Gravitational effects of Culture on Internal Migration in Brazil*

Daisy Assmann Lima[⋆,‡] Philipp Ehrl[⋆]

⋆ *Catholic University of Brasilia*, ‡ *Federal Defense Counsel*

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Abstract

This paper conducts empirical research about the role of culture on internal migration in Brazil. To do so, we deploy data from the Latin American Public Opinion Project (LAPOP) and the 2010 Brazilian Census. Against the background of the gravitational model, we adopt the method Poisson Pseudo-Maximum Likelihood with Fixed Effects (PPMLFE) to account for econometric issues. The results obtained provide new evidence on the influence of the migrant's perceptions about the push-pull factors of Brazilian municipalities. Traditionally, gravitational models apply features such as Gross Domestic Product per capita, unemployment rate, and population density to measure the attractiveness of cities. On top of that, we include cultural variables. Mainly, our finding stress that a migrant prefers the destination with a smaller distance compared to his perceptions about authoritarianism, corruption, life satisfaction, community trust, and the rule of law. Regarding personal traits. We find that the variable "being a critical person" increases the cultural distance from the migration destinations, differently from the others, the higher the distance, the higher the migration flux. We have also identified relevant characteristics of the "cultural" migrant. For example, the group that does not tolerate corruption: 16-40 years old, self-employed, and working more than 40 hours per week. All in all, these insights on the migrant's traits and perceptions about culture pave the way to design appropriate migration policies at the municipal level once migration supports, among others, renewal of the socio-economic tissue.

Keywords: internal migration, cultural distance, structural gravity model, institutions, religious diversity

JEL Classification: L26, C26, D22, O31

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1 Introduction

Internal migration flux in Brazil is significant and matters to understand the offer of public policies. It is relevant to take into consideration in a country of continental proportions as Brazil, where the internal migration is typically higher. Klugman (2009) point out that almost 740 million people in the world are internal migrants. According to the Census data from 2010, nearly 3.3 million people migrate to reach new opportunities within Brazil. Since 1980, concentration in metropolitan cities has been the main driver of internal migration, as explored by Martine (1994). More recently, migrants are moving due to other reasons. In general, they are looking for better opportunities and quality of life. Moreover, the rhythm of the internal migration after 1980 has been stable, as pointed by Klugman (2009).

Recently, Mcauliffe (2019) state that mobility is a characteristic of the nature of the human being's behavior; however, some peoples move more than others and in different ways. We regard that impediments to mobility, such as geographical distance, require additional investment. If friends or acquaintances at a given moment have migrated to a municipality, a person is more prone - when and if migrating - to opt for that same place. Among others, this study focuses on understanding how the host cultural identity and the cultural distance between the host and origin cities might help us to understand that relationship. Results of previous studies such as Switek (2016) suggest that internal migration report improvements depending on the reason for moving.

In the literature on migration, structural, and social-psychological attributes are vital concepts as proposed by Ritchey (1976) at the push-pull theory. Structural attributes indicate the individual's status in society as a lifecycle position. As a proxy for structural characteristics, we deploy time spent in the migration travel and some dyadic - at origin and destination - variables: a) unemployment rate, b) GDP per capita, and d) population density. Social-psychological attributes, in their turn, stand for motives, aspirations, values, perceptions, and modes of orientation. As a proxy for social-psychological attributes (hereafter "cultural attributes"), we deploy one's perceptions about a) national pride b) life satisfaction, c) authoritarianism, d) the rule of law, e) community trust, d) corruption, e) the trust in the evangelical church, f) religious diversity and g) self-discipline and, finally, h) himself as a "critical" person.

This study aims at exploring how these cultural attributes interfere in the voluntary flow of migrants. We underline the benefits of social exchanges: migrants tend to move to a place where they feel socially "closer," as stated by Akerlof (1997). In light of the above mentioned, we address the question: whether cultural attributes of a municipality represent a push-pull factor to internal migrants in Brazil. The migrants go to cities with more similarities from a gravity theory perspective, accounting for cultural distances. We deem that places with some similarities with the home municipality provide a friendly environment to introduce them to the new city. Akerlof (1997) remarks that groups with levels of coordination could benefit from externalities until reaching optimum social equilibrium. So the distance is a crucial element to the analysis since it could establish the level of proximity between peoples at home and host municipalities, for example. We believe that social decisions are related to the push-pull factors that improve the migration process.

International literature offers an abundance of studies assessing the relationship between international migration and cultural distances among countries (Collier and Hoeffler 2018; Falck *et al.* 2018). Authors as Aggarwal *et al.* (2009); Lucey and Zhang (2010) use the cultural gap as a push-pull factor. Only a few studies address the relationship between internal migration and culture Molloy *et al.* (2011). Worth mention are: Combes *et al.* (2005) for French regions; (Liaw and Qi 2004; Sauter 2012) for Canadian regions; Falck *et al.* (2018) for Germany and Herrmann-Pillath *et al.* (2014) for Chinese prefectures. Our study expands this field of research by looking at the economic interaction promoted by culture not yet sufficiently addressed in Brazil.

Several studies investigate the effects of the internal migration flow in the Brazilian economy (Da Mata *et al.* 2007; de Lima *et al.* 2019). We have found relevant considerations about internal migration pointed by Carvalho and Rigotti (2015). The author observed four main points: a) the relative reduction of the expansion process of large cities; b) the reduction of migration due to long geographical distances; c) an increased selectivity of the migrant to elect a destination; and d) an enhanced circularity process due to return migration, i.e., coming back to the municipality of origin.

About the literature on the cultural variables, firstly, it shall be said that we have not found studies including "national pride" in their analysis; "life satisfaction," in its turn, is more present. "Life satisfaction" as criteria for migration yields different outcomes. De Jong *et al.* (2002) points out that migration is associated with decreased post-move satisfaction. Otrachshenko and Popova (2014) showed that individuals have a higher intention to migrate when dissatisfied with life. Cárdenas *et al.* (2009) analyzed the effect of life satisfaction, examining the relationship between life satisfaction, vulnerabilities, and migration in Latin America. They found out that, controlling for income, migration experience increases the life satisfaction of the respondent.

Rapoport and Docquier (2006) mention two situations faced by migrants in the voluntary process of moving to another place. The pitfall is separation from the family; the advantage is the perspective of a "new life." These are, however, subjective factors of the migration process that need to be accounted for when speaking of "life satisfaction." Findings up to date as those from Switek (2016) suggest that internal migration is positively associated with housing satisfaction as well as life satisfaction in general. Studies on Brazilian internal migration do not account for subjective well-being elements. We, instead, opt to investigate whether these factors are push-pull factors to migrate to a specific location.

Community trust is a variable commonly found in international literature about migration. Alesina and La Ferrara (2002) reveal that, within a particular community, individuals feel more confident to express against racial integration. Relevant is the conclusion that, when the community is more heterogeneous, there is less trust in each other. We advance that "community trust" could measure the confidence in each other - and that feeling could improve economic results. Spagnolo (1999) remark this behavior is more common in small communities, with multidimensional interactions. In these places, people may trust more on others for fear of being excluded by the community. Literature also appoints the existence of endogenous locational choices for both residents and internal migrants. As an illustration, Card *et al.* (2008) indicate

the preference of neighborhoods with race-based tipping. In the same line, Damm (2009) finds empirical evidence that refugees with unobserved unfavorable characteristics self-select ethnic enclaves, as explained by Chetty and Hendren (2018a, b). The studies, at hand, support our view on the part played by cultural attributes in the choice for a place to reside.

