Cultural Corridors: An Analysis of Persistence in Impacts on Local Development — ANeo-Weberian Perspective on South-East Europe

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Abstract: Culture matters for economic development. This postulate has been a main conceptual concern for "old" institutional economics (OIE) and has lately also been tested through neoclassically inspired econometric techniques. This conceptual foundation has been confirmed in several quantitative studies on developed countries, in particular cases from the USA, Germany, and Italy. In less developed regions with a wealth of cultural heritage, particularly in South-East Europe, this postulate is still an underexplored issue from the perspective of advanced econometric approaches. Our goal is to examine the impact of the so-called South-East European cultural corridors on welfare — and especially on total employment — at the local or regional level. Accounting for gross value added and sectoral specialization, we examine the effect of such corridors by considering the distance to a cultural corridor: namely, the East Trans-Balkan Road (crossing Romania, Bulgaria, and Greece) as an explanatory factor for regional development, particularly employment. Using the European University Institute (EUI) European Regional Dataset (ERD), as well as the geo-data from the Cultural Corridors of the South-East Europe website, we estimate a regression model using a 2SLS instrumental variable (IV) approach, with a pooled dataset at the NUTS 3 level (Eurostat) from 1980 to 2011. We then triangulate the results by using the distance to the cultural corridor concerned as a treatment effect in a propensity-score-matching and difference-in-differences exploratory analysis. The findings confirm the importance of distance to the cultural corridor under investigation as a strong predictor for local socio-economic development. The results further suggest that the slow evolution of culture over time is likely to lead to the gradual emergence of new geographical cultural centers and a new cultural path-dependence build-up of persistence chains.

Keywords: culture, cultural corridor, path-dependence, persistence, place

JEL Classification Codes: J60, R32, R38, Z10
“Culture matters” is a claim with a long conceptual tradition in original or “old” institutional economics (OIE) developed by Thorstein Veblen ([1915] 2006), John R. Commons (1931), Clarence Ayres (1961), and David Hamilton (1991). It is also an accepted postulate in modern empirical neoclassical economics (see, for example, Acemoglu and Robinson 2010; Alesina and Giuliano 2015; Falck et al. 2012; Guiso, Sapienza and Zingales 2006, 2014; Harrison and Huntington 2001; Marglin and Marglin 1996; Ottaviano and Peri 2004, 2005, 2006; Schuetz 2014; Sen 1999, 2004; Tabellini 2010; Tubadji, Osoba and Nijkamp 2014). However, the original OIE definitions of culture, as well as the conceptual perspective on its impact and the neoclassical quantitative operational mechanisms for empirically testing the impact of culture, still remain poorly connected (see Adkisson 2014). As a result, in many contributions, cultural impact remains either addressed through a vague and ambiguous definition, or lacks the modern sound empirical demonstration of its paramount importance. We argue that a bridge between OIE and neoclassical empirical methods can be built and is needed because cultural impact plays an important role in socio-economic development. It deserves a thorough cognitive effort and toolkit to be combined and used for a wider and deeper understanding.

In the OIE tradition, the conceptual recognition and elaboration of the reciprocal causality between culture and economic/technological development is a prominent topic. As David Hamilton (1991, 54) noted, “[t]o the institutionalist, behavior cannot be explained on an ‘individual’ basis. There is no such thing as individual behavior. All behavior is cultural. Culture is subject to a process of cumulative development and change, and human behavior is therefore subject to this same process. Economic behavior, like all behavior, is subject to continued cumulative change and since the center of attention of the institutionalist is human behavior his whole economic structure assumes a Darwinian complexion.”

In understanding culture, neoclassical economics relies on sociological contributions to define culture and to trace the cultural impacts on socio-economic development. The sociological literature, however, is divided into three distinct and often mutually contradicting schools of thought (for a more detailed presentation of these three schools of thought, see Beugelsdijk, van Schaik and Arts 2006). First, there is a Marxist perspective which argues that culture is mainly a byproduct of economic development, and that initially economically less developed places are likely to achieve a similar level of cultural value development as more developed localities, once their economic welfare reaches the same level (Marx [1867] 1999). Second, a reverse perspective is found in cultural determinism that regards culture as a determinant of initial developmental conditions, with a persistent effect over time and space (Robert Putnam 1994). “Persistent effect” refers to an exogenously determined effect that, once occurring, acts like an initial condition and becomes a characteristic, which continues to exist beyond the process that generated it. In a sense, this assumes that culture, especially from a past period, is an exogenous factor for current socio-economic development. Third, an intermediate approach can be found in the sociology of culture elaborated by Ronald Inglehart (1977), Francis Fukuyama (1992), and Geert Hofstede (2001), who interpret culture as a locally specific “programming of the mind” that may not allow for certain developments under the same socio-
economic conditions. This is the path-dependence school that views culture as a "bandwagon" which attracts followers of a particular kind based on the overall mass of participants (also known as the "network effect"). Path-dependence assumes that culture is an autoregressive term and a lagged regressor explaining socio-economic development. In other words, cultural path-dependence is essentially a product of developing a culture over time: not just a static culture of a past period, but a changing entity that is endogenous to economics.

These three paradigms have left profound traces in modern neoclassical economic thinking. For example, a Marxist oriented approach is often the basis for a total neglect of the relevance of cultural factors (Glaeser 2001; Solow 1999). In contemporaneous research, it tends to reoccur in a mild form in various studies on the economics of culture, where the focus of research is on culture and the artistic industries, often called the “creative industries” (but in a slightly different sense from Richard Florida’s notion). In this context, culture is understood as a source of income, and its value creation function as a byproduct and a positive spillover of its production process. In the same vein, research on cultural tourism often considers cultural heritage as a source of a particular economic sector specialization and smart development (for related research, see Campo and Alvarez 2014; Throsby 1994; van Duijn and Rouwendal 2013). Next, the cultural-deterministic approach can be found in a variety of modern economic-historical studies on culture, or even in modern econometric models using an instrumental variable (IV) approach. In this approach, a historical event – or the distance to a historically significant location – is interpreted as a factor with a direct economic meaning (see Alesina, Giuliano and Nunn 2013; Andersson and Larsson 2016; Baumann 1928; Caicedo 2014; Dell 2010; Fritsch and Wyrwich 2013, 2014; Grompone and Sessa 2014; Knack and Keefer 1997; Peman, 2011). Finally, Inglehart and Hofstede’s approach matches closely with what is known in economics as cultural relativity studies, where local socio-economic patterns vary due to different cultural values and preferences, and where these preferences are understood as evolving over time on the basis of cultural interaction and/or migration. Illustrations of this stream of research can be found in Charles Tiebout (1956) – particularly in his notion of a culturally driven variety of public goods provision – the tunnel vision effects of poverty on preferences (Levine 1980), in Balassa-Samuelson’s price-effect model influenced by a home-bias-driven inefficiency of trade markets (see Balassa 1964; Samuelson 1964), or in later research on the migration-diversity nexus, as well as in more recent cultural transmission and

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1 Richard Florida (2002a, 2002b, 2005) associates creativity with freedom to make a decision in one’s practice. His definition of the creative professions spreads over a range of non-arts related occupations, such as surgeons, judges etc. Alternatively, when speaking of bohemians, Florida refers to the artistic occupations that are the subject of the economics of culture. These two notions are not necessarily disconnected. However, Florida claims that a concentration of bohemians may prompt a concentration of workers from the creative occupations. But the two notions are essentially definitionally different (for more details, see Joachim Moeller and Annie Tubadji 2009).

2 See, among others, Jose A. Divino and Michael McAleer (2007); Gianmarco Ottaviano and Giovanni Peri (2005); Ray Hudson (2008); Nico Vioglander and Hans-Joachim Voth (2012); and Annie Tubadji and Peter Nijkamp (2014).
proximity-related studies. The question of the nature of the process (persistent, path-dependent, or else), is seriously addressed by the OIE literature as well. Unlike the neoclassical approach, OIE focuses rather on “regularities of behavior” and subscribes to the idea that “these regularities are specific to time and place and persist because of enculturation rather than because of some innate and constant human characteristics” (Mayhew 1987, 588).

