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Cultural distance and gravity effects among migrants: A comparative analysis of the EU15

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CULTURAL DISTANCE AND GRAVITY EFFECTS AMONG MIGRANTS

A Comparative Analysis of the EU15

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Abstract

This paper introduces cultural gravity as a new concept for analyzing socio-economic disparities among immigrants. It tests the existence of cultural gravity effects on the geographic concentration and human capital productivity of immigrants. Using cultural distance as a proxy for the local cultural gravity potential, the paper seeks to capture empirical evidence of the presence of significant gravity effects of culture. The paper seeks to highlight three new research issues: (i) local productivity patterns and the immigrants' contribution to them; (ii) the spatial concentration preferences of different immigrant groups; and (iii) the full culture-based development (CBD) mechanism of a joint cultural impact on the concentration and productivity of local human capital. To provide empirical evidence, we compose a cross-sectional database for the EU15, comprising inter alia the World Value Survey and Eurostat Census data, initially explored by a multivariate statistical analysis. Next, we present an extended formulation of a gravity model analyzed with appropriate regression methods, in particular explored in a logit context and through a recursive 3SLS model. Our results clearly demonstrate the existence of a cultural gravity effect among immigrants. Finally, an interesting find is that cultural gravity plays also a significant role in the context of the above-mentioned CBD growth model.

Keywords: immigration, gravity, cultural distance, human capital, cultural capital, productivity

JEL classification: Z10, O31, R12

1 Introduction

In recent years an upsurge of interest in the actual or anticipated implications of foreign migration has taken place. This has led to the rising popularity of migration impact assessment (MIA) (see Nijkamp et al. 2012). An important topic in this context is the assessment of the socio-economic implications of cultural diversity on a local scale. The manifold effects of different flows of human capital between localities have attracted increasing attention in immigration-related research. Nevertheless, the conclusions on the direction and significance of the domestic effects of immigration have remained controversial because of various mutually contrasting empirical findings. For example, Boeri and Brücker (2005) and Ottaviano and Peri (2005, 2006) find positive socio-economic effects, whereas Borjas (1994, 1995, 2003), Collier (2001) and Angrist and Kugler (2002) find largely the opposite. Only the recognition that these effects are co-determined by the cultural diversity created by the inflow of different immigrants is commonly agreed upon.

Culture has also vividly but inconclusively been investigated as a critical factor that generates flows of creative human capital (Florida 2002a,b, 2005). The geographic attraction of creative human capital through investment in cultural milieus has been supported by various empirical findings (Boschma and Fritsch 2007; Wojan et al. 2007; Fritsch and Stuetzer 2008; Wedemeier 2012). However, this concept has been severely criticized on the basis of findings from both empirical tests and qualitative analyses of case studies on places where Florida's policy recommendations were followed (Malanga 2004; Kotkin 2004, 2005; Nathan 2005; Markusen and Johnson 2006; Turok 2006). Consequently, there is an urgent need for a solid, evidence-based analysis. The present paper serves to fill this gap.

The main aims of this paper are:

- to shed new light on the significance of the joint cultural effects mentioned above with regard to the concentration of foreign and local human capital in a locality;
- to examine the link between the different domestic effects from human interaction on productivity on the one hand, and the phenomenon of local cultural closedness (which is the source of cultural gravity) on the other hand.

The structure of the paper is as follows. Section 2 discusses briefly the culture-related elements in the economic literature that have as yet not been successfully integrated into ‘economic gravity’ modelling. On the basis of the latter, Section 3 offers a conceptual framework of the cultural ‘gravity effect’, i.e. the mechanism of the cultural impact on the geographical concentration and utilization of human capital in a locality; this section also presents the working definitions and the three main hypotheses to be tested in the paper, in order to obtain a better understanding of the seemingly existent local disparities in immigration impacts. Next, Section 4 presents our database, the estimation strategy employed and the econometric statistical results from operationalizing the cultural gravity model and testing the three hypotheses stated in the previous section. Finally, Section 5 provides some concluding remarks.

2 ‘Cultural Gravity’ Effects: A Neglected Concept

Generally, the economics literature has concisely interpreted the meaning of local culture as a determinant of local development as follows: culture is a factor for the movement of people and their interactions and choices, which exists in addition to the economic incentives, amenities and goods provided and which differs by place. Although this cultural effect may well be captured by the Newtonian notion of gravity as a determinant of flows based on economic mass and distance, culture and human capital have from this perspective only been jointly addressed to a limited extent in the economics literature (Veblen 1899; Polanyi 1957,

1968; Kuznets 1955; Axelrod 1997; Barro et al. 2003; Sen 2004; Guiso et al. 2006; Cavalcanti et al. 2007; Grogger and Hanson, 2008; Beine et al. 2009; Tabellini 2010.).

The gravity model itself took quite some time to become established as a respected economic approach in international trade, transportation studies and migration research. Leamer and Levinsohn (1995) capture the essence of the problem of neglecting gravity effects in the economics literature as follows: “Textbooks continue to be written and courses designed without any explicit references to distance, but with the very strange implicit assumption that countries are both infinitely far apart and infinitely close, the former referring to factors and the latter to commodities.” Since the 1990s, gravity models have appeared more prominently in economic textbooks (such as Feenstra 2004). Clearly, although Ravenstein (1889) pioneered gravity models in the context of migration in the UK during the nineteenth century, later on gravity became largely associated in the economics literature with geographical distance and trade, and it gained popularity through a series of empirical studies that used the latter approach (Cornish 1997; Anderson and van Wincoop 2004; Bergstrand and Egger 2011).¹ In the context of spatial migration flows, gravity modelling treats migration largely as a choice process instigated only by the trading of labour (for examples of this approach, we refer to Grogger and Hanson 2008 and Beine et al. 2009). Unfortunately, the impact of culture on migration choices was mainly neglected in the gravity modelling literature. Similarly, as the gravity approach research concentrated mainly on commodities and physical distance – rather than on social or cultural proximity - culture as a determining factor was also only marginally touched upon by the inclusion of variables such as religion (Helpman et al. 2008) or language (Tinbergen 1962), but hardly ever in the context of migration or communication. Surprisingly, the notion of ‘cultural distance’ - conceived of as reversed cultural similarity or proximity, or as the socio-psychological difference between localities - however, has developed vigorously in the financial decision-making-related literature. There are multiple

¹ For a detailed review of the development of gravity models and their application, see Anderson (2010).

studies regarding the importance of ‘cultural distance’ (e.g. Kogut and Singh 1988; Grinblat and Keloharju 2001; Guo 2004; Tihanyi et al. 2005; Lee et al. 2008; Lucey and Zhang 2010) that demonstrate that different behaviours in financial investment and cooperation behaviour between localities depend on their cultural similarity or difference. The research on ‘cultural distance’ is also backed by the stream of literature that investigates how culture determines investment decisions through the cultural ‘home bias’ (Duru and Reeb 2002; Chan et al. 2005; Nijkamp et al. 2011) or through various other cultural effects on investment decisions (see among others Guo 2004; Tihanyi et al. 2005; Lee et al. 2008; Lucey and Zhang 2010). It is noteworthy that the gravity model in relation to the spatial distribution of FDI has recently found interesting applications (Head and Ries 2008) and touches also on ‘cultural distance’ (for an example, see Diyarbakirlioglu 2011). Nevertheless, to the best of our knowledge, none of the existing contributions has made a serious attempt to incorporate fully the so-called ‘cultural distance’ factor into migration or growth modelling.

Clearly, ‘cultural distance’ appears to have an impact not only on financial decision-making but also on human decision-making in general, including occupational and migration choices. Following the Weberian tradition, culture may be understood as a factor that impacts on local ‘investment’ decisions with regard to occupational choice. The traditional arguments of Weber (1905) are that Protestantism is associated with a preference for the development of skills in mathematics and science, and with higher entrepreneurial motivation. In modern business and regional economics, Richard Florida’s concept of the local ‘milieu’ (i.e. the local value system) (Florida 2002a,b) and its effect on the concentration of creative workers in a locality completes the Weberian claim. Nowadays, the cultural milieu has become an increasingly popular factor to explain how creative workers are attracted to localities (Florida 2002a,b, 2005; Florida and Mellander 2010); it may either facilitate (Boeri and Brücker 2005; Ottaviano and Peri 2005, 2006) or represent a barrier (Borjas 1994, 1995, 2003; Collier 2001; Angrist and Kugler 2003) to economic development and in particular to entrepreneurial

activity (Guerra and Patuelli 2012). The above-mentioned cultural–religious effects provide a reason to expect that even more correspondence exists between cultural distance and local productivity than what is considered by the FDI improvements of the gravity model . Namely, the cultural distance effect seems to affect not only human decisions regarding the allocation of productive capital (financial or other), but also the reallocation of human capital itself. Therefore, the current paper focuses on highlighting the double link between (i) cultural distance and human capital reallocation and (ii) cultural distance and human interactions or choices, through a cultural gravity model of migration that aims to explain the differences in local human productivity.