Institutions constitute another critical and vastly studied determinant of the migration flux. In this realm, our paper adds to the literature on the connections between culture and institutions, see Alesina and Giuliano (2015) for a review. It is material to highlight that institutions, in this research, are the migrant's perceptions about them. The four variables representing institutions are i) perceptions about authoritarianism, ii) perceptions about corruption, iii) policy orientation, and iv) the rule of law. We include these perceptions on institutions due to the need for separate measurement of the effects of culture and institutions. Bertocchi and Strozzi (2008) demonstrate the impact of institutions as an attractive factor for migrants, albeit recognizing possible confounding endogenous elements as colonial history. Nifo and Vecchione (2014) regard that favorable socioeconomic contexts enable higher income and better employment opportunities. The author posits that better institutions pave the way for the achievement of these aims. As mentioned before, GDP per capita and employment are critical push-pull factors in the context of internal migration. To stress the role of institutions, even when a migrant is culturally distant from the municipality where he wants to go, he may still opt for that because he relies on the quality of the institutions therein.

Religion, for Lucey and Zhang (2010), roots behavioral patterns in most social and economic activities. Moreover, Guiso *et al.* (2003) find out that, on average, religious beliefs are associated with higher income per capita. Maybe, more importantly, Dupré (2008) emphasizes that, when a person is out of his home town, belonging is a prominent issue, and religious values and communities help to fulfill this need. Our results do not afford a role for religion as a push-pull factor to migration in Brazilian municipalities.

About the personal traits observed at the migration studies, we have Justo and Neto (2008) that depicts the profile of the Brazilian migrants using census data from 1980, 1991, and 2000: they are younger and more educated, usually male and coming from a more precarious region. Sachsida *et al.* (2009) confirms these observations by adding that age and educational level affect the decision to migrate. Further, Golgher *et al.* (2005) include the influence of regional and individual aspects in the decision to migrate. That occurs because of the unobserved characteristics of migrants. In this context, but referring to international migration Chiswick (1999), describes them as more aggressive, ambitious, entrepreneurial, and motivated.

Anderson (2011) formulates a theoretical model applying the gravitational model in the context of the migration flux. The gravitational models used to migration context, since Ravenstein (1889), is based on two statements. First, the migration flux is positively proportional to the economic size of the destination place. Second, the municipalities with bigger GDP per capita have more significant migration flux. To complement this analysis, we include the unemployment rate and the population additionally. We see, however, the necessity to supplement this analysis with cultural variables. So we argue that people gravitate at places to reach better opportunities - but not in an unconditional manner.

Consequently, we investigate, in this paper, cultural aspects as push-pull migration factors. Theories that emphasize purely economic factors fail to capture the broader framework in which decisions to migrate are essential. Greenwood (1997) provides a comprehensive reviews of modeling internal migration flows and propensities to migrate.

There are different ways to specify and estimate the gravity equation (for a review, see Head and Mayer (2014)). Specifications vary basically in two dimensions. The first dimension concerns the error term. The second is the imposition of the degree of model structure beyond the estimation. Among the estimation approaches available, one possibility is to use the Poisson Pseudo-Maximum Likelihood (PPML). Silva and Tenreyro (2006) show that PPML consistently estimates the gravity equation, and is robust to different patterns of heteroskedasticity and measurement error. More recently, Anderson *et al.* (2018) provide a more robust regression using the theoretical properties of the PPML estimator. Therefore, they distinguish that the fixed effects can replace multilateral Resistance Terms (MRT). Correia *et al.* (2019b) developed an implementation that is the new state-of-art in this methodological field. We apply this feature to our estimations.

About the data, we use the Latin American Public Opinion Project (LAPOP) survey to provide the cultural variables. For this purpose, we apply the Principal Component Analysis (PCA) to the dataset. This statistical procedure enables the reduction of the dimensionality of the data. We choose the variables with Kaiser-Meyer-Ohlin (KMO) value more significant than 0.7. The resulting variables related to cultural values are one's perceptions about a) national pride b) life satisfaction, c) authoritarianism, d) the rule of law, e) community trust, d) corruption, e) the trust in the evangelical church, f) religious diversity and g) self-discipline and finally h) himself as a "critical" person.

Mainly, our finding stress that a migrant prefers the destination with a smaller distance compared to his perceptions about authoritarianism, corruption, life satisfaction, community trust, and the rule of law. Regarding personal traits, we find that the variable "being a critical person" increases the cultural distance from the migration destinations, then, for this variable, differently from the others, the higher the distance, the higher the migration flux. So, in this case, cultural distances can reach higher migration flux. In general, as stated by geographical distances, cultural distances enhance the migratory influx. We also stress some issues about the effect of heterogeneities on migrants. Regarded the differences in the magnitude of the variables, we find that the migrant profile who cares about the national pride is a unique feature present at non-white, 16-40 years old, female, work more than 40 hours per week, and is self-employed. There is also a group that does not tolerate corruption: 16-40 years old, work more than 40 hours per week, and self-employed.

To sum up, our article contributes to the migration literature furthering the analysis of internal migration by adding cultural variables to its analytical framework in the following ways. First, we improve on existing studies applying the latest methodology - Poisson Pseudo Maximum Likelihood with Fixed Effects - in migration gravity models with a robust new database at the internal migration literature: LAPOP database. So, we analyze the push-pull factors of internal migration with the background of the gravitational model, including cultural distances. Second,

we examine the impact of cultural distances between Brazilian municipalities, considering one's perceptions about a) national pride b) life satisfaction, c) authoritarianism, d) the rule of law, e) community trust, d) corruption, e) the trust in the evangelical church, f) religious diversity and g) self-discipline and finally h) himself as a "critical" person. Third, we use geographical distance measured by the time to travel (by car in minutes - Google Maps) instead of distance in kilometers as usual. We believe that, in this manner, we can account for infrastructure restrictions.

The organization of this paper is as follows: in the second section, we present the gravity model estimations; the third section explains our data and descriptive statistics. The fourth section presents the basic results and further investigations on the effect of heterogeneity. At last, section six offers concluding remarks.

2 Gravity Model Estimation

First, we show why existing gravity studies could mislead to obtain estimates of the cultural effects on the municipality's internal migration flow. In this estimation, a core model presents the assumption that migration determines factors of attraction and repulsion. The fundamental evaluation of the gravity model mostly uses population size and distance. Several studies extend the model to include the main economic explanatory variables: GDP per capita and the unemployment rate ? all of them at the origin and destiny. We replaced population size by population density since it can be used as a proxy for social networks as well. The basic gravity model of migration suggests that differences in the unemployment rate, time to travel, origin and destiny GDP, and population density between host and origin municipalities in Brazil attract or repulse the migrants.