There is yet another socio-economic approach that has basically laid the foundations for bridging the OIE and neoclassical approaches in an almost natural manner. This approach was suggested by Max Weber ([1905] 1930), and specifically his economics of religion. Weber’s most important cultural contribution was the establishment of the understanding of cultural attitudes as a source of local differences in occupations and productivity. This perspective is equally well-positioned toward the institutional and neoclassical school. For the neoclassical school, this easily translates into different occupational and industrial structures in different localities. In the institutional domain, the understanding that people’s cultural belonging in terms of values and attitudes is linked to a certain type of economic choices and behavior directly corresponds to what, for example, Veblen identified as the “culture of borrowing,” it being a key factor underpinning German industrial development (Veblen [1915] 2006, 27). Or else, again by the OIE school, culture is defined as “correlated behavioral patterns” that are specific to time and place; “Values function as the standard of judgment by which behavior is correlated” (Bush 1987, 1077). Perhaps most importantly from the perspective of neoclassical and institutional economics, Weber was the first to link the institutional approach to culture on the basis of an empirical quantification of culture. In his early work on the “Protestant Ethics and the Spirit of Capitalism” and the so-called religious economics school, the main methodological idea at stake is quantifying the cultural-attitudinal rationale and its differences through the religious belonging, as one very appropriate (especially at that time) proxy for local cultural values.

We adopt a neo-Weberian perspective by addressing Richard V. Adkisson’s (2014) question of whether it is possible to properly quantify and demonstrate empirically with modern econometric tools the role of culture in socio-economic processes. Our neo-Weberian perspective is founded in what is called the culture-based development (CBD) approach, which is a continuation of the Weberian understanding of local development as a function of the spatially varying cultural attitude toward socio-economic development and progress. In general, CBD is a concept of individual and group cultural bias on human economic choice, which results from the influence of the locally varying attitude on human preferences and generates effects on

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3 See, for example, Alian Rallet and Andre Torre (1995); Meric Gertler (2003); Jean-Marc Callois and Francis Aubert (2007); Ron Boschma (2005); Ajay Agrawal, Devesh Kapur, and John McHale (2008); Andre Torre (2008); Roberta Capello (2009); Andres Rodriguez-Pose (2011); Daron Acemoglu and James Robinson (2011); Roel Rutten and Frans Boekma (2012); Maria Saez-Marti and Ives Zenou (2012); Morrel Cohen and Graeme Ackland (2012); Craig Beebe et al. (2013); Anja K. Leon (2013); Patrick Bayer, Hanming Fang, and Robert McMillan (2014); Annie Tubadji and Peter Nijkamp (2015); and Robert Huggins and Piers Thompson (2015).
individual and local socio-economic development in a persistent, path-dependent manner (Tubadji 2012, 2013; Tubadji and Nijkamp 2014, 2015).

We apply the CBD conceptualization to cultural corridors in the South-East part of Europe. Put differently, our focus is on the distance to a cultural corridor, defined as a vector of geographical centers of tangible and intangible cultural heritage dating from different time periods. Thus, unlike the currently popular quantification tools in empirical economics, using, for example, self-reported attitudes from the World Value Survey or Hofstede Indices measuring different cultural dimensions, we use a unique concept of a cultural corridor and its empirical operationalization (i.e., its geolocation and the geographical distance to it) in order to quantify culture and its impact. The definition of a cultural corridor is especially compatible with the OIE’s take that “[t]he institutional structure of any society incorporates two systems of value: the ceremonial and the instrumental, each of which has its own logic and method of validation” (Bush 1987, 1079). The distinction between the ceremonial and instrumental is the following: “Ceremonial values correlate behavior in an institution by providing standards of judgment for invidious distinctions, which prescribe status, differential privileges, and master-servant relationship, and warrant the exercise of power by one social class over another. Instrumental values correlate behavior by providing standards of judgment by which tools and skills are employed in the application of evidentially warranted knowledge to problem-solving processes (Bush 1987, 1079). Following the above reasoning, the cultural corridor promotes a development by drawing new populations into the systems of ceremonial and instrumental valuations that have proven most effective in terms of bringing accumulated knowledge and tools to bear on economic and social challenges.

We then use the CBD definition of culture and its quantification through a cultural corridor in the context of an empirical analysis and in the spirit of a neoclassical approach. We employ this quantification of culture and its impact for an explanatory 2SLS regression analysis, complemented with an IV approach (and other relevant econometric methods). For this purpose, we use a uniquely created geocoded database on the South-East European cultural corridors, which has been especially designed for this study. In particular, our research addresses the East Trans-Balkan cultural corridor that passes through Romania, Bulgaria, and Greece. The places, whose geo-locations we collected, have been explicitly selected and mapped by international expert groups of UNESCO, ICOMOS, the Council of Europe, and affiliated academic institutions. Thus, our statistical information originates in a refined historical and meaningful representation of the tangible and intangible cultural memory of relevant connected centers of socio-economic development in the past. Our aim is to demonstrate how the OIE’s conceptual understanding of culture and the neoclassical empirical toolkit can harmoniously cooperate for obtaining empirical evidence for the paramount role of culture in socio-economic development.

We structure the article as follows. In the next section, we introduce the CBD definition of cultural corridors as a source of socio-economic development and a basis for the channels of impact on local employment and productivity. In the same section, we also formulate hypotheses on plausible positive or negative effects that can
be expected from this particular source of cultural impact. In the third section, we present a unique database containing geo-coded information about the East Trans-Balkan South-East European cultural corridor (ETB SEE CC), and show how it can serve to operationalize the CBD definition as well as contribute to a manageable applied approach. In the fourth section, we provide econometric estimation results and their interpretation. In the final section, we make some concluding remarks on the empirical findings in the context of socio-economic development, cultural persistence, and the regional development of “urban centers” related to such cultural corridors.

**Culture-Based Development: Cultural Corridors and Socio-Economic Development**

**Definition of a Cultural Corridor**

Culture-based development (CBD) is a concept that has emerged only recently. It aims to explain place-based development discrepancies and other economic irregularities/inefficiencies through the cultural bias of individual and aggregate economic choice or action. In particular, CBD defines culture as an entity composed of tangible and intangible cultural assets and expressions of values, which are additionally subdivided into living culture (observed in the current time period) and cultural heritage (generated in previous time periods) (see Tubadji 2012, 2013). This broader conceptualization of culture allows its many different aspects to be encompassed in a complex, latently present entity that is often associated with a locality or a particular ethnic group. Empirically, CBD introduces culture as a latent variable that is quantifiable as a vector of cultural components (generated, for example, by means of a principal component analysis; see Tubadji and Nijkamp 2014), or that can be estimated through partial-least-squares path-modelling and related non-parametric techniques (see Tubadji and Nijkamp 2015). We argue that the notion of a cultural corridor offers an interesting possibility for operationalizing the CBD concept in a geographical framework. A cultural corridor may provide an even more refined approach than the above mentioned statistical methods for a quantification of the latent notion of culture since we (qualitatively) select the components of a cultural corridor based on the expert opinion of cultural historians, architects, and experts on local institutions of values and meaning.

The notion of a cultural corridor belongs to the realm of cultural historians and heritage experts. It has, however, found a prominent place in international culture-
oriented organizations, such as UNESCO, the Council of Europe, and ICOMOS.\(^5\)
Therefore, before addressing cultural corridors from a CBD perspective, we will summarize the description by the Council of Europe’s experts involved in the identification of the South-East European cultural corridors. “[T]he traditional territorial axes in the region [of South-East Europe] along which cultural values, ideas, innovations, and so on, have been circulating in constant continuity of links, influences and interactions” (Teodorescu 1974).\(^6\) Furthermore, the cultural corridor is “a historical vector, a territorial axis evolved in time, along which there has traditionally been movement and exchange” (Krestev 2005).\(^7\)

The OIE definition of culture as foci of ceremonial and instrumental valuations that influences local socio-economic development naturally fits conceptually with the definition of a cultural corridor we suggest. However, this definition has not been operationalized yet in any meaningful quantitative terms. When Adkisson (2014) asks whether the institutional notion of culture can be quantified adequately, our answer is affirmative. This can be accomplished by reinterpreting the definition of a cultural corridor in a quantitative language, as follows “a vector of identified geographical locations of historically established and recognized centers, that cluster tangible and intangible cultural heritage as mutually connected carriers of memory for local meaning.” By adopting this CBD definition of a cultural corridor, we can make several important assumptions on its expected impact, but also the cultural corridor is now quantitatively identifiable as a geolocation characterized by specific local culture.

We should add that the expression “centers” in our definition does not necessarily refer to urban centers, but may also include villages characterized by interesting types of church architecture as a result of local creative spirit and the concentration of building construction talent. Clearly, the modern notion of an urban center (see Arribas-Bel, Kourtit and Nijkamp 2013; Kramer and Diez 2012; Nijkamp 2008) as a focal point of socio-economic development may reflect the same thing, but then adapted in a historical perspective and context. The basic idea is that such centers function as pull and push forces of meaning and values that are essential for the socio-economic development in their times.

Operationally, we define a cultural corridor here as a poly-line, formed by the precise latitudes and longitude points of nearly 280 locations of cultural points.