Clearly, in explaining the neglected cultural distance and human capital relationships in gravity modelling, it might be argued that geographical distance may approximate cultural similarities and differences between localities. But this is not a universally valid proposition. For instance, while Sofia (Bulgaria) and Cairo (Egypt) are separated by a distance of 1572 km (977 miles), and Sofia and Paris (France) are separated by 1762 km (1095 miles), the cultural similarities between Bulgaria and Egypt are in total very modest in comparison with the proximity between Bulgarian and French art, architecture, institutional structures, or political and economic development. While the reasons for the latter proximity might be endogenous to historical politico-economic processes, it is precisely the element of historical path dependence that makes cultural differences between localities largely exogenous from the perspective of modern socio-economic spatial processes. Meanwhile, independent of their geographical distance, localities still experience different combinations of historical events. For example, German states historically have been differentiated into Protestant and Catholic areas, yet in modern times, the divide between Eastern and Western Germany has developed on the basis of the former ‘Iron Curtain’. Thus, there are Protestant East German localities that develop in a different way from Protestant West German areas and rather similarly to Catholic East German areas, etc. It is the specific local culture, unlike any other local factor,

that forms a unique combination experienced during the historical path of a particular locality, and this combination generates the well-known “path dependence” effect (Page 2006; Puffert 2001; David 2000; Sen 1999; Nelson and Winter 1982; Penrose 1959). Therefore, in order to avoid serious omissions, when the standard economic ‘gravity effects’ are specified besides the geographical distance, the gravity model should rather be able to reflect the role of cultural distance between relevant localities.

Another reason for introducing the cultural distance notion into migration gravity modelling is the fact that the traditional (Newtonian) gravity model is focused on a bilateral relationship. This is, however, remarkably uninformative with regard to integrated spatial economic systems and their multilateral relationships, which are independent forces expressed e.g in multinomial logit models, where choice is a matter of multiple options rather than a discrete 0–1 function. This problem has been partly addressed in some recent studies that attempt to include adjustments to the gravity model (Grogger and Hanson 2008; Beine et al. 2009). If we look, however, at the reallocation of (the mobile part of) human capital from locality A as a dichotomous choice to move either to locality B or to the rest of the world, the cultural distance between A and B helps us to analyse the migration choice through a statistically and economically acceptable explanation. Moreover, the answer to this dichotomous choice is of utmost relevance to B, since we know from the literature that inflows of different types of immigrants produce different effects on local productivity (see for instance Ozgen et al. 2010; Tubadji and Nijkamp 2013). Thus, the cultural distance gravity model can serve country B to understand why and how it can attract different groups of human capital that will exercise effects on B’s local productivity.

3 Conceptualization of the ‘Cultural Gravity’ Model

A major reason for the lack of proper cultural gravity modelling has been the lack of precise definitions of the notions of cultural distance, cultural milieu and cultural gravity. The recently developed concept of culture-based development (CBD) (Tubadji 2012a,b) may serve to overcome this deficiency. Therefore, some conceptual clarifications of CBD are needed.

CBD defines *cultural distance* as the number of incompatible elements between the recipient’s local culture and the foreigner’s culture of origin. The existence of this stress on the incompatibility between cultures creates a cultural risk that decreases the attractiveness of a locality to foreigners such as immigrants and investors, as these actors may incur a cultural cost (of migration and of reallocation of resources, in general) (for more details on cultural risk, see Tubadji 2012a). From an operational point of view, as the exact number and nature of stressful or incompatible elements is difficult to assess, CBD approximates the cultural distance with the difference in the respective cultural milieus.

Following Richard Florida and his conceptualization of the ‘creative milieu’, CBD defines the *cultural milieu* as the sum of the predominant cultural values that describe a locality. This cultural milieu can be characterized either as ‘open’ (i.e. friendly and receptive) in its attitude towards the novel, foreign and innovative or as a ‘closed’ cultural milieu, meaning a milieu that is hostile to the differences and dominated by strongly traditionalistic attitudes. Instead of attempting an exhaustive count of all possible cultural elements for quantifying cultural distance, the cultural milieu narrows down to refer to the average number of open (or ‘tolerant’ in Florida’s terms) as opposed to closed (intolerant) attitudes in a locality. Unlike Florida’s approach, however, CBD requires the consideration of a wider spectrum of attitudes describing ‘openness’. Rather than focusing on tolerance to homosexuals as a main proxy (as in Florida), CBD sets out to consider a range of attitudes towards different disadvantaged groups, attitudes towards innovation and change in general, attitudes towards work and

attitudes towards immigrants in particular. When this wider spectrum of tolerance is taken into consideration, the true cultural distance can be more realistically approximated with the cultural milieu in a locality.

To define *cultural gravity*, it is important to understand that this gravity differs from the gravity effects in trade with regard to its main field of influence. While physical distance is significant in the context of the international exchange of goods and services, culture is the ‘gravity’ factor for the movement of both financial and human capital towards and within a locality. In other words, there is a cultural gravity effect on the spatial agglomeration of human and productive capital.

More precisely, according to our operational definition, cultural gravity is the power of local culture: (i) to attract local people to different occupations (according to the Weberian interpretation of cultural impact) and to attract immigrants to a locality; and (ii) to modify the efficiency of interaction between the foreign and the local human capital, thus causing differences in the local overall human capital contribution to productivity due to cultural bias in all financial and other decision-making processes and reduced efficiency of every-day coordination. These attraction and interaction gears of the mechanisms of cultural impact represent the ‘cultural gravity’ effect on local productivity.

Consequently, cultural gravity determines the flows of both human capital and investments, and additionally sets the speed of local economic development by regulating the efficiency of the interaction of human capital in a locality. Thus, from the point of view of local economic growth, there is a cultural gravity effect on the flows of capital and on the efficient flow of the available inputs in local production.

Exercising this gravity, culture plays a unique role as a determinant of local productivity, in addition to standard economic factors, which explains the power of a locality to attract and use all forms of capital efficiently. Therefore, we introduce additionally the aggregate term

‘cultural capital’ to denote this locally available potential of culture to impact on regional development. Thus, cultural capital is a proxy for the cultural gravity potential of a locality.

On the basis of these considerations, the ultimate goal of the current investigation is to trace empirical evidence of the ‘cultural gravity effect’ on two simultaneous local socio-economic processes: human capital formation and the generation of economic production. This is necessary, since even though migration is often modelled by means of traditional gravity models (for recent examples see Beine et al. 2009; Grogger and Hanson 2008), these migration models capture only the migration flux, with respect to wages and the mass of nationals in the locality. This approach fails to integrate the cultural distance effect adequately into the gravity model, and reduces utility to wage preference. That also makes it hard to incorporate successfully Harris–Todaro’s (H-T) (1970) ‘cultural cost of migration’ notion into the gravity model, which is stated to be additional to the wage effect. This H-T cultural cost can now be articulated by the above-introduced CBD definitions and can be formally expressed.

Thus, given the above CBD conceptualization, cultural gravity can in general be modelled as:

$$H_{ij} = g(M_i, W_j, d_{ij}) \quad (1)$$

where H_{ij} denotes the share of immigrants spatially concentrated in a locality; M_i denotes the part of the overall mass of human capital as a factor of production generally supplied in the international market i , which is attracted to a mass of demand W_j for labour at destination j , while the potential flow towards this particular locality, as opposed to the rest of the world, is reduced by the cultural distance created by the closedness of the local cultural milieu to anything new and different, d_{ij} . This model (1) predicts the movement of human capital from i towards j , in particular, H_{ij} . Cultural gravity thus determines the geographic redistribution of human capital.