Another point is that the presence of distance characterizes the gravity model as a critical factor. So we use the variables of interest - cultural one - in our analysis in distance terms. We develop and present our identification strategy based on internal migrants with cultural aspects tending to move to places with more opportunities - proxied by the populational density of the municipality of attraction. So because of the analogy with the physics of gravity, we can explain social movements, here, characterized by cultural distances as same as Akerlof (1997). The formula below and the laws stated find numerous empirical confirmations in the migration literature. The gravity model thus appears as an empirical generalization of the migration flows. However, the model cannot explain why there are considerable variations in the characteristics of migrants or the differences in volume between migratory flows that start from similar municipalities.

In this vein, we could consider that the distance should have significantly reduced the result according to the model, confirming our assumption that the internal migration in Brazilian municipalities has other explanations than those provided by this theoric model. One way to solve it is to take into account the transport costs with the time to travel - in minutes - and subjective distances as cultural, institutional, religious, and personal traits distances. We present this step as an opportunity to introduce the design of analysis as well as the econometric

notation. The Newtonian law of gravitation inspires the basic of migration gravity models in their traditional form:

$$F_{ij} = G\frac{M_i M_j}{D_{ij}^2} \tag{1}$$

The force F between two bodies i and j with $i \neq j$ is proportional to the masses M of these bodies and inversely proportional to the square of their geographical distance D. G is a constant and, as such, of no significant concern. The underlying idea of a traditional gravity model, shown for migration flux as stated by Anderson (2011) follows the same rationale:

$$M_{ij} = exp(C_{ij}\beta + \pi_i + \chi_j).\epsilon_{ij} \tag{2}$$

The migration flows M_{ij} from municipality i to j explain C_i and C_j that embody the cultural variables, π_i represents the vector of time to travel, GDP per capita, unemployment rate, and the densities of the populations of municipality i and j, and χ_j represent the fixed effects of the home and host municipalities. The ϵ_{ij} is the random error term associated with all pairs of municipalities. Then we make a logarithmic transformation to form a log-linear model. In this manner, the parameters are the elasticity of the migration flow to the explanatory variables. Usually, we can express the econometric regression as follows:

$$\log M_{ij} = \log C_{ij}\beta + \log \pi_i + \log \chi_j + \log \epsilon_{ij} \tag{3}$$

By the theory, this means implies a clear direction of causality that runs from GDP, unemployment rate, and distance to trade. This direction of causality is, however, theory-driven and based on the assumption that the gravity equation is a microeconomic model. To fit the purpose of our investigation, we explicitly separate the four groups of variables of interest that measure cultural aspects from both sides (C_i) and (C_j). One is the cultural group with national pride, life satisfaction, and community trust distances. The institutional distances are authoritarianism, corruption, policy orientation, and the rule of law. The religious one is the religious diversity and trust in the evangelical church. And the personal traits one is the disciplined and critical person distances.

Multilateral resistances terms (MRT) represent the barriers to migrate. Since we are considering the intra-municipality migration, we define that we do not have obstacles to migrate in MRT terms. So we do account for the costs, but not for the barriers. Baldwin and Taglioni (2013) point out that the non-inclusion of the MTR may bias the coefficients of the cost variables, especially those associated with border dummies. But Fally (2015) demonstrates that, when the gravitational model is estimated with PPML, as suggested by Silva and Tenreyro (2006, 2011), the estimated fixed effects are precisely equal to the MRT that satisfy the equation system. So, our consideration of the barriers of the municipalities does not play a starring role.

It is vital to control for the potential confounding distances to isolate the effect of cultural distances on the migrant's influx. For this reason, we use the variables from the LAPOP database

and calculate the distances at the same sense of Kogut and Singh (1988) on social distance variables, thereby assuming that the more culturally distant from the origin municipality, the lower the migrant influx to the destination municipality. So the expected sign of all distances is negative. The distance variables were calculated by the Euclidean distance definition between origin and destiny as follows:

$$C_{ij} = \sum_{ij}((I_{ci} - I_{cj})^2)/var_{C_{ij}} \tag{4}$$

Where C_{ij} is the distance variable, I_{ci} and I_{ci} represent the values at the origin and the destiny of the cultural, institutional, and religion variables. And finally, *var* represents the variance of the I_{ij} variable. Silva and Tenreyro (2006) explains that an exponential multiplicative model makes it impossible to estimate the coefficients of the gravitational equation using ordinary least squares (OLS). The solution proposed by the authors is the adoption of the non-linear estimator called the PPML. Besides, the conditions of identification of the PPML are incompatible with the identification of the log-linear models. We need to address the inconsistency in the presence of heteroscedasticity in this model form. So Silva and Tenreyro (2006) proposes an estimation model with PPML, and Hering and Paillacar (2015) also addresses the problem of unobserved flows by running this model. Anderson *et al.* (2018); Fally (2015) bring the equation of the econometric FE-PPML model as:

$$M_{ij} = exp(C_{ij}\beta + \pi_i + \chi_j).\epsilon_{ij} \tag{5}$$

This set-up is almost identical to the equation 2 except of non-logarithmic variable of migration flux M_{ij}. We implement the FE-PPML through the Stata routine developed by Correia *et al.* (2019a, b).

After that, we made additional regressions with the PPML model with fixed effects in the origin and destiny municipalities. In this case, we can estimate efficient parameters with characteristics asymptotically also efficiently. These problems arise in logarithmic transformation due to heteroscedasticity usually present in migration data. And as pointed by Silva and Tenreyro (2006), this practice of log-linearizing the gravity equation results in error values depending on the covariates of the regression, resulting hence in inconsistent estimation even then all observations of the dependent variables are strictly positive as in our case. Our dataset, by construction, does not contain zero migration flow. We have selected only the cities with individuals with prior movement based on the place of birth.

Consequently, due to Jansen inequality doesn't apply, the error term is not equal to the log of the error term as the error terms in the log-linear specification of the gravity equation are not statistically independent from the regressors but are rather heteroskedastic. So, the elasticity coefficients are inconsistent. Given this Jansen inequality, Silva and Tenreyro (2006) argue that the log-linear transformation of the gravity model is intrinsic to heteroscedasticity, and applying OLS results in biased and inefficient estimates. However, the PPML regresses the gravity equation in levels instead of taking its logarithms. In this manner, we avoid the problem

posed by using OLS under logarithm transformation. According to the same authors, this model is appropriate thanks to the Poisson model takes account of the observed heterogeneity. And secondly, the fixed-effects PPML, hereafter FE-PPML, estimation technique gives a natural way to deal with zero-valued migration flows due to its multiplicative form. Thirdly, the method also avoids the under-prediction of large migration volumes and flows because it generates estimates of migration flows - and not the log of the migration flows.

They suggest it therefore as the new workhorse for the estimation of the constant elasticity models, such as the migration gravity model (Silva and Tenreyro 2006, 2011), find that PPML is consistent and generally well-behaved even in the presence of over-dispersion in the dependent variable. Baghdadi *et al.* (2013); Head and Mayer (2014) have shown that the choice of the best estimator is dependent on the specific dataset. And there is not a generally best estimator for these three datasets; thus, the appropriate estimator for any application is, therefore, data specific - which could be determined using some model selection tests.