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\(^5\) Equally interestingly, from an empirical perspective, the same expert groups have implemented an impressively detailed and highly professional mapping of these cultural corridors for the case of the South-East European region.

\(^6\) See www.seecorridors.eu/filebank/file_272.pdf.

\(^7\) The official website of the South-East European cultural corridors provides another, slightly more precise and more informed definition. It reads: “South East Europe has been a real crossroads of civilizations and religions through the centuries; a mediator between the East and the West, the North and the South, transpierced by internal connections and influences, bound up by common historical routes. As a result, in time, cultural corridors in the region have been formed — trans-national axes of centuries-old interactions — the living memory of the civilizations and strong connections between the peoples, which inhabit the region. Please, get to know these cultural roads, which have preserved their vitality from the ancient times until today!” (available at http://seecorridors.eu/?w_p=23&w_l=2#).
(including fortresses, villages important for handicrafts, historic towns, churches and monasteries, etc.). These locations were identified as the building elements of the East Trans-Balkan Road (one of the nine South-East Europe corridors defined by the ICOMOS team). We obtain the information about this corridor and the locations belonging to it, accompanied by detailed qualitative descriptions, from the website of the Cultural Corridors of South-East Europe (available at http://seecorridors.eu/?w_p=23&w_l=2&w_c=6). For the purposes of this study, we extract the geo-coordinates of these physical locations from Google Maps. Next, we measure the cultural impact by the geographical distance to this cultural corridor and the statistical significance of this distance for local socio-economic development. Put differently, we want to quantitatively analyze whether living in proximity to the corridor affects socio-economic performance.

After the CBD interpretation of cultural corridors, the question arises: Is there a persistence of tangible and intangible local development, or, after a certain time, can local prosperity at a time be followed by a local decline in a subsequent period due to the cultural persistence of values? If the latter holds true, then cultural impact might serve to explain the fall and rise of local development centers or cultural corridors as a whole. In the next sub-section, we present our argumentation about these assumptions.

The Cultural Corridor and Its Mechanism of Impact

The notion of a cultural corridor expresses a strongly region-and-innovation related type of mechanism of impact of the “cultural milieu” on local development (Jacobs 1961; Huggins and Thompson 2015; Trax, Brunow and Suedekum 2015; Westlund, Larsson and Olsson 2014). In other words, local economic development is driven by a locally specific cultural attitude in the form of (a) social capital between people with homogeneous attitudes to progress (Bush 1987) and (b) segregation resulting from clustering motivated by the positive spillover effects of spatial proximity (Akerlof 1997; Axelrod 1997). Naturally, culture-producing agents are attracted to economically prosperous places for the higher demand concentrated there. However, as numerous studies show (for a recent contribution, see Andersson et al. 2014), even when controlling for the demand factor, it is also the clustering of other artists that explains the concentration of artists in a locality. Thus, culture concentrates in places on account of both their economic prosperity and their specialization as cultural sectors. On the other hand, the driver of economic development – innovation, especially destructive innovation – causes changes in the
spatial concentration of economic growth. For instance, with the advent of a SiliconValley type innovation age, the economic significance of the spatial foci of previous industrial economic development (such as mines) has declined. However, the social capital that they have concentrated, and the artistic output and milieu that they have created, remains in these now declining spatial foci as a form of capital — local cultural capital (as defined by Tubadji 2012, 2013).

Naturally, the further back in time these foci are identified, the more pure a measure of cultural capital they would constitute today. The spatial concentration of such past foci of interest drives a mechanism with two components: (i) local cultural capital creates the cultural cost of migration, and thus keeps within the locality a part of its human capital that would otherwise be washed away by economic incentives (Falck, Lameli and Ruhose 2014; Harris and Todaro 1970; Sjaastad 1962); and (ii) these past foci of development are also related to the concentration of transportation networks. The latter component is partially endogenous to the current economic development level, but its significance for economic development is crucial, as new investments in transportation infrastructure are costly, even if they are possible and realistic investments (Celbis, Nijkamp and Poot 2014; Mori and Nishikimi 2002).

Thus, a cultural corridor unites within itself previous foci of interest that are proxies of past cultural activity and lie on past significant trade and communication roads. Nowadays, neither culture nor transportation is primarily concentrated there. That is why, in a purely classical Weberian sense, these cultural corridor foci carry the identification of places where, historically, people’s attitude toward economic development was shaped in a particular direction and according to a certain understanding of technology and progress.

The historical relevance of the meaning of a corridor as a proxy for attitudes is the same as the approximation of attitudes by religion or distance to Wittenberg10 (Becker and Woessman 2009; Weber [1905] 1930). The cultural corridor, however, is further augmented by its relationship to the idea of transportation economies of scale — in other words, economies of scale due to connectivity between places that used to concentrate the most human capital and economic prosperity in a certain time period, and that were operating with particular set of attitudes and ideas for production and development. Even if incentivized economically, human capital will be disincentivized to leave places with a vigorous cultural milieu and high social capital. Therefore, the spatial shift of employment and skilled people due to technological innovation, urbanization, and the rise of new foci of socio-economic development is likely to happen at a closer distance to the past cultural corridor of socio-economic development in a locality. Modern entrepreneurs will try to locate their new businesses near previously existing roads and social capital, and the new foci of development will emerge close to old ones, as far as the resources for new technology will allow.

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10 This refers to the diffusion of Protestantism from Luther’s hometown of Wittenberg (Germany).
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We can now summarize the above propositions in a testable and operational CBD model for the proximity of the centers of localities to a cultural corridor. Therefore, we specify the following model (1):

\[
HC_{i(t-1)} = \beta_1 CG_i + \beta_2 X_{1i(t-1)} + \epsilon_1 \quad (a)
\]

\[
HC_{it} = \beta_3 HC_{i(t-1)} + \beta_4 GVA_{it} + \beta_5 X_{1t} + \epsilon_2 \quad (b)
\]

\[
IS_{it} = \beta_6 HC_{it} + \beta_7 X_{2i} + \epsilon_3 \quad (c)
\]

\[
Empl_{it} = \beta_8 IS_{it} + \beta_9 GVA_{it} + \epsilon_4 \quad (d)
\]

In this system of equations, \( i \) denotes a particular locality and \( t \) stands for the current period of time; \( t-1 \) denotes the period before the current influx of external human capital to the locality; \( HC \) stands for the share of human capital in locality \( i \); \( GVA \) is the gross value added to be interpreted as the investment potential in the locality concerned; \( X_1 \) denotes a vector of the standard economic incentives for labor migration, such as wages, cost of living, etc.; \( CG \) is the source of cultural gravity; \( IS \) stands for the sectoral specialization; \( X_2 \) denotes the economic and natural endowments of the locality; \( Empl \) indicates the volume of local employment; and \( \epsilon \) denotes the standard error of the respective equation of the system.

Model (1) suggests that a certain type and level of human capital is concentrated in a particular time at a particular place. In an Inglehart-Axelrod sense, specific human capital clusters emerge around a certain concentration of cultural capital. Also (in the Weberian tradition), this clustered human capital carries culturally specific skills and occupation-related preferences (equation (a)). Thus, the available human capital decides — on the basis of its skills and preferences — how to exploit the local economic resources. In the next period — given these skills, the economic endowments, the embodied productivity, and the wage distribution — a certain center starts to attract human capital from outside as well (equation (b)). Thus, both the locally generated and externally attracted human capital in the second period determines — together with the local economic endowments and the economic structure of the place — the sectoral specialization (equation (c)).\(^{11}\) Finally, local employment is a function of local sectoral specialization controlled for local productivity of human capital (equation (d)).\(^{12}\) The source of cultural gravity in this context (i.e., the cultural factor influencing the model) can be approximated by the distance of a locality to a historical cultural corridor, among other things. In the next section, we present this particular and novel operationalization of model (1).\(^{13}\)

\(^{11}\) The cultural diversity that occurs due to the inflow of people with different values creates a disruption of the local cultural milieu. Yet, until a tipping point is reached when the local cultural milieu would no longer be predominant in decision-making, the local culture will have a persistent effect.

\(^{12}\) Local cultural gravity and its effect on the interaction between culturally distant agents still influence the efficiency of local productivity by the dominant effect of local culture.