However, CBD claims that the cultural gravity effect continues to operate in a second gear, the cultural interaction, where:

$$Y_{ij} = f(H_i, K_j, d_{ij}) \quad (2)$$

Here, we have the mass of accumulated human capital as a competitive factor of production supplied from the market i , H_i , which is attracted to a mass of demand for human capital created by the locally available productive capital² at destination j , K_j , where the potential flow is reduced by the cultural distance between the locality concerned and the rest of the world, d_{ij} . Thus, model (2) predicts a redistribution of wealth between the rest of the world i and destination j , denoted as Y_{ij} and dependent on cultural distance.

Combining model (1) and (2), the extended full CBD gravity model should, therefore, be modelled by expressing the cultural attraction and cultural interaction gears as one cultural impact mechanism. To do so, the twofold CBD mechanism can be translated into a system of simultaneous equations composed of the above functions. If we assume g and f to be linear, and transform the equations into a natural logarithmic form, we obtain a recursive model that can be empirically tested as a system of equations with suppressed intercepts:

$$\begin{aligned} H_{ij} &= g(M_i, W_j, \ln d_{ij}) \\ Y_{ij} &= f(H_i, K_j, d_{ij}) \end{aligned} \quad (3)$$

The particular operational aim of this paper is now to test the significance of the main claim behind the CBD model – the existence of cultural gravity – in its different dimensions. In particular, the cultural gravity effect will be inferred with regard to the different domestic immigration impacts on disparities and spatial concentration differences, taken separately or as a composite phenomenon. Methodologically, the hypotheses of interest for us are the following:

H01: There exists a cultural gravity effect on general productivity and a particular economic contribution from any immigrant group.

² Here productive capital is defined in terms of labour and economic capital, as shown in Baycan and Nijkamp (2011).

H02: There exists a cultural gravity effect on the preference for the concentration of a given immigrant group in a given locality.

H03: There exists a combined cultural gravity effect on the concentration of different human capital groups in a locality and their overall contribution to productivity.

To test the above hypotheses on cultural gravity, we will use the models (1), (2) and (3), by approximating cultural distance with the predominant openness or closedness of the local cultural milieu. If these tests confirm the three hypotheses, we may conclude that the claimed CBD cultural gravity effect is plausible and is worth further investigation on the basis of more detailed theoretical and empirical modelling.

4 Operationalization of the CBD Gravity Model

4.1 Database

To address our three hypotheses empirically, we employ a compiled cross-section database on culture, productivity and migration for the EU15 countries. Our data set concerns the so-called NUTS2 level, combining: (1) integrated NUTS3 data from the Eurostat Census 2001; (2) GDP per capita NUTS2-level data from the Regional Database of Eurostat; and (3) cultural indicators resulting from the European and World Values Survey (WVS) four-wave integrated data file, 1981–2004. This matched and cleaned final data set had to drop the UK-related data since the latter are available in a non-compatible delimitation. The indicators obtained from the sources described above are thus socio-economic indicators and cultural indicators.

The Eurostat information concerns the following standard socio-economic indicators: number of people with tertiary education (in particular: share of human capital); total unemployment rate; and cost of employment (wages and social compensation paid by the employer). Eurostat is also the source of the data concerning the total number of immigrants and the number of

employed immigrants from the EU, the rest of Europe, Russia, Asia and Africa. We transform all these variables into shares of the total local population. The average wage is calculated as the cost of employment in relation to the total employment.

The existing cultural capital in a locality is measured as a composite cultural factor built up of four categories of different cultural indicators extracted from the data from the World Value Survey (WVS) database. Our cultural indicators fall into four subcategories: (i) negative attitudes towards different races, Muslims, Jews, immigrants and homosexuals; (ii) positive attitudes towards imagination, tolerance and obedience (as values people would like to teach their children); (iii) attitudes towards work: whether work needs to be creative and the motivation that drives people to work; and (iv) attitudes directly oriented towards immigrants. The WVS collects its data on the basis of a structured questionnaire, in which we have identified the specific questions of interest for our research and counted the number of people who have selected the answer of interest (for more details, see Appendix 1). Since the WVS provides representative data at the NUTS2 level, the number of answers of interest divided by the total population represents the share of people in a locality who have the particular attitude concerned. If the local milieu is predominantly characterized by negative attitudes, we consider it to expose immigrants to a stronger cultural distance effect.

4.2 Estimation Strategy

Using the data described in the previous section, the current inquiry aims to examine in detail the main theoretical claim for cultural gravity effects on local human capital accumulation and productivity.³

First, we will perform a factor analysis with our WVS data, as this is a multi-variate database that is still in an unstructured form on the NUTS3 level. In this way, we can identify the factor

³ Differences between inter-local and intra-local applications of the model cannot be handled with the available data due to the low number of observations. We could incorporate country dummy variables capturing such

of the local cultural milieu that carries the strongest connotation of negative attitudes towards immigrants and novelty. We refer to this factor as our measure of the negative local cultural milieu. To develop our cultural distance measure, we create a dummy variable, with a value of 1 if the local level of our negative cultural milieu factor is above the mean value of this negative cultural capital factor for the EU15, and 0 otherwise. In this way, we create an index of a closed cultural milieu (i.e., a higher cultural distance exposure), indicated by a greater than average concentration of local negative attitudes towards immigrants and novelty.

Second, we make an initial exploration of the data in order to address our H01. We conduct an OLS estimation with robust standard errors to cross-check the existence of cultural influence simultaneously with the effects that different groups of immigrants have on local productivity. To do so, we regress the natural logarithm of the local GDP per capita on the total employment (L), immigrant group of interest (IMM), shares of skilled (HQ) and creative (CREA) human capital, share of total employment (E) and our index of cultural distance (CC). If we find evidence of the significance of the cultural distance index and varying significance for each immigrant group, we will then conclude that our results fail to reject H01. Formally, our empirical model for testing H01 is:

$$\ln\text{GDP} = \beta_0 + \beta_1\text{L} + \beta_2\text{IMM} + \beta_3\text{HQ} + \beta_4\text{CREA} + \beta_5\text{E} + \beta_6\text{CC} + \text{error} \quad (4)$$

Empirical model (4) is an operationalization of theoretical model (2), where $\ln\text{GDP}$ approximates Y_{ij} ; the sum of IMM, HQ, CREA measures H_i ; L and E approximate the productive capital; and CC expresses the cultural distance d_{ij} . A standard Ramsey test for omitted variables will cross-check the reliability of our model (4).

Third, to address H02 regarding the immigrants' preferences and their dependence on the exposure to cultural distance, we employ a logit model. As an alternative to the multinomial

differences, but this would increase the number of regressors and decrease further the low degrees of freedom for our estimation. For further explanation of the inter- and intra-local application of the model, see Tubadji (2012b).

logit approach regarding possible opportunities (Grogger and Hanson 2008; Beine et al. 2009), we focus our investigation on the actual choices made by the immigrants. More specifically, the immigrants' preference is modelled as a discrete choice by creating a dummy variable Z with a value of 1 if the share of a particular group of immigrants (IMM) in a locality is above the mean share of concentration of this type of immigrant in the EU15, and 0 otherwise. Thus, we regress the dummy for the above-average concentration of a particular group of immigrants on three regressors: the natural logarithm of the local average wage (Wage); the natural logarithm of the share of total employment (Empl) (representing the classical gravity variables in the gravity context); and, to augment and complete the model, our cultural distance variable (CC). If the factor of negative attitudes registers significant values in the utility function of immigrants, we may infer that our results are supportive of the claim in H02. Formally, this empirical model is specified as:

$$\Pr(Z=1|Wage,Empl,CC) = F(\beta_0 + \beta_1 Wage + \beta_2 Empl + \beta_3 CC) \quad (5)$$

Model (5) is an interpretation of model (1), where the mass of human capital attracted to a locality j , H_{ij} , is expressed as the probability Z of having an above-average concentration of this type of immigrant in other localities. Here, the relationship between the mass demand for labour W_j and the mass of human capital available in the local market from model (1) is captured by the level of employment (Empl) in the locality and the local wage level (Wage), as determinants of the immigrants' concentration preferences. This preference might or might not be affected by the cultural distance d_{ij} approximated by CC, depending on the particular immigrant group culture of origin. A standard test for omitted variables and misspecification (linktest) will be used to cross-check the reliability of our specification of model (5).