Returning to the fixed-effect, Silva and Tenreyro (2006) and Silva and Tenreyro (2011) consider that the unobserved heterogeneity is correlated with the error term. Usually, the model proposed by Anderson and Van Wincoop (2003) is estimated by an FE-PPML approach with these concerns. There are, however, some drawbacks in the fixed-effect model in the sense that all variables have the perfect collinearity with fixed-effects we drop from the model. Consequently, the fixed-effect model eliminates some important theoretically relevant variables from the gravity equation: the GDP, population, and unemployment at origin and destiny. Finally, we repeat the FE-PPML estimation to find out whether different heterogeneities among the data such as the group of male, female, primary and secondary school, age, time of work, and type of employment. The above considerations suggest the necessity to include the fixed-effect in our empirical analysis of the PPML model and report the pseudo-loglikelihood statistic and AIC selection model. Also, we can do so with a rich dataset, which allows us to control for all municipalities specific through municipality fixed effects and focus on the characteristics of the match.

3 Data

The dataset assembled for the present study is composed of four sources: the Brazilian Census, the Brazilian Institute of Geography and Statistics (IBGE), the Departamento de Informatica do Sistema Unico de Saude (DATASUS), and the Latin American Public Opinion (LAPOP). The tool Stata - statistical software - routine developed by Weber and Péclat (2017) calculate the distance in terms of travel time in minutes, considering the travel by car. LAPOP employs an innovative method to carry out targeted national surveys. Given the low number of observations, we do not deploy the World Value Survey (WVS) to account for differences between inter and intra-local municipalities. We use Brazilian Censo and other datasets from IBGE and DATASUS. Rigotti (2011) asserts that the 2010 Brazilian Census contains information about the place of birth and the location of the last residence, also about duration of residence and, this data allows partial knowledge of the migratory stages. Thus, we can measure the accumulated migration

that occurred between the place of birth and the location of residence. Therefore we use a full list of 50 municipalities listed on table A.5. We get this list of towns from the joint of the migrants from the Census dataset. So this procedure results in 450 pairs of them from the de LAPOP dataset.

Another concern about the datasets mainly the LAPOP one is that we need to have caution in over-interpreting findings based upon a survey question that could be interpreted in different ways by different persons as pointed by Alesina and La Ferrara (2002); Glaeser and Vigdor (2001). To explain the composition of the sample at hand, we firstly define migrants as those dwelling in one municipality in the last ten years having been born in another city, thereby leading to a selection of 450 cities pairs on a set of 50 municipalities. It is a sound approach, for our sample entails migrants solely, and a migrant usually chooses between two destinations to where he considers going to, as explained by Molloy *et al.* (2011). We select municipalities as of the geographic unit of measurement due to its specificity and broader data availability, notwithstanding the use of datasets at the state level is more frequent in national studies. Further, we do not include municipalities with zero migrant influx. We also rule out from the dataset the cities with the only one observation.

The variables to measure the migration effect merits some considerations. Several studies have adopted different variables as birthplace, last residence, reasons for migration, and duration of the residency. The UNDP (2013) elucidate that international migrant is the person staying abroad for one year or longer, so our understanding is in line with the UN definition, namely of migration based on where people are born. Another concern is the kind of data: we use the variations at the migration stocks as Bertoli and Moraga (2015).

All datasets are from 2010. Here the data limitations cannot report for a temporal order of preferences. Still, it can offer a hint on the general tendency measured in absolute levels, which is, in its turn, a matter of further consideration. Also, we believe that cultural aspects are less sensitive to temporal variations. Individuals who have moved several times during 2010 are indistinguishable from individuals who have only moved only once. We understand that it may potentially affect the migrant's measurement because of some movers have returned to their birth municipality after residing elsewhere. Molloy *et al.* (2011) alert that, eventually, the data may not reflect recent migration decisions.

We assume that the set of cultural distances in the birthplace is paramount to define the destination municipality of a migrant. Mainly when dealing with migrants from small towns to large urban agglomerations. This fact confirms the effects of the dynamic advantages such as learning, sharing, and matching associated with large agglomerations.

Appendix table A.2 provides an overview of the descriptions and sources of the variables of this study. Table A.1 depicts the respective summary statistics like mean, standard deviation, the minimum and maximum value of each variable.

4 Results

4.1 Baseline results

In this section, we provide estimations on migration gravity models accounting for several issues as heterogeneity and fixed effects. The dependent variable is the number of the influx of migrants, and the time to reach the destination city is the main explanatory variable. In table 1, first, we include the traditional variables of the gravitational model: origin and destination population densities as well as home and host unemployment rates and GDP to account for structural attributes. The basic results are in line with the traditional gravitational model, i.e., the negative relation between the migration flux and the time to travel between the municipalities. As expected, the destiny GDP, origin, and destiny population are pull factors. The destiny GDP and unemployment are usually pushing elements besides our regression presented as pull factors as well as the former variables.

Our basic empirical model holds good fitness to the data and explains a substantial proportion of variation in the correlations presented. The adjusted pseudo-R2 is relatively high across specifications, generally between 0.5. We can define culture as social norms and values, religious beliefs, family structures. Taking this into account, we regress, at column (2) of the table (1), the cultural distances: national pride, life satisfaction, and community trust. Then, at column (3) of the table (1), the institutional distances: authoritarianism, corruption, policy orientation, and the rule of law. After, at column (4) of the table (1), the religions distances: praise for religious diversity and trust in the evangelical church. Finally, at column (5) of the table (1), we add distances for personal traits: disciplined and critical person. The complete model, at column (6) of the table (1), is better fitted: lower AIC statistic and higher loglikelihood statistic.

The complete PPML model indicates more migration flux with lower authoritarianism, life satisfaction, and religious diversity distance. This general result is consistent with our prediction that similarities for cultural distances lead migrants the converge in the choice of destination. Another probable consequence is the improvement of the agglomeration process in the cities. Our baseline model is in the basic specification of column (5), in table 1.

Furthering this analysis, another variable that deserves some consideration is the unemployment rate. We can see that it is relevant to explain the migration flux. So we can infer that economic opportunities influence the decision to migrate. This feature may be seen as a consequence of the individual perceptions about to migrate. In column (6) in table 1, the unemployment rate is not relevant as a push factor. Otherwise, we have that the bigger the migration flux when bigger is the distance about being a disciplined person.

We provide an extended model in table A.6. There are unobserved effects that may affect the results presented in the previous regressions. We have inserted PPML regressions with cultural values separately for home and host municipalities to mitigate this problem. And the complete model was the better fitted. About the results, it is essential to highlight that we find that there is more migration flux when having more authoritarianism and less community trust at the origin municipality. So we can infer from the results of the regressions that the authoritarianism and the community trust are home-oriented. On the other side, corruption and religious diversity

are host-oriented. Schwartz (1973) indicates that the migration analysis could be done without origin values since all are migrants, and since we are considering only people who move. Their only decision problem is the choice of a location among the alternative destinations. Besides that, we find that the perceptions at home are relevant to account for the change of the city.

We consider the PPML results with fixed effects the most robust model since this is the new methodological state-of-art. The table (2), we regress, in column (1), the cultural distances: national pride, life satisfaction, and community trust. Then, in column (2), the institutional distances: authoritarianism, corruption, policy orientation, and the rule of law. After, at column (3), the religions distances: praise for religious diversity and trust in the evangelical church. Finally, in column (4), we add distances for personal traits: disciplined and critical person. The complete model, at column (5), represents the preferred model and goodness of fit: lower AIC statistic and higher loglikelihood statistic.