\(^{13}\) This process might, at first glance, seem deterministic when considered for just one period of time. But put in a dynamic perspective, model (1) assumes that, even if the development of local culture takes place more slowly than economic events, it would also evolve based on the cultural capital belonging
To empirically address the essence of the hypothesis behind model (1), we use two combined datasets, one of which is uniquely created for our research purposes. The first dataset, based on the European University Institute (EUI) European Regional Dataset (ERD), offers an unbalanced panel of local productivity and regional employment by economic sector for Greece, Romania, and Bulgaria on a NUTS-3 level for the period from 1980 to 2011. From this dataset, we obtain indicators about total employment, employment per sector, and gross value added, which serve as the basis for our main explanatory variables. The second dataset contains the estimated shortest distance from each NUTS-3 region to the East Trans-Balkan South-East European cultural corridor. We obtain this information by first finding the centroid of each NUTS-3 region. Then, we determine the geo-locaational coordinates for each of the 280 listed items of the East Trans-Balkan South-East Europe cultural corridor. Finally, we estimate the shortest distance as the distance from a point (the NUTS-3 centroid) to a poly-line (formed by the geo-locations of the cultural corridor items). Our source of the elements of the corridor is the South-East European cultural corridor website (www.seecorridors.eu), and we identified and extracted their geo-locations from Google Maps, which provide the longitude and latitude of either the particular cultural endowment (e.g., a fortress) or more generally the nearest geographic location identifiable (i.e., the closest village to a fortress). Moreover, in the presence of a very high ethnic, religious, and linguistic homogeneity in the countries under investigation, any familiar measure for culture like religion or language will be powerless to capture quantitatively the cultural capital differences in these localities.

Next, in order to obtain an appropriate sector specialization, we implement several transformations of the EUI variables. Similar to Ana Angulo, Jesus Mur, and Javier Trivez (2015), we obtain the local shares of sectoral employment as a ratio of the share of total employment in this locality by using the following equation:

to the incoming foreign capital. Migration is economically driven, but it is strongly subject to cultural gravity and interaction between cultures. Thus, the process of cultural change is determined by the culturally driven reallocation of human capital between localities. According to cultural gravity, a more culturally open milieu would change faster, but would also attract more human capital and transform into an important center of development. If it stays open, the effect may persist, but if it turns toward over-dominance (which normally is the threshold of a continuously power-accumulating entity, or the "empire effect"), this would ultimately lead to less human capital concentrating in this locality, and gradually the locality would lose its economic power. Thus, a break in the chain of the persistence of the cultural effect on local development would happen in this locality.

14 In particular, in Greece, about 99 percent of the population belongs to the same religion (Eastern Orthodox Christianity). Furthermore, Cypriot Greeks, for example, officially share the same religion and language, but they are carriers of group-specific attitudinal characteristics, known mostly from anecdotal evidence as often opposing to the average Greek attitude. In Bulgaria, linguistically and religiously, the population has been submitted during different historical periods to forced conversions and change of names, so it is a highly latently heterogeneous notion what a Bulgarian Muslim is, for example, and how this category has to be identified adequately as a carrier of a particular cultural attitude.
\[ SI = \frac{(Es/Est)}{(Er/Et)} \] (2)

In equation (2), \( SI \) represents the specialization index; \( Es \) stands for local employment in the sector of interest; \( Est \) is the employment in this sector in the given country; \( Er \) stands for total local employment in all sectors; and \( Et \) denotes total employment in the country. Using the sectoral indices, for every sector, we construct a dummy variable equal to 1 when the \( SI \) index for the specific sector exceeds 1. In this way, we ultimately create as regressors six dummy variables denoting specialization in the following sectors: \( si\_agri\_d \) — agriculture; \( si\_ind\_d \) — industry excluding manufacturing; \( si\_constr\_d \) — construction; \( si\_trade\_d \) — wholesale, retail, transport and distribution, communications, hotels and catering; \( si\_fin\_d \) — financial and business services; and \( si\_non\_m\_d \) — non-market services.

The overall number of observations in our final compiled dataset amounts to 2,850 observations covering the period from 1980 to 2009 for Greece and the period from 1990 to 2009 for Bulgaria and Romania. Each year covers all NUTS-3 regions of the three countries. The years of the crisis after 2009 are excluded, owing to the specific shock conditions that might bias the results (this especially in a view of the fact that 2009 was the benchmark year for the crisis-related developments that happened in Greece). In the next section, we present the data-handling procedure through a pooled dataset in order to test the main hypothesis behind model (1).

**Estimation Strategy**

The above data allow us to test the main hypothesis underlying model (1). To sum up, our working hypothesis, on which model (1) is based, is:

\[ H01: \text{In the course of time, historical cultural factors (even if moderated by immigration in a locality) affect local sectoral specialization in the locality at the current time, and thus ultimately shape (partially) the level of employment in this locality.} \]

To test this hypothesis and perform a robustness check of the results, we examine the hypothesis using two alternative estimation methods (i.e., applying the recommended within-method triangulation; see Downward and Mearman 2007). We first use an instrumental variable (IV) approach, combined with a 2SLS regression, and then we conduct several types of propensity-score-matching and difference-in-differences methods in order to identify the impact of culture on local employment.

In particular, the 2SLS IV approach has two alternative operationalizations. The first operationalization, following the trade and home-bias rationale, uses the distance to the cultural corridor as an instrument for the culturally biased specialization in trade\(^{15}\) and conducts a just-identified 2SLS estimation of this specification. As a second alternative, we follow a Weberian proposition that there is a culturally driven

\(^{15}\) For a recent contribution on the mechanisms of the significance of trade as a factor for regional development, see Kristof Dascher and Alexander Haupt (2011).
local occupational preference. Based on this premise, all sectoral specializations can be considered proxies of local cultural preferences. Therefore, we use all dummy variables for specialization in all sectors as instruments for distance to the cultural corridor, which is used as a regressor, together with local gross value added, in an attempt to explain the local level of employment. This second alternative represents an over-identified 2SLS estimation with six instrumental variables for the culture-related regressor distance to the cultural corridor.

Finally, we triangulate (Downward and Mearman 2007) the results obtained through the 2SLS method by using a propensity-score-matching and difference-in-differences approach. We define distance to the cultural corridor in three alternative ways: up to 10 km (treatment 1), up to 15 km (treatment 2), and up to 20 km (treatment 3). We use a probit model to estimate the propensity first in levels (of employment), and then as a dependent variable, the difference between the propensity in each two consecutive years for every NUTS-3 region available in our dataset (a one-year difference defining the before and after state in our dataset). The latter estimation serves as our difference-in-differences estimation. Next, we implement a matching procedure for each of the above-mentioned dependent variables (in levels and in differences) separately. To match the scores, we alternatively use one of the three treatments using the following matching methods on a comparison basis: nearest-neighbor matching, kernel matching, and stratified matching. We simultaneously conduct a simple t-test and a test with control variables and common support intervals. In all types of estimations conducted, both IV-related and propensity-score-related, we use controls for year, country, and capital city.

**Results**

**Instrumental Variables and 2SLS Estimation**

**Prefatory Remarks**

Table 1 presents the first introduction to the data in summary statistics format. Sharing a close mean and standard deviations, total employment (emp_t) and gross value added (GVA) explain each other almost completely. This means that the rest of the variables will be able to address, in a meaningful model, our intended investigation regarding the additional cultural impact.

The first part of our empirical analysis uses a 2SLS instrumental variable (IV) approach. Our main motivation for using IVs is to estimate a model where total employment is explained by economic capital (approximated by GVA) and economic structure (the sectoral index dummies). But both total and sectoral employment are culturally endogenous, according to the Weberian claim for cultural impact on productivity and occupational choice. Therefore, we need to extract the cultural bias from the regressor — the sectoral specialization — by finding an IV related to this regressor, but not with the error term of the regression itself. Our strategy is to use the distance to a historical corridor, the East Trans-Balkan cultural corridor specifically.
As it is known from urban economics, distance to the urban center is one of the main determinants of the economic specialization of production. Furthermore, specialization is related to occupational choice, while occupational choice in a locality depending on cultural preferences, in addition to natural endowments. Thus, if there are indeed traces of cultural persistence, they might be a reason for sufficient correlation between past and present centers of development, so that the distance to the cultural corridor may be expected to be correlated with the urban centers today. As Table 2 indicates, such a correlation does exist, yet it is not that high, which indicates that the impact of culture does not completely determine the process.