Lastly, addressing H03, we employ a two-simultaneous-equations model, reflecting the gears of cultural attraction in equation (1) and cultural interaction in equation (2) of the model as in model (3). Given the available data, using a three-stage least-squares method (3SLS), as the first step, we regress the local share of human capital (HC) on the average wage (AvWage),

the share of creative workers (CREA) (in line with Florida's contributions), the share of immigrants (IMM) (reflecting the importing of human capital from abroad), the share of nationals (Nat) (reflecting both the Weberian claim of local 'cultural rationale' as a determinant of the development of skills in the local population and as a measure of diversity) and our cultural distance index as the last regressor (denoted by CC). In the second step, we insert the share of human capital from equation (1) as an explanatory variable for the local GDP per capita equation. The additional regressors for local productivity are: the share of skilled (HC) and creative workers (CREA); the share of total employment (Empl); the share of immigrants (IMM) as a measure of diversity; and our cultural distance index (CC), aiming to capture the local 'cultural interaction' effect. If the cultural distance index in both equation (1) and equation (2) manages to register significant levels, we consider these results to support H03. Model (6) expresses them the empirical operationalization of model (3) as :

$$HC = \beta_1 AvWage + \beta_2 CREA + \beta_3 IMM + \beta_4 Nat + \beta_5 CC + error_1$$

$$GDP_per_cap = \beta_6 HC + \beta_7 CREA + \beta_8 Empl + \beta_9 IMM + \beta_{10} CC + error_2 \quad (6)$$

In the above model (6), HC stands for $\ln H_{ij}$; the sum of CREA and IMM expresses M_i ; Nat serves as a Weberian-motivated control variable, and helps the statistical identification; and AvWage approximates W_j . In the second equation, GDP_per_cap stands for $\ln Y_{ij}$; CREA and IMM approximate two important aspects $\ln H_{ij}$; and Empl approximates the productive capital K_j . Again, our cultural milieu index CC approximates the theoretical cultural distance d_{ij} . We expect this model to produce the standard behaviour of the growth model, but in addition to capture also the cultural gravity effects summarized in the CC variable.

Empirical model (6) is system of simultaneous equations. For this system it is true that there is at least as many non-collinear exogenous variables in the remaining system as there are endogenous right-hand-side variables in each equation of the system. This condition is

considered as the technical requirement for identification of any system of simultaneous equations. Moreover, empirical model (6) actually represents a recursive type of model, where the dependent variable from equation 1 (HC) plugs in as an explanatory variable in the second equation. According to the "Recursive Rule," recursive models are always identified (see Rigdon, 1995 and Drton et al. 2006 for more details). Therefore, we consider our endogenous model (6) for sufficiently reliable regarding identification concerns.

4.3 Empirical Results

Firstly, it should be noted that the raw data set from the WVS contains a relatively large number of mixed observations at the NUTS3 level. Therefore, we perform a principal component factor analysis for the cultural indicators using this raw data set. The results are presented in Table 1.

+++ insert Table 1 about here +++

After rotation, the factor loadings clearly indicate that, among others, the first factor combines the negative attitudes to race, Muslims, immigrants and homosexuals, and is characterized by a preference for obedience and nationalistic pride. Therefore, we refer to this factor 1 as our variable labelled “fac1”, indicating the negative cultural milieu perception, which gives rise to the cultural distance between the incumbent and the foreign population. This variable fac1 will help us to capture the cultural gravity effect. Next, we aggregate the WVS on the NUTS2 level and merge it with the Eurostat data.

Some interesting descriptive statistics regarding our newly compiled database are presented in Table 2 below.

+++ insert Table 2 about here +++

The correlation table shows that, while the average wage is highly associated with the natural logarithm of local GDP per capita, the labour- and immigration-related variables have lower and highly inconsistent correlation coefficients. The share of the total employment and the

share of skilled workers both have a slightly lower correlation coefficient than the share of creative workers in correlation with the GDP. It is interesting that the share of nationals has a negative (-0.45) correlation coefficient with GDP, which might be considered to support the expectations of positive cultural diversity effects. The correlation of the share of the different immigrant groups with GDP varies sharply, from positive (0.68) for Asian immigrants to negative (-0.06) for Russian immigrants. The results for immigrants from the EU, the rest of Europe and Africa are also highly inconsistent, leading to expectations of a different relationship between each immigrant group and local productivity. It is also interesting to note the low (0.20) correlation coefficient between the shares of creative and skilled workers, which allows us to treat them as independent worker categories. Meanwhile, both are highly correlated with the share of the total employment, while the share of creative workers outperforms the share of human capital. In addition, the share of 'creatives' is much less related to the average wage (0.40) than the share of skilled workers (0.67), while with respect to culture there is a reversed proportionality of dependence. Also, the share of immigrants is slightly less correlated with the negative cultural milieu, and again we observe major differences between the different immigrant groups, varying from -0.30 for EU immigrants to 0.09 for Russian immigrants. On the basis of this descriptive evidence, we expect to observe: (i) different relationships between creative workers, skilled workers, different immigrant groups and local productivity; and (ii) significant discrepancies in the cultural preferences expressed with regard to the concentration of the different immigrant groups.

At the outset of our empirical exploration, we want to cross-check the adequacy of our new CBD measure of cultural distance as a predictor for cultural impact on local development. To this end, we make a comparison between the popular Herfindahl Index (HI) (measuring local heterogeneity) (Herfindahl, 1950) and our new index of cultural distance (calculated on the basis of fac1 from our multivariate factor analysis). Table 3a presents the results from the 'horse-race' between these two indicators, in two different contexts. Initially, we compare the

two measures of cultural impact in a standard specification where local productivity (measured in GDP per capita) is explained by: share of human capital, share of total employment, and culture. As a next step, we consider Florida's conceptual claim on the role of the 'Creative Class' and augment the standard model with a variable 'screa', measuring the share of creative workers in the locality.

+++ insert Table 3a about here +++

According to the standard formula, the HI was calculated as a sum of the square of the share of nationals and the square of the share of each immigrant group available in our dataset (i.e. immigrants from the EU, remaining Europe, Russia, Asia, Africa and other immigrants). The overall diversity in Europe (mean HI) appears to be above 0,87, while HI reports a high negative correlation with the natural logarithm of GDP per cap (below -0.40). This suggests that an observed high diversity tends to have a strongly negative effect on local productivity. The empirical results of the standard specification where GDP per capita is explained by only shares of human capital, share of local employment and culture, confirm these expectations (with all variables being reported highly significant). However, while human capital and total employment report the expected high levels, the overall reliability of the model varies around 47%. That is not particularly high. Meanwhile, the share of human capital and the share of creative workers appear to have a correlation coefficient of 0.20, which allows us to include in the standard model the share of the 'Creative Class' in the locality as an additional independent explanatory variable. The results demonstrate that the 'Creative-Class' augmentation improves significantly the overall explanatory power of the model to 64%. Interestingly, this improvement of the specification of the model with the highly significant share of creative workers not only reduces the significance of the share of total employment, but also changes the odds between the significance of HI and our CBD index of cultural distance. The sign of the significant HI in the standard model is also opposite to the highly significant cultural distance index in the improved augmented specification. These results

produce two important findings: (i) when measuring local productivity, we should use the ‘Creative Class’ augmented model, which looks at human capital more profoundly (including both skills and creativity), and (ii) when using the improved Cultural-Class augmented specification for local productivity, our measure of cultural distance is the only measure of cultural impact that can capture the effect of local culture.

To cross-check the reliability of our findings a Ramsey test for omitted variables is consulted. The Ramsey (RESET) test uses powers of the fitted values of the dependent variable to test the null hypothesis that the model has no omitted variables. If the p-value is higher than the usual threshold of 0.05 (95% significance), we fail to reject the null hypothesis of the test and conclude that we do not need more variables. According to the Ramsey test all our specifications are well-specified, except for the Creative-Class augmented specification which attempts to capture the cultural diversity impact only with the HI index. These test results are first supportive for the reliability of our empirical model. Second, the test is in favour for our conclusions from the ‘horse-race’ performed, that using HI variable for cultural diversity does not capture successfully the cultural impact, causing misspecification due to omission of other important cultural variables that build up the factor variable culture.

Next, in the light of the above findings, we proceed by examining our H01 about the different impacts of immigrants and the significance of cultural distance in this context. We will use the Creative-Class augmented specification to address the immigrants’ impact. Furthermore, in compliance with model (4) from our estimation strategy, we add a variable for immigrants – alternatively approximated as the share of immigrants as a whole and as the share of specific groups of immigrants. The results from our OLS estimations with robust standard errors are presented in Table 3b.