We identify that migrant's preferences over alternative migration destinations are better when we have lower ranges about perceptions about authoritarianism, corruption, life satisfaction, community trust, and the rule of law. Regarding personal traits, we find that being a critical person enhances the cultural distance to the migration flux at the municipalities. At this level of analysis, we could see the effect of a bad equilibrium, as stated by Alesina and La Ferrara (2002). We believe that this could occur in Brazilian cities because the migrants move, in general, to bigger cities. So the people go to a more heterogeneous community. And then the behavior of accepting a bribe, for example, is more comfortable to see when the people are in bigger cities than when they live in a smaller one.

4.2 Effect heterogeneity

We explore the possibilities of heterogeneities among the migrants. The present literature about this topic find some characteristics about the migrants, but we intend to verify through our data another specificity beyond the cultural variables and other cultural aspects. The question arises as to whether there is a group of individuals that are driving the baseline results.

The first result that we find at table 3 is the difference between white and non-white migrants. National pride, the rule of law, and being a critical person are not relevant to the non-white migrants. So, these distances do not matter as push-pull factors at placing in a municipality. The second heterogeneity issue that we analyzed was the level of education: primary (until ten years of study) and high school (until 14 years of study). Within our database, we do not identify graduated migrants. Both migrants do no account for national pride, life satisfaction, the rule of law and, being a critical person.

The third result is about the age of migrants. We find that the younger migrants care about life satisfaction and national pride with more emphasis. We define as older migrants who have more than 40 years old because, at literature, more younger, more probably to migrate. Taking this into account, we identified that they have more care about authoritarianism, corruption, the rule of law, and being a critical person. We could say that these concerns are more aligned to the former people that, in some manner, do not concern so much about the job market but

to the political aspects. And we could suspect that these migrants still have memory abut the dictatorial period that occurred in Brazil during the recent past.

The fourth result that we find at table 3 is the difference between male and female migrants. Life satisfaction and national pride are more relevant to female migrants since the magnitude of the variable is more significant when compared to the male migrants. The opposite occurs with the rule of law and being a critical person. The fifth result is about the kind of job that the migrant has: self-employed and the employed. We identified that the only similarities between them are the perception of community trust and authoritarianism. While autonomous care about national pride and being a critical person, the employed concern about life satisfaction and corruption. Considering, in this turn, who works more than 40 hours per week and who works less than 40 hours per week, we remark that they have similar characteristics about perceptions on community trust, and being a critical person. The difference between them is prominent about national pride, life satisfaction, authoritarianism, corruption, and the rule of law that is relevant for who work more than 40 hours per week only.

The only group that considered the trust at the trust in the evangelical church is the people between who has more than 40 years. And the only group that does not account for authoritarianism is those who have 16-40 years old. All of them consider community trust as an attraction factor to a municipality. The question to community trust is: "Speaking of the people here, would you say that the people in your community" are significant at all regressions. The national pride is a unique feature present at non-white, 16-40 years old, female, work more than 40 hours per week, and is self-employed. There is a group that does not tolerate corruption: 16-40 years old, work more than 40 hours per week, and is self-employed.

Table 1: Baseline PPML Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	dependent variable: migration flux					
time to travel	-0.41***	-0.38***	-0.44***	-0.42***	-0.40***	-0.42***
	[0.08]	[0.08]	[0.08]	[0.08]	[0.08]	[0.07]
destiny GDP	0.91***	0.81***	0.84***	0.86***	0.95***	0.71***
	[0.18]	[0.16]	[0.20]	[0.17]	[0.18]	[0.19]
origin GDP	0.57***	0.49***	0.48***	0.48***	0.62***	0.35*
	[0.18]	[0.16]	[0.18]	[0.18]	[0.18]	[0.19]
origin population	0.34***	0.35***	0.36***	0.35***	0.35***	0.38***
	[0.07]	[0.06]	[0.06]	[0.07]	[0.07]	[0.07]
destiny population	0.35***	0.36***	0.37***	0.34***	0.36***	0.38***
	[0.06]	[0.06]	[0.07]	[0.06]	[0.07]	[0.07]
origin unemployment	0.17	-0.07	0.19	0.17	0.17	-0.10
	[0.22]	[0.25]	[0.20]	[0.22]	[0.22]	[0.22]
destiny unemployment	0.49**	0.29	0.51**	0.45**	0.51**	0.25
	[0.21]	[0.24]	[0.21]	[0.20]	[0.21]	[0.24]
authoritarianism			-0.11**			-0.08**
			[0.04]			[0.04]
corruption			0.04			0.03
			[0.03]			[0.03]
policy orientation			-0.01			-0.05
			[0.03]			[0.05]
rule of law			-0.01			-0.00
			[0.04]			[0.05]
national pride		-0.02				0.02
		[0.03]				[0.03]
life satisfaction		-0.21***				-0.20***
		[0.04]				[0.03]
community trust		-0.02				-0.00
		[0.02]				[0.02]
trust in evangelical trust				-0.06*		-0.03
				[0.04]		[0.03]
religious diversity				-0.01		-0.01**
				[0.00]		[0.00]
disciplined person					-0.01	0.04***
					[0.03]	[0.01]
critical person					0.08*	0.06
					[0.05]	[0.05]
Observations	450	450	450	450	450	450
Pseudo-R2	0.56	0.61	0.62	0.58	0.57	0.67
LL	-68020.30	-62381.88	-62485.17	-67072.13	-67469.99	-57049.33
AIC	136056.6	124785.8	124994.3	134164.3	134960	114136.7

Notes: The table Robust standard errors in brackets and the variables time to travel, density population, GDP, and unemployment rate are in logarithm. The dependent variable is the migration flux. Cultural, institutional, religious, and personal traits variables are measured in distance terms as specified by the Euclidean equation. In all equations, standard deviations are robust to heteroskedastic by the white method. We add at the first column the cultural variables; then, we add the institutional one, then religion variables, and finally, the personal one. As cultural variables: community trust, national pride and life satisfaction, as institutional: authoritarianism, corruption, policy orientation and rule of law, as religious: trust in the evangelical church and religious diversity, and as personal one: disciplined and critical person.