Table 1. Basic Descriptive Statistics of the Compiled Dataset

| Variable    | Obs. | Mean   | Std. dev. | Min.   | Max.   |
|-------------|------|--------|-----------|--------|--------|
| emp_t       | 2850 | 130.097| 140.24    | 2.075  | 1124.790|
| loc_size    | 2850 | 0.024  | 0.02      | 0.003  | 0.165  |
| sitrade_d   | 2850 | 0.379  | 0.49      | 0.000  | 1.000  |
| gva         | 2850 | 235.699| 325.52    | 10.770 | 4756.740|
| siagr_d     | 2850 | 0.526  | 0.50      | 0.000  | 1.000  |
| siconstr_d  | 2850 | 0.384  | 0.49      | 0.000  | 1.000  |
| siind_d     | 2850 | 0.445  | 0.50      | 0.000  | 1.000  |
| sifin_d     | 2850 | 0.259  | 0.44      | 0.000  | 1.000  |
| sinon_m_d   | 2850 | 0.474  | 0.50      | 0.000  | 1.000  |
| capital     | 2850 | 0.014  | 0.12      | 0.000  | 1.000  |
| country_d_bg| 2850 | 0.196  | 0.40      | 0.000  | 1.000  |
| country_d_gr| 2850 | 0.509  | 0.50      | 0.000  | 1.000  |
| distance_e  | 2850 | 163623.400 | 185309.90 | 87.700 | 663000.000 |

Source: Authors' calculations.
Notes: Table 1 presents the descriptive statistics for the main explanatory variables used in the analysis: emp_t – total employment; loc_size – number of people in a locality; gva – gross value added; sitrade_d – dummy variable for specialization in trade; siagr_d – dummy variable for specialization in agriculture; siconstr_d – dummy variable for specialization in construction; siind_d – dummy variable for specialization in industry; sifin_d – dummy variable for specialization in finance; sinon_m_d – dummy variable for specialization in non-market services; capital – dummy variable for capital city; country_d_bg – dummy variable equal to 1 if country is Bulgaria; country_d_gr – dummy variable equal to 1 if country is Greece; distance_e – calculated distance from the centroid of NUTS-3 to the polyline composed of the geo-data of the points contained in the East Trans-Balkan cultural corridor.

To identify the 2SLS IV model, we consider Table 2 again. There is a positive and relatively satisfactory correlation only between specialization in trade and distance to the cultural corridor. Theoretically, however, one may expect that all specialization variables are related to this distance. Therefore, we alternatively follow the statistical and then the theoretical rationale in order to be sure that the estimation model is not under-identified theoretically. In other words, we first use a just-identified 2SLS IV model, where distance to culture is the instrument for specialization in trade. This is justified by the fact that specialization in trade is, as evident from Table 2, the only variable that seems to be statistically likely to be endogenous to the culture variable (besides the historical variable of distance). If, however, the theoretical claim that all
specialization is culturally endogenous is true, then we might be venturing into an under-identification problem with more endogenous variables than instruments.

Table 2. Correlations Among Main Variables

|               | dist~ast | sitrad~d | siagr_d | sicons~d | siind_d | sifin_d | sinon_m_d |
|---------------|----------|----------|---------|----------|---------|---------|-----------|
| distance~ast  | 1        |          |         |          |         |         |           |
| sittrade_d    | 0.21     | 1        |         |          |         |         |           |
| siagr_d       | 0.06     | -0.49    | 1       |          |         |         |           |
| siconstr_d    | 0.13     | 0.26     | -0.36   | 1        |         |         |           |
| siind_d       | -0.37    | 0.11     | -0.42   | 0.06     | 1       |         |           |
| sifin_d       | 0.11     | 0.08     | -0.24   | 0.01     | 0.05    | 1       |           |
| sinon_m_d     | -0.12    | -0.05    | -0.27   | 0.08     | 0.22    | 0.41    | 1         |

Source: Authors’ calculations.

Notes: Table 2 presents the correlation coefficients between the culturally endogenous variables (dummy variable for sectoral specialization listed in Table 1) and the intended instrumental variable – distance to the cultural corridor (described in detail in Table 1).

As an alternative, we estimate the same model of total employment explained by GVA and cultural impact on occupation and specialization, but this time the latter is approximated directly by the distance to the cultural corridor. We use the dummy variables for specialization only as instruments for distance to the cultural corridor. We can statistically and theoretically afford this specification because GVA already almost completely explains total employment, while specialization might also explain total employment, but not the other way around, which is the first reason why we use the specialization as a regressor on the right-hand side. Thus, our alternative specification of a 2SLS IV model is an over-identified, theoretically consistent, and statistically reasonable one.

The degree to which we manage to tackle the potential problems around the instrumental variables and their suitability for the model is further examined after the main estimations with the standard tests: the Hausman test for endogeneity (comparing the OLS and the IV estimates); the B-W-H tests for exogeneity (checking if cov(xe) is different from 0); and the over-identification test for the second alternative, where there are more than one instrumental variable. Additionally, we conduct weak instruments tests as the correlations are low, especially between some of the specialization dummies and the distance variable. The last test we conduct is a special probit-based IV estimation for the case when the dependent endogenous regressor is a dummy for trade specialization (i.e., for the just-identified specification). In the next sub-sections, we describe in detail the main IV estimation results and the aforementioned post-estimation tests.

Test with a Just-Identified 2SLS Model

Table 3 presents the just-identified specification where distance to the cultural corridor is an instrument for specialization in trade. Table 4 shows the alternative
over-identified specification, where distance to the cultural corridor is instrumentalized with the six dummy variables for specialization. As Table 3 reveals, first in OLS and then in a just-identified 2SLS IV specification, when we regress total employment on GVA, the impact of GVA is strongly statistically significant and positive. The impact of sector specialization varies, however, especially after the instrumentalization of specialization in trade with the distance to the cultural corridor, the effect of specialization in trade on total employment shows a sign change and becomes negative. This is a clear indication that specialization in trade is indeed culturally endogenous. The impact of the other specializations remains relatively stable across methods, but only specialization in agriculture loses its significance under the IV procedure. For the remaining sectors, specialization in construction is a stable positive factor for total employment, while specialization in finance, non-market activities, and industry has a stable negative association with total employment, regardless of the involvement of the instrumental variable.

Table 3. 2SLS IV Just-Identified Specification

| Source: Authors’ calculations. |
|-------------------------------|

| OLS            | 2SLS          |
|----------------|---------------|
| dep.var.       | emp_t         | sitrade_d     | emp_t       |
| emp_t          | coef.         | t-value       | coef.       | t-value |
| sitrade_d      | 14.2          | 5.34          | -           | -       |
| gva            | 0.2           | 48.27         | 0.0002      | 8.97    |
| siagr_d        | 27.7          | 9.30          | -0.474      | -25.79  |
| siconstr_d     | 14.0          | 5.67          | 0.052       | 3.09    |
| siind_d        | -8.2          | -3.28         | 0.022       | 1.25    |
| sifin_d        | -12.2         | -4.29         | -0.036      | -1.86   |
| sinon_m_d      | -11.2         | -4.51         | -0.159      | -9.48   |
| distancetoeast | -             | -             | 8.53E-07    | 14.25   |
| capital        | 409.6         | 39.01         | 0.270       | 3.76    |
| country_d_bg   | -111.6        | -34.96        | -0.021      | -0.98   |
| country_d_gr   | -223.4        | -78.59        | -0.167      | -6.92   |
| const          | 167.8         | 25.92         | 0.474       | 10.89   |
| Year dummies   | Yes           | Yes           | Yes         |
| F (or chi)     | (38,2811) = 384.84 | (38,2811) = 43.46 | chi2(38) = 13195.83 |
| Prob>F (or Prob>chi) | 0.0000 | 0.0000 | 0.0000 |
| R-squared      | 0.8388        | 0.3701        | 0.8191      |
| Adj R-squared  | 0.8366        | 0.3615        | -           |
| Root MSE       | 56.69         | 0.3877        | 59.644      |
| N              | 2850          | 2850          | 2850        |

***D-W-H test for endogeneity

- Durbin χ²(1) = 25.1715 (p = 0.0000)
- Wu-Hausman F(1,2810) = 25.0394 (p = 0.0000)

***exogeneity test - ols residual

- F(1,2818) = 236.38
- Prob>F = 0.0000

***weak instruments test - estat

- Robust F(1,2811) Prob>F = 194.2 0.0000
Notes: Table 3 presents the results from a 2SLS IV estimation, where the endogenous variable is specialization in trade in the region, and the instrument for this is the distance to the East Trans-Balkan cultural corridor. Post-estimation tests for endogeneity and weak instruments are presented.