+++ insert Table 3b about here +++

Indeed, with regard to local productivity, our tests suggest that the share of creative and the share of highly skilled workers (in line with standard expectations) are positively significant

and outperform the positive effect of the share of the total employment. What we observe is that, while these variables behave in a relatively stable way across the specifications for the different immigrant groups, the impact of the share of immigrants varies greatly across immigrant groups. This means that, while EU and Asian immigrants are positively and significantly associated with local productivity, the rest of the immigrants are not significantly associated with it, whereas Russian immigrants tend to form a negative insignificant factor for local productivity. While these results partially corroborate the findings of Ozgen et al. (2010) in their confirmation of the positive effect from EU immigrants versus the rest of the immigrants, on the other hand we register a highly positive significant Asian impact, but there is an insignificant effect from European immigrants. An interesting result here is that for all immigrant groups, the effect of the cultural factor remains strongly positively related to local productivity, meaning that the more productive EU countries are associated with negative attitudes towards foreigners and expose immigrants to higher cultural distance risks (for a detailed explanation of the concept of cultural risk, see Tubadji 2012a). This gives us a reason to assume that the source of the negative or insignificant impact from some immigrant groups might be due to the higher cultural distance acting as a barrier to their efficient cultural interaction and contribution to local productivity. An alternative explanation could be that different immigrant groups end up in localities with different levels of cultural distance with regard to their own bargaining power. We observe a high negative correlation between the highly productive creative workers and local high cultural distance. So, since we observe in Table 3b a positive effect from some immigrants and a negative one from others, when there is a large cultural distance in the highly productive localities, this can be interpreted as the existence of a barrier for the creative part of certain immigrant groups to be concentrating or operating efficiently in the more productive EU localities. Summing up the results from testing H01, cultural distance reports high significance levels with regard to immigrant groups' productivity disparities. Moreover, a cultural gravity effect on the efficient utilization

of all available inputs is detected. The CBD concept expected this gravity effect on efficiency to be due to the cultural interaction in the locality, and our test of H01 provides evidence in this direction. The same tests on H01 were performed using HI as an alternative measure of cultural distance but the HI index did not manage to capture any of the cultural effects, and the HI specifications always showed a lower predictive power than the cultural-distance specifications. Therefore, the HI results were not presented in a table here.

To cross-check the reliability of the above results we again employ a Ramsey test. The test confirms the reliability of the model vis a vis testing immigrants preferences in general. Moreover, the test supports our interpretation of the results that in specific EU immigrants and immigrants from Asia obviously enjoy higher bargaining power than the rest of the immigrants and therefore further factors can therefore be significant in addition for these specific categories of immigrants.

So, the CBD factor variable of cultural distance captures successfully the expected gravity effect. However, the CBD framework also claims that in this cultural interaction, the most sensitive groups are those most exposed to cultural distance elements: the attracted foreign human capital – the immigrants. Thus, to examine further the reasons for cultural gravity, we need to cross-check the cultural milieu effect on the concentration of immigrants in certain localities. We refer to the tendency for the above-average spatial concentration of a particular group of immigrants in a locality as the immigrants' preference for this locality. To that end, we will employ a logit model

Tables 4 a , b summarize the logit model estimations of the utility function for the different groups of immigrants, involving economic and cultural explanatory variables according to model (5) in our estimation strategy. Specifically, Table 4a presents the results when approximating the cultural impact with the cultural distance factor variable 'fac1', while Table 4b presents the results with the alternative variable HI.

+++ insert Table 4 a , b about here +++

As seen in Table 4a, we find here evidence of a completely different bargaining power exercised by the different immigrant groups. The predominant concentration of immigrants per se seems to be driven by employment opportunities that are negatively associated with the negative attitudes in the local cultural milieu and indifferent to the respective wage levels. When it comes to EU immigrants however, this group of immigrants seems empowered to exercise its wage preferences strongly, is slightly dependent on total employment and is not affected by cultural distance. Non-EU European immigrants, who are culturally close but lack the full labour rights of EU workers, have less power to exercise wage preferences and tend to concentrate where there are employment opportunities, being sensitive to the cultural distance factor and avoiding places with negative attitudes. The rest of the immigrants cannot exercise preferences with respect to the cultural milieu, and may end up in negative-attitude localities. Meanwhile, Russian immigrants seem to be completely randomly distributed and Africans still concentrate with regard to work availability, while Asian immigrants enjoy strong bargaining power with regard to employment and even wage levels. These results demonstrate that it is only non-EU European immigrants who are able to avoid successfully the places with negative cultural attitudes. In general, the concentration of immigrants differs due to their ability to exercise their bargaining powers differently over cultural milieu and wages.

The same logit-based tests were repeated using HI (Table 4b) as an alternative measure for the cultural impact on immigrant preferences for spatial concentration. Highly similar results were obtained, with the significance levels of the cultural impact being slightly higher for the first two categories of immigrants, but remaining insignificant for the rest of the immigrant groups. The same sign of influence is preserved in the significant specification. The HI specifications however, need a higher number of iterations and suffer weaker general

parameters, reconfirming the CBD measurement approach as a more appropriate quantification of the cultural impact.

In summary, the tests of H02 fail to reject the existence of a cultural distance impact on immigrants' preference for concentration in a particular locality. It is worthy of remark here that the cultural distance variable outperforms the impact from the average wage. This is valid for the general case of all immigrants from any background. This confirms the claim for the existence of the cultural gravity effect on the local concentration of immigrants. However, also, as expected, the size of the cultural gravity effect and its significance vary, depending on the cultural distance variations between the local culture and the cultural background characteristics of each immigrant group.

To cross-check the reliability of the above results we employ a standard test for specification error and omitted variable (linktest). The linktest performs a check of the specification of the model, by trying if it is possible to find any additional predictors that are statistically significant. The test uses the linear predicted value (\hat{y}) and linear predicted value squared (\hat{y}^2) as the predictors to rebuild the model. In a properly specified model without missing variables, the variable \hat{y} should be a statistically significant predictor, since it is the predicted value from the model; while on the other hand, if our model is properly specified, variable \hat{y}^2 shouldn't have much predictive power except by chance. Therefore, if \hat{y}^2 is significant, then the linktest test reports possible omitted relevant variable(s) or misspecified function. The results in Table 3a and 3b all survive the test for omitted variables and misspecification, except for one case – the specification of preferences of immigrants from Russia both for the fac1 and the HI specifications where \hat{y} is not significant. In addition, the preferences of immigrants from Africa when cultural impact is captured through the fac1 variable show by chance a significant \hat{y}^2 . These test results support our claim that the immigrants with smaller bargaining power obviously face other institutional and alike factors

which are not at stake for all immigrants per se. Also, the Russian immigrants data is relatively small number, therefore it is normal that the specification might show instability.

Thus, the results from Tables 3a,b and 4a,b show that the distribution of the ‘less productive’ groups of immigrants suggests that they are unable to exercise their preference to avoid places with a negative cultural milieu, and these places experience negative effects from the latter immigrant groups. This joint relationship leads us to the design of our extended full CBD model where cultural gravity affects the entire human capital and human interaction process in a locality. This relationship is clearly worth further exploration.

As a last step of our empirical exploration, we address H03 regarding the joint effect of the cultural attraction of immigrants and human capital in a locality and the culturally biased interaction of foreign and incumbent human capital in the locality concerned. Table 5 represents for this broader socio-cultural mechanism of impact in our 3SLS estimation results.

+++ insert Table 5 about here +++

In particular, Table 5 shows the three specifications used in our search of a parsimonious model of local productivity, addressing cultural distance and human capital as main explanatory variables of interest, among a series of economic moderation variables. The first equation represents the gear of attraction, and the second the gear of interaction of the mechanism of cultural capital, according to model (6) from our estimation strategy. The findings from our first equation of the model demonstrate that the local concentration of human capital is positively associated with the average wage, while, it is negatively associated with the predominance of negative cultural attitudes in the locality at hand. This culturally sensitive element, human capital, is addressed in our second equation as an input for growth; it registers the highest significance for local productivity, outperforming total employment and the share of creative workers. In this context, cultural distance seems to be high in places with a high productivity, and therefore immigration cannot play a role in

productivity in the locality concerned. On the basis of these findings, cultural distance is indeed significant for both the concentration and the interaction of human capital. Moreover, while immigrants (as a specific sub-category of local human capital) are a non-significant factor for productivity, human capital is significant and is sensitive, with a negative sign, to the local negative cultural milieu. On the other hand, according to our second equation, the more productive localities are characterized by a highly negative cultural milieu. This fact is therefore a plausible reason why such localities cannot benefit from the concentration of high human capital from immigrants to enjoy positive effects from their presence. Additionally, since immigrants' human capital has ended up in the negative attitude milieu, this milieu serves as a barrier to the efficient exploitation of the inflowing foreign human capital. Thus, our results are supportive of the existence of a double-gear cultural mechanism of impact, as suggested by the CBD framework. Put differently, cultural distance is found to play a decisive role in both the process of formation of human capital and the process of generation of economic growth in the EU labour market regions. This twofold process indeed provides support for the CBD cultural gravity principles described by the conceptual models (1), (2) and (3).