* indicates $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: Fixed Effects PPML regressions

	(1)	(2)	(3)	(4)	(5)
	dependent variable: migration flux				
time to travel	-0.97***	-0.95***	-0.99***	-0.97***	-0.94***
	[0.06]	[0.06]	[0.06]	[0.06]	[0.06]
authoritarianism		-0.11**			-0.09**
		[0.05]			[0.04]
corruption		-0.06*			-0.06**
		[0.03]			[0.03]
policy orientation		-0.02			-0.00
		[0.05]			[0.05]
rule of law		-0.04*			-0.05*
		[0.03]			[0.03]
community trust	0.09***				0.09***
	[0.02]				[0.02]
national pride	-0.04				-0.05*
	[0.03]				[0.03]
life satisfaction	-0.05				-0.06*
	[0.04]				[0.03]
religious diversity			-0.02**		-0.01
			[0.01]		[0.01]
trust in evangelical trust			0.03		0.04
			[0.03]		[0.03]
critical person				0.08	0.09*
				[0.05]	[0.05]
disciplined person				-0.02	0.02
				[0.03]	[0.03]
Fixed Effects (fe)					
Origin/Destiny	✓	✓	✓	✓	✓
Observations	450	450	450	450	450
Wald stat	454.69	351.52	286.09	303.70	461.71
Pseudo-R2	0.89	0.89	0.88	0.89	0.90
LL	-16096.19	-16203.06	-16633.28	-16771.67	-15150.44
AIC	32202.39	32418.12	33274.57	33551.34	30326.89

Notes: The table Robust standard errors in brackets and the variables time to travel, density population, unemployment rate, and GDP are in logarithm. The dependent variable is the migration flux. Cultural, institutional, religious, and personal variables are measured in distance terms as specified by Euclidean terms. In all equations, standard deviations are robust to heteroskedastic by the white method. We add at the first column the cultural variables; then, we add the institutional one, then the religion one, and finally the personal distance variables. As cultural variables, we have community trust, national pride, and life satisfaction, as institutional: authoritarianism, corruption, policy orientation, and the rule of law, as religious one: trust in the evangelical church and religious diversity, and as personal traits: disciplined and critical person. All regressions have fixed effects on home and host municipalities.

* indicates $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Heterogeneities fixed effects PPML regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
dep.var.:	core model	white	non-white	high school	prim.school	age:16-40	age: more 40	male	female	40hrs	40 hrs+	self-employed	employed
time to travel	-0.94***	-0.91***	-0.95***	-0.93***	-0.89***	-0.94***	-0.96***	-0.94***	-0.95***	-0.82***	-0.96***	-0.90***	-0.95***
	[0.06]	[0.06]	[0.07]	[0.07]	[0.07]	[0.06]	[0.07]	[0.06]	[0.07]	[0.07]	[0.06]	[0.07]	[0.07]
community trust	0.09***	0.10***	0.07**	0.08***	0.11***	0.09***	0.08***	0.09***	0.09***	0.10***	0.09***	0.09***	0.09***
	[0.02]	[0.02]	[0.03]	[0.03]	[0.03]	[0.02]	[0.02]	[0.03]	[0.02]	[0.04]	[0.02]	[0.03]	[0.02]
national pride	-0.05*	-0.04	-0.07*	-0.05	-0.05	-0.07**	-0.02	-0.05	-0.07**	-0.03	-0.06*	-0.09**	-0.04
	[0.03]	[0.03]	[0.04]	[0.04]	[0.04]	[0.03]	[0.04]	[0.03]	[0.03]	[0.05]	[0.03]	[0.04]	[0.03]
life satisfaction	-0.06*	-0.07*	-0.05	-0.06	-0.05	-0.08**	-0.01	-0.06	-0.07*	-0.03	-0.06*	0.03	-0.08**
	[0.03]	[0.04]	[0.05]	[0.04]	[0.05]	[0.03]	[0.04]	[0.04]	[0.04]	[0.06]	[0.03]	[0.06]	[0.03]
authoritarianism	-0.09**	-0.07*	-0.15***	-0.11**	-0.14***	-0.06	-0.17***	-0.10**	-0.08*	-0.04	-0.10**	-0.16***	-0.07*
	[0.04]	[0.04]	[0.05]	[0.06]	[0.05]	[0.04]	[0.04]	[0.04]	[0.05]	[0.06]	[0.04]	[0.05]	[0.04]
corruption	-0.06**	-0.06**	-0.06**	-0.05*	-0.08***	-0.05	-0.09***	-0.06**	-0.06*	-0.02	-0.07***	-0.03	-0.07**
	[0.03]	[0.03]	[0.03]	[0.03]	[0.02]	[0.03]	[0.03]	[0.03]	[0.03]	[0.05]	[0.03]	[0.04]	[0.03]
policy orientation	-0.00	-0.02	0.02	0.00	-0.01	-0.00	0.00	0.00	-0.01	0.03	-0.01	0.06	-0.03
	[0.05]	[0.04]	[0.05]	[0.05]	[0.05]	[0.05]	[0.05]	[0.05]	[0.05]	[0.06]	[0.04]	[0.05]	[0.05]
role of law	-0.05**	-0.05**	-0.05	-0.05	-0.04	-0.04	-0.07**	-0.07***	-0.01	-0.06	-0.05*	-0.04	-0.05**
	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]	[0.04]	[0.03]	[0.03]	[0.03]
trust in evangelical trust	0.04	0.01	0.07	0.02	0.04	0.02	0.07*	0.04	0.04	0.04	0.04	0.03	0.04
	[0.03]	[0.03]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.03]	[0.04]	[0.04]
religious diversity	-0.01	-0.01	0.00	-0.00	-0.01	-0.01	-0.01	-0.01	-0.01	0.02	-0.01	-0.00	-0.01
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
disciplined person	0.02	0.05	-0.01	-0.00	-0.01	0.01	0.06	0.03	-0.01	0.00	0.02	0.03	0.02
	[0.03]	[0.03]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.03]	[0.04]	[0.05]	[0.03]	[0.04]	[0.04]
critical person	0.10*	0.11*	0.08	0.07	0.09	0.07	0.14***	0.09*	0.09	0.13*	0.09*	0.17***	0.06
	[0.05]	[0.06]	[0.06]	[0.06]	[0.06]	[0.06]	[0.05]	[0.05]	[0.07]	[0.07]	[0.05]	[0.05]	[0.06]
Observations	447	443	447	445	447	447	439	445	443	424	447	420	447
fixed effects													
Orig./dest.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wald stat	460.01	378.75	380.16	352.29	286.55	420.41	394.54	447.39	340.44	228.13	466.66	396.48	397.78
Pseudo-R2	0.89	0.89	0.84	0.83	0.81	0.87	0.87	0.88	0.86	0.79	0.89	0.82	0.89
LL	-15081.56	-9364.94	-10068.54	-8678.88	-10028.07	-12612.23	-5613.79	-11545.83	-7404.56	-5250.20	-12931.81	-5663.26	-12750.86
AIC	30189.12	18755.9	20163.1	17383.76	20082.15	25250.46	11253.58	23117.67	14835.13	10526.42	25889.63	11352.53	25527.73

Notes: The table Robust standard errors in brackets and the variables time to travel, density population, GDP, and unemployment rate are in logarithm. The dependent variable is the migration flux. And all the data are from the 2010 year. In all equations, standard deviations are robust to heteroskedastic by the white method. We have as cultural variables: community trust, national pride and life satisfaction, as institutional: authoritarianism, corruption, policy orientation, and rule of law, as religious: trust in the evangelical church trust and religious diversity, ans as personal traits: disciplined and critical person.

* indicates $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5 Conclusion

The present paper provides evidence that a migrant prefers the destination with a smaller distance compared to his perceptions about authoritarianism, corruption, life satisfaction, community trust, and the rule of law. Regarding personal traits, we find that the variable "being a critical person" increases the cultural distance from the migration destinations. For this variable, differently from the others, the higher the distance, the higher the migration flux.

In this sense, Molloy *et al.* (2011) advocate that lower mobility could eventually raise aggregate well-being and economic output. That would be the case of a small municipality that is overburden by the sudden influx of migrants and would need to rewire its infrastructure to accommodate them. Recently we see this occurring at Altamira municipality in the North of the country because of the construction of the Belo Monte hydroelectric plant. Suddenly the population at that place grew a lot.