These results are plausible, as the post-communist period in this region was marked by a decline of industry in Romania and Bulgaria, and subsequently an outflow of employment, while the other two sectors are underdeveloped (the financial sector) and traditionally lower paid (non-market services). It is, therefore, natural to be associated with a negative effect on total employment in the countries of interest. Meanwhile, there are the year, country, and capital city controls, where the latter has a strong positive association with employment which is a good sign for the reliability of our results, capturing the expected agglomeration biases. The main conclusion from this exercise is that economic structure is indeed culturally embedded — i.e., a culturally endogenous and biased process.16

The post-estimation tests for endogeneity also support the need for the instrumentalization of specialization in trade with distance to the cultural corridor. These tests show an F-statistic well above 10 (194), indicating that distance to the cultural corridor is not a weak instrument. Still, we are aware of the loss of significance of specialization in agriculture in the presence of the instrument, which might mean that another specialization dummy, besides the trade-related one, is endogenous to culture, even if the statistical characteristics of the agricultural variable do not suggest this. To secure triangulation of the results, we infer an over-identified alternative to the same model. We do this by switching the place of what is an endogenous factor under investigation and an instrument in the first specification (Table 3). Plus, we expand the theoretical motivation of the instrument and include a higher number of instruments, thus arriving at an over-identified specification. We adopt this approach despite the lack of high correlation between distance to the cultural corridor and specialization in trade because, theoretically, it is justifiable that agriculture is the traditionally important sector in urban economics models.17 Also, the Weberian hypothesis about the cultural impact on occupational choice per se suggests that there is a link between cultural attitudes and forms of labor specialization.18

16 The estimations with a probit model and instrumental variable were consistent in their economic interpretation with our results. Still, we need to compare Table 3 and Table 4, with the latter over-identified specification following the OLS, 2SLS presentation, and thus we present here the OLS vs. 2SLS results for the just-identified specification as well.

17 Indeed, trade and industry are often the cornerstones for urban and regional models, accounting for physical factors like geographical location, proximity to rivers, seas, etc. However, going back to basics, life and then trade became possible because there was a surplus of agricultural produce.

18 It is noteworthy that the same IV estimation with an alternative dependent variable — population density — also registers a significant value of the cultural corridor in the second equation, after it has been rid of endogeneity as a measure. This means that the effect of the cultural corridor is on population rather than on the skilled population in particular. (Results available from the author upon request.)
Table 4 presents the new over-identified specification results. It shows an OLS and then a 2SLS IV estimation, where total employment is regressed on GVA and distance to the cultural corridor, while the distance is instrumentalized with the dummies for sectoral specialization. This over-identified specification presents exactly the same results as the just-identified specification in Table 3 with regard to the relationship between total employment and GVA, as well as between total employment and the control variables for year, country, and capital city. The difference, however, is in the effect on total employment of the distance to the cultural corridor. This regressor changes sign after the instrumentalization, which supports the endogeneity assumption, but it has no association with the dependent variable of total employment. This is actually a sign that distance to the cultural corridor is indeed a very good instrument in the setting of the just-identified specification. Moreover, this result demonstrates that there is no direct cultural persistence effect. The cultural impact exists only as a latent path-dependence driver of a Weberian effect on specialization in trade. Yet, our post-estimation tests for endogeneity and over-identification, as well as the weak instrument tests, all perform satisfactorily. This means that there is still reasonable support for the Weberian theoretical claim of a specialization and culture relationship per se. Yet, this also means that our results based on the 2SLS need further empirical triangulation. That is why, we move on to the implementation of another endogeneity estimation method: the propensity-score-matching method, combined with a difference-in-differences approach.

A Propensity-Score-Matching and Difference-in-Differences Approaches

Propensity-Score-Matching Approach

Propensity-score-matching is a method that allows for analyzing the average effect of the distance to the cultural corridor (which is our treatment) for the total employment in the NUTS-3 regions under investigation (which is the output). We divide these regions into two groups according to a maximum distance to the corridor. Regions within this maximum distance we consider to have received the treatment, while the rest fall into the category of a control group. We test three alternative maximum distance definitions (10 km, 15 km, and 20 km), which are denoted as treatment 1, treatment 2, and treatment 3, respectively. These are three alternative quantifications of the distance to the cultural corridor as a treatment effect for local employment. The goal is to estimate a probit model $p(x) = \text{prob}(D=1 | x) = E(D | x)$, where $x$ is a vector of the relevant characteristics of the regions — e.g., GVA and sector specialization. In other words, we want to see if the local productivity is explained depending on the distance to the cultural corridor.

As these are observational data (and not a controlled experiment), it is essential that our matching is done on the basis of $x$, and not only the output variable. In other
words, we want to match NUTS regions that are comparable in terms of not only output (GVA), but also of regional characteristics of the economic structure.\(^{19}\) The matches for the treated observations among the propensity scores of the controlled observations and their characteristics will also be made only within a certain common support interval, meaning that we restrict the comparison range and consider only the propensity levels inside the interval where there are observations to match. Under this

\(^{19}\) As mentioned previously, controls for year, country, and capital city were used across all specifications.
setting, we use three alternative methods of matching: nearest neighbor (identifying the closest propensity score for the treated observation among the controlled ones, given the \( x \) characteristics); Kernel matching (which takes all propensity scores, weighting them according to their best matching to the propensity score of the treated observation); and stratified matching (where the matching is done only with those control observations within the same strata as the treated observation in terms of propensity score stratification). Tables 5, 6, and 7 depict the way treatment and control groups are statistically characterized under the three alternative definitions of the maximum distance from the cultural corridor treatments 1, 2, and 3, respectively.

Table 5. Descriptive Statistics for Distance to Cultural Corridor: Treatment 1 (10 km)

| Variable   | Treatment 1 | Freq. | Percent |
|------------|-------------|-------|---------|
|            |             | 0     | 2,755   |
|            |             | 1     | 754     |
|            | Total       | 3,509 | 100     |

| Variable   | Obs. | Mean   | Std. Dev. | Min. |
|------------|------|--------|-----------|------|
| treatment1 | 0    | 115.802| 121.785   | 908.895 |
| emp_t      | 2330 | 246.7625| 318.6188 | 4756.74 |
| gva        | 2330 | 0.482396| 0.499781 | 0     |
| sitrade_d  | 2755 | 0.615608| 0.48654 | 1     |
| siagr_d    | 2755 | 0.482396| 0.499781 | 0     |
| siconstr_d | 2755 | 0.474773| 0.499454 | 0     |
| siind_d    | 2755 | 0.380762| 0.485662 | 0     |
| sinon_m_d  | 2755 | 0.550635| 0.49752 | 0     |
| capital    | 2755 | 0.010526| 0.102075| 0     |
| country_d_bg| 2755| 0.126316| 0.332265| 0     |
| country_d_gr| 2755| 0.536842| 0.498731| 0     |

Source: Authors’ calculations.
Notes: Table 5 presents descriptive statistics for the treated (treatment 1 = 1) and control (treatment 1 = 0) groups for the case when treatment (treatment 1) is defined with a maximum distance of 10 km from the East Trans-Balkan cultural corridor.

Table 6. Descriptive Statistics for Distance to Cultural Corridor: Treatment 2 (15 km)

| Variable     | Obs. | Freq. | Percent |
|--------------|------|-------|---------|
| treatment2   |      |       |         |
| 0            | 2,523|       | 71.9    |
| 1            | 986  |       | 28.1    |
| Total        | 3,509|       | 100     |

| Variable     | Obs. | Mean  | Std. dev. | Min.  | Max.  |
|--------------|------|-------|-----------|-------|-------|
| emp_t        | 2161 | 108.936| 115.4554  | 2.075 | 908.895|
| gva          | 2161 | 251.9512| 328.1005  | 13.145| 4756.74|
| sitrade_d    | 2523 | 0.473643| 0.499404  | 0     | 1     |
| siagr_d      | 2523 | 0.60761| 0.48838   | 0     | 1     |
| siconstr_d   | 2523 | 0.48474| 0.499866  | 0     | 1     |
| siind_d      | 2523 | 0.472057| 0.499318  | 0     | 1     |
| sifin_d      | 2523 | 0.382085| 0.485993  | 0     | 1     |
| sinon_m_d    | 2523 | 0.544986| 0.498071  | 0     | 1     |
| capital      | 2523 | 0.011494| 0.106614  | 0     | 1     |
| country_d_bg | 2523 | 0.114943| 0.319016  | 0     | 1     |
| country_d_gr | 2523 | 0.574713| 0.494485  | 0     | 1     |

| Variable     | Obs. | Mean  | Std. dev. | Min.  | Max.  |
|--------------|------|-------|-----------|-------|-------|
| emp_t        | 689  | 196.4683| 183.7713  | 43.955| 1124.79|
| gva          | 689  | 184.7262| 312.0946  | 10.77 | 2718.31|
| sitrade_d    | 986  | 0.551724| 0.49757   | 0     | 1     |
| siagr_d      | 986  | 0.63286| 0.48227   | 0     | 1     |
| siconstr_d   | 986  | 0.53854| 0.498766  | 0     | 1     |
| siind_d      | 986  | 0.74645| 0.435264  | 0     | 1     |
| sifin_d      | 986  | 0.440162| 0.496659  | 0     | 1     |
| sinon_m_d    | 986  | 0.643002| 0.479357  | 0     | 1     |
| capital      | 986  | 0.029412| 0.169044  | 0     | 1     |
| country_d_bg | 986  | 0.529412| 0.499388  | 0     | 1     |
| country_d_gr | 986  | 0.029412| 0.169044  | 0     | 1     |

Source: Authors’ calculations.