Finally, we tried the same estimation procedure with the alternative measure for cultural impact – HI. HI fails to capture any cultural impact in this more advanced augmented mechanism of cultural impact. According to the HI-based results, the first equation i.e. the attraction of people to a locality, is reported to be seemingly dependent only on average wage. The second equation, addressing the interaction between human capital in a locality in the process of generating the local GDP per capita, shows several significant economic variables, but again fails to detect cultural influence. The overall explanatory power of the resulting estimations with HI is in general lower than the one with the cultural-distance specifications. This confirms once more the advantages of employing the cultural milieu (CBD fac1) rather than the ethnic heterogeneity (HI) in our search for the cultural impact of immigrants'

preferences and their participation in local development, especially when more advanced modeling techniques regarding the impact mechanisms are introduced.

5 Conclusion

Summing up the results from the testing of our three hypotheses, different immigrant groups seem to be able to exercise their preferences differently in order to avoid localities with negative cultural milieu effects. These different groups of immigrants also have a different impact on productivity. Those who can exercise more bargaining power for immigration are those who manage to register positive effects for productivity. However, the most productive regions of Europe reported a highly negative cultural milieu, which supposes a high cultural distance for immigrants. Therefore, these localities cannot enjoy positive effects from the culturally more distant immigrants concentrated in the locality. Moreover, the cultural gravity effect applies not only to the concentration of immigrants, but also to the concentration of other forms of human capital, productive capital and their efficient utilization for generating local growth.

Our findings have two main consequences. Firstly, we confirm cultural distance to be a significant factor concerning immigrants' impacts, immigrants' preferences for concentration and the local concentration of human capital and productivity. Therefore, we conclude that there is sufficient evidence for the existence of cultural gravity, as is claimed by the main idea behind our three hypotheses. Second, this cultural distance seems to be highly related to the discrepancies between the contributions of different immigrant groups to local productivity in an extended growth model context. This suggests that the relationship between cultural distance and migration exercises a 'cultural gravity' effect with better economic theory back-up than the standard gravity model, and this can be a valuable start for a new discourse in this

scientific area that is worth further investigation with larger data sets, allowing for more advanced estimation techniques.

Finally, our evidence-based explorations confirm that cultural distance and cultural capital can only very roughly be approximated by means of popular measures of (ethnic) heterogeneity, and the latter has only a limited capacity to capture the intricate mechanism of cultural impact. The direct measurement of culture through a factor variable (such as the CBD factor variable for cultural closedness - fac1) and/or its derivative (the index of cultural distance) appears to achieve a higher explanatory power and to improve the overall performance of the estimation model.

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Table 1: Cultural Distance as a Factor Variable, Factor Loadings after Rotation

Variable	Factor1	Factor2	Factor3	Factor4	Uniqueness
happiness	-0,0639	-0,0212	-0,1143	0,7030	0,4882
imagination	-0,0192	0,6050	0,0011	-0,1138	0,6207
tolerance	-0,0335	0,2768	0,2058	0,3176	0,7791
obedienc1	0,1080	-0,5674	0,0091	-0,0296	0,6654
nb_race	0,7717	-0,0143	-0,0093	-0,0533	0,4013
nb_musl	0,7857	0,0018	0,0357	0,0498	0,3789
nb_immigr	0,7792	-0,0006	-0,0467	-0,0708	0,3857
nb_homo	0,5733	-0,1635	0,0104	0,0134	0,6443
trust	-0,1246	0,3112	0,0041	0,4685	0,6681
initiative	0,1016	0,5133	0,1051	0,2260	0,6640
w2duty	0,0358	-0,0726	0,8074	0,0435	0,3397
instr_innov	-0,0120	0,2343	-0,1095	0,1573	0,9082
tradit_immig	-0,0536	0,0851	0,7854	-0,0901	0,3649
nationalism	0,0914	-0,4450	0,1242	0,4830	0,5449

Legend:

The table presents the factor loadings after the rotation, performed as the final stage of principle component factor analysis with WVS data on the NUTS3 level. Four main cultural factors were identified through this analysis: factor 1 represents the cultural traditionalism and closedness; factor 2 represents the cultural openness and tolerance; factor 3 outlines the Weberian factor – the “calling” that treats work as a duty to society; and factor 4 sums up the social capital attitudes of trust and pride of group belonging (nationalism). We use fac1 to approximate the existence of cultural distance between newcomers and the incumbent population (i.e. cultural closedness creating costs for migration and operation for the foreign workers in the locality).

Source: Authors’ calculations.

Table 2: Correlations between Cultural and Economic Variables

	fac1	loggpd*c	st*lemp1	av_wage	stotnu*s	shc	screa	stotal*s	simm_t*I	simm_eu	simm_ru	simm_e*a	simm_~ia	simm_~ca
fac1	1													
loggpd_pc	-0,20	1												
stotalemp1	-0,34	0,53	1											
av_wage	-0,19	0,87	0,26	1										
stotnumres*s	-0,52	0,38	0,39	0,23	1									
shc	-0,25	0,59	0,41	0,67	0,25	1								
screa	-0,45	0,60	0,50	0,40	0,61	0,20	1							
stotalnati*s	0,24	-0,45	-0,40	-0,52	0,01	-0,29	-0,36	1						
simm_total	-0,33	0,56	0,59	0,57	0,11	0,37	0,47	-0,87	1					
simm_eu	-0,30	0,31	0,38	0,34	0,02	0,17	0,25	-0,61	0,71	1				
simm_ru	0,09	-0,06	0,16	-0,12	-0,13	0,25	-0,30	-0,03	0,07	0,14	1			
simm_europa	-0,29	0,54	0,55	0,53	0,12	0,36	0,44	-0,85	0,96	0,65	0,04	1		
simm_asia	-0,11	0,68	0,36	0,70	0,06	0,39	0,43	-0,58	0,66	0,36	0,00	0,58	1	
simm_africa	-0,08	0,22	0,18	0,32	-0,14	0,27	0,19	-0,30	0,38	0,35	0,10	0,16	0,42	1

Legend:

The table presents levels of correlation between the cultural factor of cultural closedness (fac1) and the standard socio-economic variables, i.e. log GDP per capita, and shares of: total employment, total number of residents, highly skilled, creative, total number of immigrants, nationals and immigrants from the EU, Russia, the rest of Europe, Asia and Africa. Cultural closedness seems to be highly negatively correlated with the share of natives (-0.52), which is a reverse measure of diversity, and with creative workers (-0.45), and we observe half of these values for the almost equal negative correlation coefficients of fac1 with skilled workers (-0.25) and with productivity (-0.20), all of which support Florida’s claims regarding the creative class. Meanwhile, the two categories of workers are almost equally associated with productivity, with slight dominance of the creatives (0.59 and 0.60, respectively).

Source: Authors’ calculations.