The incorporation of cultural distances adds value to a model that already considers the role of population density, GDP, and unemployment rate, providing more robust evidence on the determinants of inter-municipality migration in 2010. Then we could perceive that geographic proximity does not necessarily mean cultural neighborhood. The effect of the variables included in the gravitational model - with the novelty of the PPML regression accounting for the fixed effects - were capable of capturing the impact of local attractiveness related to cultural distances with the more recent state-of-art methodology. We also identified some characteristics that are relevant to explain the migrant profile: our finding stress relevant characteristics of the "cultural" migrant. For example, the group that does not tolerate corruption: 16-40 years old, self-employed, and working more than 40 hours per week.

In general, we contribute with the literature when we state that in studied Brazilian cities, we find that migrants go to municipalities with similarities from the origin city. Alesina *et al.* (1999), among others, point out that the public policies are more efficient with more homogeneous localities, and we could confirm this result in our study because migrants choose to live similar municipalities at the cultural point of view. From a policy perspective, we stress a positive externality of social interaction by migration, i.e., a reciprocal benefit of people's movement by renewing the local social tissue as remark Akerlof (1997).

Public policies may deter migration by excluding policies favorable to locals. However, it is noteworthy that the free movement of people yields a more efficient allocation of human resources, thereby reducing the national unemployment rate aside from increasing life satisfaction. Brazilian Constitution, in Article 5, sets forth the equality principle: people from different places have the same rights. However, we know that attitudes and social norms favor locals in detriment to a migrant. We suggest, therefore, that the public administration and the private sector, at a cultural level, strike a balance between preserving local principles but equally fostering national values - which are more neutral and hence less restrictive on migrants. Future research may support to unravel other economic, sociological, and psychological issues by using LAPOP data. In this scenario, our findings have vital implications for the developing debate about culture, institutions, and religion on internal migration. Furthermore, it could be interesting to study

this kind of movement over time to explore the evolution path for cultural development, for example, with another type of data. Also, it is possible to examine the influence of immigration on the internal migration in Brazilian cities.

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A Appendix – additional tables

Table A.1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
migration flux	225.91	647.68	2.11	6589.73	450
destiny GDP	9.92	0.53	8.44	10.98	450
origin GDP	9.93	0.52	8.33	10.98	450
Google Maps distance in time	6.89	1.03	3.35	8.51	450
origin population	6.21	2.16	0.64	8.99	450
destiny population	5.84	2.1	1.89	8.96	450
origin unemployment	1.96	0.32	0.89	2.94	450
destiny unemployment	1.88	0.37	0.89	2.65	450
white migrants	131.71	405.26	0	4857.29	450
non-white migrants	94.2	282.04	0	4198.13	450
high school	80.3	222.01	0	2729.91	450
primary school	80.11	235.9	0	3363.66	450
16-40 years	159.05	444.05	0	4400.32	450
more than 40 years	59.91	192.67	0	2253.92	450
male migrant	149.45	436.73	0	4705.95	450
female migrant	76.46	215.38	0	2124.91	450
until 40 hrs	35.43	99	0	995.29	450
higher 40 hrs	190.47	552.69	0	5594.44	450
self-employed migrant	46.05	132.76	0	1530.47	450
employer migrant	170.41	490.97	0	5043.19	450
religious diversity distance	28.6	17.01	3.13	92.34	450
policy orientation distance	2.02	3.22	0	24.23	450
community trust distance	2.2	3.86	0	30.5	450
national pride distance	1.89	3.45	0	27.56	450
life satisfaction distance	1.77	2.52	0	14.19	450
authoritarianism distance	2.23	5.84	0	50.47	450
corruption distance	1.91	3.28	0	21.19	450
rule of law distance	2.19	3.06	0	20.82	450
disciplined person distance	2.14	5.28	0	58.12	450
critical person distance	1.76	2.68	0	20.93	450
trust in evangelical church distance	1.94	3.01	0	30.46	450
o.national pride	6.48	0.35	4.97	7	450
o.life satisfaction	1.54	0.18	1.17	2.05	450
o.community trust	2.2	0.26	1.53	2.88	450
o.authoritarianism	1.88	0.09	1.42	2	450
o.corruption	0.08	0.07	0	0.36	450
o.policy orientation	6.04	0.45	4.23	7	450
o.rule of law	4.19	0.6	2.59	5.79	450
o.disciplined person	5.60	0.48	2.57	6.60	450
o.critical person	3.46	0.41	2.04	4.45	450
o.trust in evangelical church	4.74	0.59	1.5	6.04	450
d.national pride	6.44	0.38	4.97	7	450
d.life satisfaction	1.56	0.19	1.17	2.05	450
d.community trust	2.18	0.24	1.4	2.88	450
d.authoritarianism	1.87	0.08	1.42	2	450
d.corruption	0.08	0.07	0	0.36	450
d.policy orientation	6.01	0.45	4.23	7	450
d.rule of law	4.23	0.58	2.59	5.79	450
d.disciplined person	5.58	0.46	2.57	6.60	450
d.critical person	3.52	0.46	1.8	4.45	450
d.trust in evangelical church	4.73	0.6	2.93	6.04	450

Table A.2: Data Description

Variable	Description	Source and Year
Migration flux	number of the flow of migrants	Brazilian Censo of 2010
destiny GDP	destiny current GDP per capita in logarithm	IBGE of 2010
origin GDP	origin's current GDP per capita in logarithm	IBGE of 2010
time to travel	bilateral Google Maps time in logarithm	Google Maps
origin population	density population of origin's municipality in logarithm	IBGE of 2010
destiny population	density population of destiny's municipality in logarithm	IBGE od 2010
origin unemployment	percentage of the population aged 16 and over, economically active, unemployed of origin's municipality	DATASUS of 2010
destiny unemployment	percentage of the population aged 16 and over, economically active, unemployed of destiny's municipality	DATASUS of 2010
community trust	Would you say that the people in your community are trustworthy ? (1) Very trustworthy (2) More or less trustworthy (3) Little reliable (4) Unreliable	LAPOP of 2010
national pride	How far have you been proud to be Brazilian? 1-7 higher, better.	LAPOP of 2010
life satisfaction	To what extent are you satisfied with your life? (1) Very satisfied (2) Unsatisfied (3) Little dissatisfied (4) Very dissatisfied	LAPOP of 2010
authoritarianism	Do you believe that when the country is facing difficulties is it justifiable that the president of the republic dissolves the Supreme Federal Court? (1) Yes, justified. (2) No, not justified	LAPOP of 2010
corruption	Do you think that, as things stand,	LAPOP of 2010
	sometimes it is justifiable to pay a bribe? (0) No; (1) Sim.	LAPOP of 2010
policy orientation	The Brazilian state must implement firm policies to reduce income inequality between rich and poor. How much do you agree or disagree with this sentence? 1-7 higher, better	LAPOP of 2010
rule of law	To what extent do you have confidence in the Federal Supreme Court? 1-7 higher, better	LAPOP of 2010
religious diversity	. What is your religion if you have?	LAPOP of 2010
	Catholic, Evangelical Protestant, Other non-Christian,	LAPOP of 2010
	None, Pentecostal Evangelical, Mormon or Church of Jesus Christ of Latter-day Saints, Traditional or Native Religions, Kardecist Spiritist, Jewish, Are you an atheist / Don't believe in God. Higher,better	
disciplined person	Dependable and disciplined person.	LAPOP of 2010
critical person	A critical and quarrelsome person.1-7 higher, better	LAPOP of 2010
trust in evangelical church	To what extent do you have confidence in the Evangelical Church? 1-7 higher, better	LAPOP of 2010

