index (the first Principal Component of PCA), in separate cases, cultural index 1st or 2nd lag is included.,*

RD_{it} – *the share of investment in local human capital formation (the change of expenditure on research and development (RD) per inhabitant (%)),*

W_{it} – *the change of wages as a percentage of GDP (%) (economic variable),*

L_{it} – *the share of labour force (the change of total employment (employed persons) per capita (%)),*

GCF_{it} – *the share of capital (the change of gross capital formation as a percentage of GDP (%)),*

Y_{it} – *the measure of economic growth (GDP growth rate (%)).*

As there is a panel dataset, it is essential to evaluate the heterogeneity of the cross-sections, i.e., differences driven by countries. To address this, a fixed effect instrumental variable (IV) regression model for panel data is constructed. The culture index and its lag (t-2) as well as the variables of expenditure on research and development (RD) and wages, are included as instrumental variables. The results of this model (PLM_IV culture) are presented in Table 4. The findings reveal that human capital, influenced by the cultural environment, has a positive and significant impact on economic growth. Moreover, the impact of the cultural environment is observed with a lag. In other words, the impact of the cultural environment on the economy becomes fully evident with a lag.

To test the robustness of the model and compare the results, additional models are constructed. The second model, as shown in Table 4, is identical to the PLM IV model but excludes cultural variables (PLM_IV without culture). In this model, the variables of expenditure on RD and wages are included as instruments. Compared to the first model, the second model exhibits slightly higher standard errors and a lower coefficient of determination. Another instrumental variable model is also constructed, using the same instruments as the first model. The results of this model are very similar to the previous ones, indicating the robustness of the first model. Weak instrument diagnostics are performed, and the p-value for weak instruments is found to be very small (p=0.000048), allowing us to reject the null hypothesis that the instruments are weak.

Finally, fixed-effects linear panel data models (PLM) are constructed, including one model with the culture variable (the lag of the culture index) and another model without the culture variable. It is noteworthy that the decision to choose fixed-effects models is made after conducting an F-test for the significance of individual effects. The null hypothesis of this test states that the pooled PLM is an appropriate model, suggesting no need for choosing PLM with fixed-effects as all individual effects are

assumed to be zero. The p-values for these tests were very low (p=4.615e-11 for PLM with the culture variable, p=1.304e-11 for PLM without the culture variable), allowing us to reject the null hypothesis and confirm the existence of significant individual effects. Consequently, it is deemed preferable to choose PLM with fixed-effects.

A comparison of the PLM models reveals that by including a cultural component, the model's stability is maintained, and the estimates of both models are similar. Moreover, the PLM model with the cultural component exhibits a higher coefficient of determination. Additionally, a statistically significant culture variable is obtained, indicating that the cultural environment (with a lag) has a positive impact on the economy. However, the impact is relatively weak (0.002). The concept of the latter model aligns with Tubadji's (2014) proposed culturally augmented specification of Romer's simple model. Both the constructed PLM model and Tubadji's model statistically confirm the significant impact of culture on economics.

Notably, the coefficient of determination is relatively low in all models. While the cultural component does affect economic growth, it is not the main determinant. Therefore, it is not possible to achieve a high coefficient of determination.

Table 4. Estimates of the models

	PLM_IV culture	PLM_IV without culture	IV	PLM culture	PLM without culture
Researchers	0.220*** (0.065)	0.235* (0.093)	0.246*** (0.071)	0.021 (0.021)	0.025 (0.020)
Employment	0.636*** (0.110)	0.616*** (0.125)	0.744*** (0.117)	0.862*** (0.103)	0.755*** (0.089)
Gross capital formation	0.000005 (0.000007)	0.000001 (0.000008)	-0.000003* (0.000001)	-0.0000005 (0.000007)	-0.000003 (0.000006)
(Intercept)			0.757* (0.338)		
lag (Culture, 1)				0.002* (0.001)	
Num.Obs.	208	233	208	209	233
R2	0.208	0.137	-0.069	0.334	0.278
RMSE	1.94	2.32	2.44	1.72	1.87
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001					

Source: compiled by the author, using Eurostat, and OECD data.

The models developed in this study confirm the results obtained by other authors, highlighting that the cultural environment indeed affects economic growth. The impact of culture can be assessed indirectly through its effect on human capital, as suggested by various scholars (Tubadji, 2013, 2014, 2020; Tubadji and Gnezdilova, 2014; Tubadji and Nijkamp, 2015; Tubadji and Pelzel, 2015). This

implies that a cultural environment can foster a society that is more open and receptive to innovation, positively impacting economic development.

On the other hand, as authors note, if the cultural environment is closely tied to cultural heritage, with a preference for traditions or closeness over innovations or openness, the impact of culture can be negative (Dakhli & De Clercq, 2007; Shane, 1995; Tubadji, 2012). In the empirical analysis, while constructing the cultural index, greater emphasis is placed on living culture and contemporary cultural infrastructure, and cultural class. Consequently, the observed impact of culture is positive. These results reinforce the findings of Tubadji (2014), suggesting that the cultural environment does play a role in attracting highly skilled human capital.

4. CONCLUSIONS AND RECOMMENDATIONS

After conducting a theoretical analysis, four distinct strategies for assessing the impact of culture on social and economic domains emerge. First, culture can be integrated into economic growth models, enabling the development of culture-based economic growth models. Second, the value generated by culture can be quantified through the activities of cultural and creative industries and their economic outcomes. The third and fourth strategies pertain to the effects of participation in cultural activities. Depending on the forms of participation, these strategies aim to capture impacts on social capital and individual well-being. These findings contribute to a deeper understanding of the intricate nature of culture and offer potential strategies for evaluating its impact on socio-economic domains and the corresponding outcomes.

While scholars generally recognise the positive impact of culture on social and economic fields, there remains a scarcity of detailed and comparable studies in this domain. Common research methodologies in cultural impact studies include correlation and regression analyses, along with surveys. However, certain studies that use correlation analyses or survey summaries only propose potential correlations without establishing causality. Regression analyses often focus on a single country and a specific time period, overlooking the broader context for comparisons between countries and over time. These limitations stem from fragmented cultural statistics and the multidimensional nature of culture. Nonetheless, the underdeveloped field of cultural quantification can have negative implications for cultural policy, as the absence of evidence regarding the benefits of cultural investment may complicate budget negotiations.

The empirical model developed in this study confirms the theoretical assumptions, demonstrating that culture can influence economic growth through human capital. This finding calls for a re-evaluation of cultural policy, moving from a sectoral perspective – typically associated with separate ministries and policy decisions for each sector, avoiding cross-sectoral policy decisions – to a broader national policy context. In this context, the cultural component can play a crucial role in creating knowledge-intensive

and innovation-friendly human capital, fostering a more intelligent, open, and creative utilisation of available resources. Moreover, understanding that the cultural environment can positively impact human resources can facilitate debates about allocating more funding to cultural sector. This research demonstrates that culture should not only be understood as a subsidized area, but it is also possible to quantify the value of culture.

For further research, it would be beneficial to decompose the culture index according to the separate sets of variables. This is likely to result in a more precise set of cultural indices describing the cultural environment. It would also be relevant to take a more detailed look at the differences that exist between various European countries and to build separate models for each group.

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