Table 3a: ‘Horse-race’ Test for Herfindahl Index vs Cultural Distance Index

	Standard Spec.						Creative Class Augmented Spec.					
	coef.	t-value	coef.	t-value	coef.	t-value	coef.	t-value	coef.	t-value	coef.	t-value
	loggdp_pc											
shc	3,038	5,73	3,318	5,35	3,121	5,99	3,142	5,33	3,606	6,69	3,480	6,19
stotalempl	1,451	2,53	1,904	3,37	1,510	2,45	0,471	1,05	0,597	1,22	0,443	0,92
screa							10,317	4,46	13,662	5,71	12,953	5,30
HI	-0,893	-2,23			-0,918	-2,18	-0,518	-1,38			-0,516	-1,30
big_cdist			0,031	0,47	0,043	0,66			0,162	2,63	0,162	2,65
_cons	9,808	19,24	8,796	39,97	9,775	18,45	9,486	23,36	8,724	57,23	9,278	21,32
F	(4,61) = 24,31		(3,62) = 31,94		(3,62) = 28,06		(5,60) = 35,27		(4,61) = 38,42		(4,61) = 42,95	
Prob > F	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
R-squared	0,49		0,48		0,45		0,66		0,61		0,65	
Root MSE	0,24		0,24		0,25		0,2		0,21		0,2	
N	66		66		66		66		66		66	
Ramsey RESET test for omitted variables												
F	(3,59) = 0,51		(3,59) = 0,60		(3,58) = 0,45		(3,58) = 6,11		(3,58) = 2,22		(3,57) = 2,64	
Prob>F =	0,6757		0,6197		0,7163		0,0011		0,0956		0,0584	

Legend:

The table presents the estimation results from OLS ‘horse race’ between two alternative measures for cultural impact: the standard diversity measure related with ethnic heterogeneity – the Herfindahl Index (HI) and our index of big cultural distance generated on the base of our CBD fac1 from the preceding factor analysis. The measures of cultural impact are first investigated in the ‘standard model’ context, where GDP per capita is explained through local share of human capital, share of total employment and culture. As a second step, the ‘standard model’ is augmented according to Richard Florida’s (2002a,b; 2005) conceptual claims with the share of creative workers in the locality. The augmentation is allowed by the existing low correlation coefficient (0.20) between share of human capital and share of creative workers. Ramsey test of omitted variables cross-checks the reliability of our results.

Source: Authors’ calculations.

Table 3b: Immigrants' Impact, Coefficients and t-Values

specif.	1		2		3		4		5		6	
	coef.	t-value	coef.	t-value	coef.	t-value	coef.	t-value	coef.	t-value	coef.	t-value
dep.var.	loggd_pc											
simm_total	1.45	1.78										
simm_eu			4.00	1.18								
simm_europa					1.32	1.50						
simm_ru							-22.03	-0.82				
simm_asia									48.50	6.16		
simm_africa											0.70	0.19
shc	3.40	5.85	3.60	6.95	3.41	5.92	3.76	6.58	2.82	5.44	3.58	6.60
screa	12.61	5.25	13.53	5.76	12.73	5.14	12.58	4.36	10.51	5.36	13.63	5.66
stotalempl	0.17	0.35	0.41	0.87	0.27	0.53	0.76	1.34	0.46	1.03	0.60	1.21
big_cdist	0.17	2.75	0.17	2.65	0.16	2.58	0.17	2.70	0.14	2.58	0.16	2.60
_cons	8.86	58.96	8.77	63.08	8.85	55.82	8.70	54.48	8.87	58.42	8.72	56.65
N	66		66		66		66		66		66	
F(5, 60) =	37.57		38.11		36.80		33.63		51.86		34.41	
Prob > F	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	
R-squared	0.67		0.66		0.66		0.65		0.73		0.65	
Root MSE	0.195		0.199		0.196		0.199		0.175		0.201	
Ramsey RESET test for omitted variables												
F(3,57) =	2,60		3,66		1,69		2,55		3,03		2,53	
Prob>F =	0,0612		0,0175		0,1789		0,0644		0,0367		0,0665	

Legend:

The table presents the estimation results from OLS with robust standard errors. We present the tests for the different specifications examining the joint effect on productivity from shares of immigrants and the different immigrant groups (EU, non-EU Europe, Russian, Asian and African) in turn, in the context of the share of total employment, the mass of creative and skilled workers in the locality and the index of cultural distance (our dummy variable big_cdistance, which is equal to 1 when fac1 in the locality is above the mean value for the EU15). The results are plausible and consistent across the specifications with regard to the significance of all the variables, except for immigrants, whose impact on local productivity varies strongly from t-value (6.16) for immigrants from Asia and non-EU Europe to an insignificant and even negative impact from African and Russian immigrants. It is interesting to remark that in those specifications in which the share of immigrants is insignificant, the model registers increased importance of the share of skilled workers and a drop in the significance of the creative ones. Moreover, productivity is associated with the existence of high cultural distance. These three observations lead to the conclusion that some immigrant groups cannot properly exhibit their share of creative input in a context of cultural distance and hostility. Since in Europe the localities that are characterized by increased cultural distance are the more productive ones, these particular regions suffer a less positive impact or even negative non-significant effects from some of the incoming foreigners. Ramsey test of omitted variables is used to cross-check the reliability of our results.

Source: Authors' calculations.

Table 4a: Immigrants' Preferences and Cultural Distance, Coefficients and t-Values

specif.	1		2		3		4		5		6	
	odd ratio	z	odd ratio	z	odd ratio	z	odd ratio	z	odd ratio	z	odd ratio	z
dep,var,	attr_immtotal		attr_eu		attr_europa		attr_ru		attr_asia		attr_africa	
logav_wage	3,19	0,97	12,32	2,07	4,75	1,15	0,3	-1,29	55,56	2,66	1,92	0,72
logstotalempl	8,26E+08	2,91	89,63	1,53	4,37E+12	2,9	2,74E+01	1,46	1,51E+06	2,33	1,43E+02	2,1
fac1	0,07	-1,78	0,16	-1,38	0,07	-1,58	2,63	0,87	1,83	0,48	2,25	0,75
Iteration 0 log likelihood =	-44,25		-39,62		-42,67		-37,65		-42,01		-42,67	
Iteration 1 log likelihood =	-26,45		-31,59		-24,86		-35,7		-30,86		-39,27	
Iteration 2 log likelihood =	-23,72		-31,04		-20,15		-35,66		-30,04		-39,19	
Iteration 3 log likelihood =	-23,28		-31,03		-19,43		-35,66		-30,03		-39,19	
Iteration 4 log likelihood =	-23,28		-31,03		-19,42		-35,66		-30,03		-39,19	
Iteration 5 log likelihood =	-23,28				-19,42				-30,03			
Iteration 6 log likelihood =					-19,42							
N	66		66		66		66		66		66	
LR chi2(3) =	41,95		17,16		46,5		3,98		23,96		6,97	
Prob > chi2	0		0		0		0,26		0		0,07	
Log likelihood	-23,28		-31,03		-19,42		-35,66		-30,03		-39,19	
Pseudo R2	0,47		0,22		0,54		0,05		0,29		0,08	
linktest												
	coef,	z	coef,	z	coef,	z	coef,	z	coef,	z	coef,	z
_hat	1,093	3,84	1,489	2,85	1,084	3,68	-1,205	-0,79	0,962	2,96	-1,667	-1,32
_hatsq	0,059	1,18	0,225	1,32	0,047	1,48	-1,405	-1,57	-0,032	-0,22	-2,522	-2,06
_cons	-0,129	-0,33	-0,051	-0,13	-0,103	-0,25	-0,449	-0,60	0,029	0,08	-0,040	-0,10

Legend:

The table presents our investigation of the preferences of immigrants in the context of the gravity effects of the average wage, the share of total employment and the existing cultural closedness factor, which creates the cultural distance representing a cost for the inflowing foreign workers. The results reflect a logit estimation, in which the preference of a particular immigrant group to cluster in a locality is measured with a dummy variable equal to 1 when the concentration of this group of immigrants has an above average share of these immigrants in other EU localities. The different immigrant groups exhibit different preferences, which determine their concentration in a locality. While for all immigrants per se the negative cultural attitudes and cultural distance are a non-desirable characteristic of a locality, it is only the non-EU European immigrants who have the bargaining power to avoid this type of locality, while the rest of the immigrant groups end up in the culturally “keeping a distance” localities. Meanwhile, the EU immigrants also end up in the culturally unfavourable localities, but this happens in the context of their unique power to exercise a wage preference. So, from Table 3 we see that their impact is insignificant, but on an individual level they are empowered to achieve better labour conditions. Moreover, the latter results corroborate our previous findings in the sense that the places with the highest wages are also characterized by the non-desirable high cultural distance. Thus, while the EU, non-EU European and Asian immigrants manage to exercise different preferences vis à vis their different expected bargaining powers (based respectively on EU rights, cultural proximity and high skill levels), Russian (completely) and African (slightly able to follow employment opportunity) immigrants are stripped of bargaining power to exercise preferences vis à vis their concentration in the EU. This means that Russian and African immigrants end up in both the less productive and the more culturally distant regions than the rest of the immigrants because they have the lowest bargaining power. So, even if there is creative and entrepreneurial potential in these still self-selected individuals, their potential is more severely curbed by the local milieu than in the conditions faced by the other immigrant groups elsewhere. A standard test for specification error and omitted variables (linktest) is employed to cross-check the reliability of our results.