Table A.3: Pairwise correlation coefficients for the main variables

	(1)												
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
community trust[1]	1												
national pride[2]	0.0638	1											
life satisfaction[3]	0.0233	0.181	1										
authoritarianism [4]	0.228	0.136	0.195	1									
corruption [5]	-0.0756	-0.0699	-0.0630	-0.0546	1								
policy orientation [6]	0.0793	0.546	0.0913	0.288	-0.0964	1							
rule of law [7]	-0.0210	0.109	-0.0453	0.182	0.126	0.145	1						
trust in evangelical trust [8]	0.145	-0.0824	0.0327	0.124	-0.0229	0.00608	0.0767	1					
religious diversity [9]	-0.0272	0.0724	-0.109	-0.0620	0.0424	-0.00751	0.105	-0.0631	1				
disciplined person [10]	-0.0286	0.187	0.227	0.131	0.0527	0.129	0.109	0.0409	0.0878	1			
critical person [11]	-0.0281	0.219	-0.000481	-0.0491	0.00442	0.114	0.0760	0.0199	0.173	0.429	1		
migration flux [12]	-0.00650	-0.0716	-0.122	-0.0695	-0.0497	-0.0914	-0.0801	-0.0673	-0.100	-0.0350	-0.0944	1	
time to travel [13]	-0.123	-0.144	0.0842	-0.155	0.0514	-0.144	0.0138	-0.0256	-0.0258	0.0432	0.0781	-0.260	1

Table A.4: Expected Signs

Variable	**Expected Sign**
time to travel	-
origin population	+
destiny population	+
origin unemployment	+
destiny unemployment	-
origin GDP	-
destiny GDP	+
policy orientation distance	-
community trust distance	-
rule of law distance	-
disciplined person distance	-
critical person distance	-
national pride distance	-
life satisfaction	-
authoritarianism distance	-
corruption distance	-
trust in evangelical church distance	-
religious diversity distance	-
o.policy orientation	+
o.community trust	-
o.rule of law	-
o.disciplined person	-
o.critical person	-
o.national pride	-
o.life satisfaction	-
o.authoritarianism	+
o.corruption	+
o.trust in evangelical church	+
o.religious diversity	+
d.policy orientation	+
d.community trust	
d.rule of law	-
d.disciplined person	-
d.critical person	-
d.national pride	-
d.life satisfaction	-
d.authoritarianism	+
d.corruption	+
d.trust in evangelical church	+
d.religious diversity	+

Notes: As cultural variables: community trust, national pride, and life satisfaction, as institutional: authoritarianism, corruption, policy orientation, and the rule of law, as religious: trust in the evangelical church and religious diversity and personal: disciplined person and critical person. The expected signs of the core gravity model obey the literature of migration flux, as stated by (Silva and Tenreyro 2006, 2011). The other signs are expectations made by the authors once this work is the first in this field of research with Brazilian data.

Table A.5: List of the 50 municipalities included in this study

Aloandia	Goiania	Mogi das Cruzes	Sao Lourenco
Belem	Itagiba	Passos	Senador Guiomard
Belo Horizonte	Itaguaje	Possoes	Sao Jose dos Campos
Brasília	Itumbiara	Ponta Grossa	Sao Paulo
Blumenau	Itupeva	Porecatu	Timbauba
Branquinha	Jaboatao dos Guararapes	Porto Espiridiao	Uaua
Capela	Jaciara	Porto Velho	Vilhena
Coronel Ezequiel	Ji Parana	Pelotas	Vera Cruz
Cuiaba	Jijoca de Jericoacoara	Progresso	
Curitibanos	Juazeiro	Redencao	
Duque de Caxias	Jaragua do Sul	Rio Bonito	
Embu-Guacu	Minacu	Rio Branco	
Fortaleza	Mossoro	Rio de Janeiro	
Franca	Marilia	Sao Jose del Rei	

Table A.6: PPML Regressions - Origin and Destiny values

	(1)	(2)	(3)	(4)	(5)
	dependent variable: migration flux				
time to travel	-0.42***	-0.48***	-0.55***	-0.49***	-0.62***
	[0.09]	[0.09]	[0.08]	[0.09]	[0.08]
destiny GDP	0.95***	0.68***	0.71***	0.94***	0.63***
	[0.16]	[0.16]	[0.18]	[0.15]	[0.17]
origin GDP	0.59***	0.36*	0.34*	0.63***	0.26
	[0.16]	[0.19]	[0.19]	[0.16]	[0.22]
origin population	0.38***	0.32***	0.31***	0.35***	0.39***
	[0.08]	[0.06]	[0.07]	[0.06]	[0.07]
destiny population	0.39***	0.35***	0.31***	0.35***	0.38***
	[0.07]	[0.06]	[0.06]	[0.06]	[0.07]
origin unemployment	0.24	0.17	0.32	0.24	-0.26
	[0.23]	[0.23]	[0.26]	[0.23]	[0.40]
destiny unemployment	0.56**	0.37*	0.67***	0.40**	0.08
	[0.22]	[0.20]	[0.20]	[0.20]	[0.30]
o.authoritarianism		3.44***			4.69***
		[0.93]			[1.19]
o.corruption		3.20***			4.02***
		[1.12]			[1.55]
o.community trust	-0.37				-1.33***
	[0.33]				[0.44]
o.religion diversity			-2.38***		-2.05**
			[0.90]		[0.91]
d.authoritarianism		0.46			-0.26
		[0.96]			[1.11]
d.corruption		3.78***			5.19***
		[1.12]			[1.21]
d.community trust	-0.36				-0.35
	[0.37]				[0.51]
d.religion diversity			-2.00**		-2.31***
			[0.81]		[0.66]
Observations	450	450	450	450	450
Pseudo-R2	0.59	0.60	0.60	0.56	0.68
LL	-66409.17	-60312.25	-63748.44	-64857.77	-51214.98
AIC	132846.3	120656.5	127520.9	129739.5	102490

Notes: The table Robust standard errors in brackets and the variables time to travel, density population, GDP, and unemployment rate are in logarithm. The dependent variable is the migration flux. Cultural, institutional, religions and personal traits variables are measured in absolute values. In all equations, standard deviations are robust to heteroskedastic by the white method. We add at the first column the cultural variables; then, we add the institutional one, then the religion variables, and finally, the personal traits variables. As cultural variables, we have community trust, national pride, and life satisfaction, as institutional: authoritarianism, corruption, policy orientation, and the rule of law, as religious: trust in the evangelical church and religious diversity and as personal traits: disciplined and critical person. For simplicity of the table, we omit the results not significant of the following variables: life satisfaction, trust in the evangelical church, policy orientation, rule of law, national pride disciplined and critical person.
* indicates $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.