Notes: Table 6 presents descriptive statistics for the treated (treatment 2 = 1) and control (treatment 2 = 0) groups for the case when treatment (treatment 2) is defined with a maximum distance of 15 km from the East Trans-Balkan cultural corridor.

As Table 5, 6 and 7 show, the treated group always has a higher total employment, with a lower GVA than the control group, and it also has a higher specialization in trade, construction, and financial services than the control group. At the same time, agricultural specialization is at the same level for both the treated and the controlled groups. This might be explained by the fact that agriculture depends on
the availability of land, while the other specializations are more a question of occupational-choice preferences than the physical endowments of the place. We also observe that the differences increase when the maximum distance increases, but this might mean mostly that the number of controls will be decreasing, as well as the common support interval. Yet, it also means that the distance to the cultural corridor is likely to be of significance for the propensity of total employment. In the next step, we estimate the propensity scores for total employment controlled for the x characteristics (GVA and sectoral specialization dummies) and the relevant year, country, and capital city controls. We also implement the three types of matching – nearest neighbor, Kernel, and stratified matching – respectively represented by treatment 1, treatment 2, and treatment 3 in Table 8.

Table 7. Descriptive Statistics for Distance to Cultural Corridor: Treatment 3 (20 km)

| Variable | Treatment 3 | Freq. | Percent |
|----------|-------------|-------|---------|
| 0        | 2,320       |       | 66.12   |
| 1        | 1189        |       | 33.88   |
| Total    | 3,509       |       | 100     |

| Variable  | Obs | Mean     | Std. dev. | Min. | Max. |
|-----------|-----|----------|-----------|------|------|
| treatment3| 0   | 98.62157 | 98.54083  | 2.075| 528.321|
| gva       | 2012| 250.8117 | 332.9956  | 13.145| 4756.74|
| sitrade_d | 2320| 0.4625   | 0.498699  | 0    | 1    |
| siagr_d   | 2320| 0.6125   | 0.487284  | 0    | 1    |
| siconstr_d| 2320| 0.469397 | 0.49917   | 0    | 1    |
| siind_d   | 2320| 0.45     | 0.497601  | 0    | 1    |
| sifin_d   | 2320| 0.383621 | 0.486372  | 0    | 1    |
| sinon_m_d | 2320| 0.530603 | 0.49917   | 0    | 1    |
| capital   | 2320| 0        | 0         | 0    | 0    |
| country_d_bg| 2320| 0.0875  | 0.282627  | 0    | 1    |
| country_d_gr| 2320| 0.6125  | 0.487284  | 0    | 1    |
| treatment3| 1   | 838      | 205.6693  | 188.4474 | 27.788 | 1124.79|
| gva       | 838 | 199.4151 | 303.9831  | 10.77 | 2718.31|
| sitrade_d | 1189| 0.560135 | 0.49658   | 0    | 1    |
| siagr_d   | 1189| 0.619008 | 0.485835  | 0    | 1    |
| siconstr_d| 1189| 0.559294 | 0.496681  | 0    | 1    |
| siind_d   | 1189| 0.742641 | 0.437363  | 0    | 1    |
| sifin_d   | 1189| 0.42725  | 0.494887  | 0    | 1    |
| sinon_m_d | 1189| 0.654331 | 0.475786  | 0    | 1    |
| capital   | 1189| 0.048781 | 0.215499  | 0    | 1    |

Source: Authors' calculations.
Notes: Table 7 presents descriptive statistics for the treated (treatment 3 = 1) and control (treatment 3 = 0) groups for the case when treatment (treatment 3) is defined with a maximum distance of 20 km from the East Trans-Balkan cultural corridor.

Table 8. Propensity Score Matching and Diff-in-Diff: Distance to Cultural Corridor as a Treatment for Total Employment

| Treatment | Est. method | Differences using 1 period data | Differences using 2 period data |
|-----------|-------------|--------------------------------|--------------------------------|
| 1         | t-test      | 77.9208                        | *                              |
|           | Reg., dummy & controls | 9.497868                  | *                              |
|           | ATT nearest neighbor | 3.587                      | *                              |
|           | ATT kernel matching | 14.166                     | *                              |
|           | ATT stratified matching | 14.696                    | *                              |
|           | **common support** | [0.05320394]                | [0.99136058]                   |
| 2         | t-test      | 87.53229                      | *                              |
|           | Reg., dummy & controls | 17.22185                   | *                              |
|           | ATT nearest neighbor | 15.366                     | *                              |
|           | ATT kernel matching | 15.28                      | *                              |
|           | ATT stratified matching | 15.254                    | *                              |
|           | **common support** | [0.00913926]                | [0.79163732]                   |
| 3         | t-test      | 19.8                          | *                              |
|           | Reg., dummy & controls | 25.48063                   | *                              |
|           | ATT nearest neighbor | 34.522                     | *                              |
|           | ATT kernel matching | 30.381                     | *                              |
|           | ATT stratified matching | 38.504                    | *                              |
|           | **common support** | [0.02287165]                | [0.88621778]                   |

Source: Authors’ calculations.

Notes: Table 8 presents the coefficients and significance level for the treatment, analyzed with alternative methods for estimating the average treatment effect on the treated. The methods presented: t-test (directly repressing outcome on the propensity), a simple regression with controls, and then comes the propensity score matching implemented with the following methods: nearest neighbor, Kernel matching, and stratified matching. The first column presents one period of observations. The second column presents the difference-in-differences estimation for a change in employment over one year. The common support represents the interval of propensity within which the matching is implemented. All propensity score matching implementations involve controls for sector specialization and GVA on the NUTS-3 level.

Table 8 presents both a simple t-test where matching is based only on propensity scores, and a test where the propensity is controlled for the x vector of variables. In addition, Table 8 presents the one-period and two-period (difference-in-differences) results. The first estimation looks at the available data as a pooled cross-section of treated and non-treated regions, and considers the level of total employment as an
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outcome variable. For the difference-in-differences estimation, we take as an outcome the difference in total employment within one year for every year for which data is available. When matched on propensity scores and x variables, as seen from column 1 of Table 8, there is a high positive significance of the treatment effect on total employment that, on average, amounts to about 14,000, 15,000, and 30,000 more employed people per treated region, and this varies depending on the method and the treatment definition concerned. This means that the regions closer to the cultural corridor experience a higher level of total employment. Moreover, there is an interesting effect that, with an increase of the maximum distance, this effect intensifies, which means that there are no indications of a decline of the effect with distance. In other words, the effect is very robust and better captured when a bigger sample is analyzed as a treated group.

**Difference-in-Differences Approach**

The difference-in-difference results in column 2 of Table 8 point to another interesting observation. The change in employment – i.e., the employment growth – is again significantly, (but this time negatively) associated with the treatment effect. This means that, while enjoying a higher total employment, these regions that are closer to the cultural corridor experience a slower growth of employment. This evidence – seen from the perspective of the entrepreneurial cultural milieu which claims that, in a broader sense, past centers of productivity shape current centers of productivity and employment – can be interpreted as a relationship between distance to the corridor and what can be thought of as an economic lifecycle of the region. The regions closer to the cultural corridor have higher level of employment, as expected from the hypothesis that there is a long path-dependent process of cultural impact (i.e., from proximity to places of past-times of socio-economic productivity). The effect is more evident for places closer in distance to the cultural corridor. In a sense, they experience a “cash cow” lifecycle stage, where their total employment is higher due to an accumulated past history of socio-economic development.

The newly growing centers of employment are elsewhere, but they are still in a developing stage, hence still lagging behind the cash-cow lifecycle regions. In a broader perspective, the result supports the proposition that culture is a source of a certain persistence chain^20^ (i.e., the distance to the cultural corridor is associated with higher total employment). Yet, there is a slow trend of change captured by the slower growth of employment in the treated regions. The latter means that new spatial foci of socio-

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^20^ “Persistence chain” is called a “chain” for the same reasons it is in the term “Markov chain” in the sense that a persistence chain characterizes a persistent process over a limited period of time. The economic processes happen much faster than social change. Thus, the value change for a certain period of time is negligible. During this period, a persistence-similar process endures. Put differently, in a cross-sectional environment, a persistence effect can be traced due to the existence of persistence chains. However, in a time-series or a panel environment with a long enough period of observation, so that cultural change is captured (over twenty years, for example; see Hauser 2013), several path-dependent chains can be observed that build up the path-dependence phenomenon of cultural impact.
economic development may emerge over time. These new foci are currently still accumulating socio-economic conditions that will trigger the new socio-economic geography, but with the path-dependent character of their local development. These results corroborate the findings of David Cuberes (2011, 229), who observes that, “[a]t some point, the growth rate of this city slows down and the second-largest city then becomes the fastest-growing one. Eventually, the third-largest city starts growing fast as the two largest cities slow down.” Moreover, there is a link between this pattern in the development of local centers and their proximity to what we term here “cultural corridor.”