Source: Authors' calculations.

Table 4b: Immigrants' Preferences with Herfindahl Index, Coefficients and t-Values

	1		2		3		4		5		6	
	odd ratio	z	odd ratio	z	odd ratio	z	odd ratio	z	odd ratio	z	odd ratio	z
dep,var,	attr_immtotal		attr_eu		attr_europa		attr_ru		attr_asia		attr_africa	
logav_wage	0,16	-0,77	4,89	1,14	7,39	0,54	0,36	-1,04	45,49	2,52	1,53	0,44
logstotalempl	2,13E+23	2,37	4,39E+01	1,30	1,30E+14	2,65	36,77	1,36	908,26	1,96	63,3	1,72
HI	3,24E-47	-2,41	8,24E-09	-3,3	2,64E-29	-2,78	32,49	0,64	0,66	-0,07	0,22	-0,35
Iteration 0 log likelihood =	-44,25		-39,62		-42,67		-37,65		-42,01		-42,67	
Iteration 1 log likelihood =	-13,12		-25,68		-13,5		-35,91		-30,86		-39,48	
Iteration 2 log likelihood =	-10,81		-24,91		-11,47		-35,82		-30,15		-39,41	
Iteration 3 log likelihood =	-9,10		-24,86		-8,86		-35,82		-30,14		-39,41	
Iteration 4 log likelihood =	-8,11		-24,86		-8,02		-35,82		-30,14		-39,41	
Iteration 5 log likelihood =	-7,99		-24,86		-8,01				-30,14			
Iteration 6 log likelihood =	-7,99				-8,01							
Iteration 7 log likelihood =	-7,99				-8,01							
Iteration 8 log likelihood =	-7,99											
N	66		66		66		66		66		66	
LR chi2(3) =	72,52		29,51		69,32		3,66		23,74		6,52	
Prob > chi2	0,0000		0,0000		0,0000		0,3002		0,0000		0,0890	
Log likelihood	-7,99		-24,86		-8,01		-35,82		-30,14		-39,41	
Pseudo R2	0,82		0,37		0,81		0,05		0,28		0,08	
linktest												
	coef.	z	coef.	z	coef.	z	coef.	z	coef.	z	coef.	z
_hat	1,002	2,41	1,121	3,10	1,062	3,10	-0,222	-0,16	0,971	2,96	-1,150	-1,07
_hatsq	0,007	0,05	0,076	0,56	-0,046	-1,67	-0,694	-0,92	-0,023	-0,16	-1,917	-1,94
_cons	-0,020	-0,02	-0,105	-0,23	0,233	0,32	-0,380	-0,50	0,021	0,06	-0,044	-0,11

Legend:

The table presents our investigation of the preferences of immigrants as an alternative to the gravity effects with the standard heterogeneity cultural variable – the Herfindahl Index of ethnic diversity (HI) - included together with the average wage and the share of total employment in a logit model for spatial concentration preferences of immigrants. The preference of a particular immigrant group to cluster in a locality is measured with a dummy variable equal to 1 when the concentration of this group of immigrants has an above average share of these immigrants in other EU localities. The results closely resemble the results from Table 4a with the alternative measure for the cultural impact – our calculated factor of cultural closedness – fac1. The number of required iterations however, for the specifications in Table 4a is lower than the ones for the HI specifications presented here. This can be interpreted in favour of the predictive power of cultural distance (fac1) over HI as an explanatory variable for cultural bias on immigrant preferences. A standard test for specification error and omitted variables (linktest) is consulted to cross-check the reliability of our results.

Source: Authors' calculations.

Table 5: Cultural Impact with Segmented Human Capital, Coefficients and t-Values

specif.	full						pars1						pars2					
	coeff.		z-value				coeff.		z-value				coeff.		z-value			
dep.var1	shc																	
av_wage	4,372		6,41				4,329		6,31				4,322		7,11			
screa	-0,557		-1,52				-0,537		-1,45				-0,540		-1,52			
simm_total	0,089		0,60				-0,003		-0,02									
big_cdlist	-0,017		-1,89				-0,017		-1,91				-0,017		-1,92			
stotalnationals	0,099		0,99															
_cons	-0,077		-0,76				0,021		1,13				0,021		1,15			
dep.var2	loggpdp_pc																	
stotalempl	1,075		2,11				1,099		2,15				1,092		2,35			
screa	12,101		4,13				12,074		4,12				11,166		3,97			
shc	8,212		7,34				8,240		7,37				7,751		6,55			
simm_total	-0,750		-0,88				-0,775		-0,90									
big_cdlist	0,248		3,46				0,248		3,47				0,245		3,27			
_cons	8,161		45,91				8,151		45,79				8,186		47,63			
Equation	Obs	Parms	RMSE	R-sq	chi2	P	Obs	Parms	RMSE	R-sq	chi2	P	Obs	Parms	RMSE	R-sq	chi2	P
shc	66	5	0,032	0,49	62,41	0,0000	66	4	0,032	0,48	60,40	0,0000	66	3	0,032	0,48	60,40	0,0000
loggpdp_pc	66	5	0,280	0,25	188,22	0,0000	66	5	0,281	0,24	190,70	0,0000	66	4	0,268	0,31	168,74	0,0000

Legend:

The table presents the results from a 3SLS estimation of a two-simultaneous-equations model, in which the first equation reflects the cultural gravity effect for the formation of human capital in a locality, together with the average wage, diversity (as the share of nationals) and the mass of workers – as the share of creative workers and the share of immigrants (since we identified these two categories to have different levels of relationship with human capital). The second equation plugs in human capital as an explanatory variable for local productivity, measured in log GDP per capita. Productivity in equation (2) is modelled as a gravity result of the mass of employed people as a share of the total employment, the share of skilled and creative workers, the immigrant share and the local cultural distance as a factor determining the efficient cooperation of the different types of human capital (skilled, creative and foreign) in a locality. The test clearly identifies cultural distance as a negative factor for the concentration of skilled workers in a locality and indicates that these workers are important for local productivity, together with creative workers. Creative workers, however, avoid (negative significant t-value) places with high cultural distance, while the concentration of highly skilled workers follows the average wage preference. Since creative immigrants cannot exercise a wage preference owing to their lower bargaining power created by the high cultural distance in the EU productive regions, we end up reporting a lack of a positive contribution from immigrants to local productivity. Our model survives the technical requirement for number of unique explanatory variables per equation and in addition our model is recursive, therefore we consider this simultaneous equation model as sufficiently identified.

Source: Authors' calculations.

Appendix 1: Cultural Indicators from the WVS

This paper measures local cultural capital by using data on attitudes reported in the European and World Values Surveys (WVS) four-wave integrated data file, 1981–2004 (v.20060423). Our four categories of cultural indicators are informed by the WVS as follows: 1) negative attitudes towards different races, Muslims, Jews, immigrants and homosexuals (these are counts of people who indicated the particular group as being one they would mind having as a neighbour – the answer to questions A125, A128, A133, A129 and A132 from the WVS questionnaire); 2) positive attitudes towards imagination, tolerance and obedience (as values people would like to teach their children – answer to questions A034, A035, A042 and A044 in the WVS); 3) attitudes towards work regarding whether work needs to be creative (the indicators “initiative” and “instr_innov” answering a positive response to questions C016 (counting those who mentioned the need to use their initiative as an important preference criteria for their job) and C061 (answers of interest are those stating “it depends” whether one always has to follow instructions or whether innovation is allowed, from the WVS questionnaire) and the motivation that drives people to work (work as an individual’s duty – an indicator we are interested in because of its link to Max Weber’s notion of work as a calling; related to question C039 in the WVS); 4) attitudes directed towards immigrants – negative, such as unwillingness to help immigrants (E166, answers 4 and 5) or disapproval of an employment policy favouring the interests of immigrants in the labour market perceived as a threat to the locals (question E143, answers 3 and 4), as well as positive attitudes such as concern for the well-being of immigrants (E161, answers 1 and 2); in addition, we selected, among others, the attitudes towards the culture of immigrants (if they have to preserve their different cultural traditions (E145, answer 1) or they have to be assimilated (E145, answer 2); and 5) general attitudes of the people, such as happiness (A008), depression (A017), remoteness from other people (A013), trust (A165, answer 1) and nationalism (feelings of national pride, question G006, answers 1 and 2).