In general, our last result is consistent with the fact that the main assumption regarding the treatment effect is significant (which is observed with regard to distance to the cultural corridor), and this is the assumption of partial equilibrium (Nijkamp 2007). In other words, the cultural treatment we investigate here does not deterministically drive the observations in a constant manner, but is actually conditional on independent current development assumptions. However, it still holds as a factor of influence on total employment in the regions.

Synthesis

As a final comment on the robustness of the results, we should note that the common support interval is rather large, which means that we can use almost the whole control group for the matching exercise. This common support naturally decreases when we enlarge the treatment group, but it is interesting that the interval decreases first from above (when we increase the definition of maximum distance to the cultural corridor from 10 km to 15 km), and then it decreases from below (when we increase this further from 15 km to 20 km for treatment 3). Even though remotely, this can still be a sign for a fading of the cultural effect where the leading and the worst-performing regions of the treated group have a difficulty finding a match among the control group. Put differently, there are both “cash-cows” and “falling stars” lifecycle regions among the treated regions.

In summary, our propensity-score-matching and difference-in-differences estimations have two functions. They triangulate and support the results from the 2SLS IV estimations, confirming the cultural effect of distance to the cultural corridor on the local total employment. In addition, they provide further insight into the

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21 The findings of David Cuberes (2011) concern, among other countries, Bulgaria for the period from 1888 to 1990. Bulgaria is one of the three countries through which the cultural corridor, we examine, passes geographically. Furthermore, with respect to Bulgaria, the last few decades in Cuberes’s database coincide with the time period covered by our dataset, too. Our and Cuberes’s (2011) datasets are from different sources. Therefore, we consider the result as an interesting triangulation of the result from 2011.

22 The other three assumptions of unconfoundedness (the treatment does not act on the control group), overall existence assumption (i.e., there are suitable matches), and the balancing assumption (comparable number of matches per observation) are within acceptable margins of fit with the data, although not to an ideal degree (especially with regard to the balancing assumption). Still, we implement robustness control, and the resulting overall consistency is a sign of the general reliability of the results.
pattern of cultural impact, which is characterized as one of path-dependence related to social change and a chain of economic development, rather than to a fixed deterministic persistence effect. Nevertheless, the effect of the distance from the cultural corridor, at a fixed moment in time and space, even if only a path-dependent (persistence chain only) effect, is still a very strong predictor of local output. A spatial panel exploration or a generalized-method-of-moments (GMM) panel estimation, with a varying cultural component, could be a promising continuation that may cast further light on our findings regarding the cultural impact mechanism of persistence chains.

Conclusion

We attempted to offer a novel quantification of the analysis of the “cultural factor” by including the culture-based development (CBD) concept in a cultural corridor context. We aimed to enhance the understanding of culture as a factor variable that captures the cultural milieu and related cultural assets clustered in a locality over time. We provided an argumentation for the conceptual acceptability of this quantification, and for using it to explore the effect of a cultural corridor on local employment in Greece, Bulgaria, and Romania. We provided clear econometric evidence in support of the generally accepted notion in economics — usually tested in many geographical case studies — that culture matters. Our study is both consistent with existing evidence and original in terms of its quantitative approach and the selected geographical scope of analysis. In other words, the results support our working hypothesis and demonstrate that the distance to the East Trans-Balkan cultural corridor is associated with economic benefits (in terms of employment gains) for regions or localities that are situated closer to the corridor.

23 We should note that the notions of path-dependence and persistence are not clearly distinguished in the literature (Freeman 2012). We follow the CBD definitions for the distinction between the two notions. Schematically, this distinction can be described as follows: “Persistence” means a strictly repetitive effect of culture on choice over time. Under cultural persistence and over time, a locality will always exhibit x percent preference for the consumption of, say, fruit over meat; x will be a constant. Under cultural path-dependence, x will change its value over time, and thus the local preference for fruit over meat will have to be expressed as \( f(\sum_t \Delta x) \). Finally, a path-dependence built up of persistence chains is a subcase of the latter. A cultural path-dependence of cultural persistence chains is basically analogous to a “Markov chain” process. In this case, \( f(\sum_t \Delta x)_{t(1 \text{ to } m)} \), where t denotes a time period and in \( t(1 \text{ to } n) \), \( x(t \text{ to } n)=a \), and \( a \) is a constant. In \( n+1 \text{ till } n+m, (n>0), x(n+1 \text{ to } n+m)=b \), and \( a \) and \( b \) are different. Thus, the cultural path-dependence of cultural persistence chains reflects a process where change in the cultural factor happens very slowly over time, and for some periods there is no change. In other words, this path-dependence built up of persistence chains is a path-dependence of no-change periods that have a beginning and an end, and the level of the cultural attitude changes only over longer periods of time, within which a series of economic changes take place. In a sense, this notion reflects that time flows slower for cultural change than for economic change. That is why, some periods of economic development seem to happen under conditions of no cultural change, but this is only a temporary chain of persistence. The cultural effect on socio-economic development is actually further back in time, and is only path-dependent and not deterministically persistent.
We should also add that some interesting insights on the cultural effect are evolving from the analysis we conducted. First, sector specialization and past cultural development are both confirmed to be culturally endogenous, which supports the general place-based development hypothesis and its relationship to the notion of local culture. Second, our results caution against a cultural determinism approach, and rather suggest a cultural persistence chain (path-dependence) to be a more likely process for describing the cultural impact on local development. Third, and particularly interesting, is the finding that the local socio-economic lifecycle is likely to be associated with historical cultural centers as a treatment effect. This means that, for a certain period of time, the established cultural and socio-economic centers remain a source of culturally dependent prominence for these localities and their immediate vicinity. Additionally, social change — even though normally much slower than regular economic processes — still takes place, while also newly emerging social and economic centers are possible and likely to develop. Fourth, the change in and magnitude of cultural impact on local development is dependent not directly on the geographical proximity to the cultural corridor, but on the Weberian occupational cultural choice we approximated to local sectoral specialization.

The consistency of the results we obtained from the methods and specifications we used suggests that it would be useful to do further work on cultural impact studies regarding the local socio-economic development, in particular, development in the South-East European (SEE) region. Clearly, the our article offers a promising foundation for more methodological triangulations and inferences on the distance to the cultural corridors in SEE, and elsewhere, where cultural corridors exist. Furthermore, the results we obtained give rise to intriguing questions regarding the effect of distance to cultural corridors in SEE in relation to other culturally sensitive processes, such as migration and innovation, with the first giving rise to the shrinking-regions phenomenon in these geographical areas and the second being a main driver of economic growth and development.

Finally, the very notion of cultural corridors we proposed here is a conceptual novelty that is worth further consideration in regional research. Cultural corridors, known in other disciplines and touching on economics mostly through cultural tourism and geography, offer a more spatially connected and realistic notion of cultural capital at the local level. Cultural variation exists on every level of aggregation from the individual level onward: group, neighborhood, region, and country. There are, for example, undeniable local dialect differences in most countries, and this applies to many other historical-cultural differences, even though this is less obvious at first sight. The cultural corridor tracks (records) the concentration of cultural capital across space and time, and recognizes its cumulative character and interconnectedness.

The cultural corridor location, therefore, can provide more meaningful information than the abstract distance to a single geographic location, for example, especially given that different locations were culturally prominent in history at different times and for different reasons. It is difficult to argue about which one should be more important than the others. Furthermore, leading international
experts in history, cultural heritage, and architecture have already mapped out the existing cultural corridors across all localities of the member countries of the Council of Europe (see http://seecorridors.eu/?w_l=2). Yet, the information about these corridors, to our knowledge, has remained unexploited to date in most applied quantitative spatial-economic and econometric research. Consequently, appropriate and comprehensive insight into cultural influences on the local (and regional) economic development in these localities is still insufficient. Finally, our operationalization shows that yet another quantification, even closer to the OIE definition, can very well be offered as an answer to Adkisson’s (2014) question regarding the feasibility of bridging empirics and institutional economics.

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