Gravity effects of Culture, Institutions and Religion in Brazil[*]

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Abstract

The present paper evaluates the dynamics of the influx of the mass internal migration at the Brazilian counties using a gravity model. This issue is growing the attention at the literature. This paper will conduct an empirical analysis of the role of cultural, institutional and religion distance in migration inflow of Brazilian population using traditional gravity models in international economics accounting for the omitted and endogeneity issues. Origin and destination cities are characterized by intrinsic differences in culture, institutions and religion. We confirm some expectations about the explanatory power of variables as individual trust, community trust, market orientation, proud being Brazilian, satisfaction with life, freedom politic, corruption, disciplinaded person, intention of migrate to another country, critical person and religious diversity for the movement of people in Brazilian counties. For this, we employ data of Censo 2010 considering that the original place is the born place of the individuals.

Keywords: internal migration, cultural distance, gravity model, institutions, religious diversity
JEL Classification: L26, C26, D22, O31

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1 Introduction

Human mobility can be hugely effective in raising a person income, health and education prospects. And there are some concerns about this elements in the migration literature. But its value depends of others elements. In this paper we will investigate the cultural, institutional and religion factors that could influence the decision to witch city the people will chose migrate in Brazil. Another point is the fact that be able to migrate is a key element of human freedom (Klugman 2009). But, in Brazilian case, we have another concern about this question. We get more internal than international migrants. So, in this sense, this paper highlights some considerations at the county level, regarding the cultural, institutional and religion aspects in the Brazilian internal migration.

So we intend observe the effects of internal migration flows in Brazilian economy. Some articles clearer this relation (Da Mata *et al.* 2007; de Lima *et al.* 2019). While considering traditional elements, for example, age, wage, scholarship, population and GDP are crucial to explain these movements, the are also important differences in using cultural, institutional and religion aspects. Traditional components could be driven by these gaps and their interaction.

We consider the parameters of the gravity model and then we measure in distance terms. And this mean to consider besides the number of migrants, the log of GDP per capita, the density population and the rate of unemployment of the origin and destination county, the cultural, institutional and religion distance components.

Our model we formulate based on the assumption that population mobility is determined by push and pull factors. This study will explore how the voluntary flow of migrants behaves with mainly the the time, the population of the municipality and GDP, showing the weight of cultural, institutional and religion distances exposing the explanatory power of the migratory movement in the people flow of the city between host and origin counties.

In view of this, we have two questions: i) what intrinsic migrants characteristics contribute to the internal migration effects using data from the migrant's city of origin and controlling for monetary and non-monetary costs. In addition, we have a second question: ii) there are a cultural, institutional and religion component in the internal migratory movement in Brazil? This question is related to the first one because, for example, cultural component in a society is a non-pecuniary cost and generally not considered in this analysis.

There are several studies analyzing the relationship between the international migration and the cultural, institutional and religion factors among the countries such as (Collier and Hoeffler 2018; Collier *et al.* 2014; Falck *et al.* 2018). Some studies analyze this relationship with the focus in internal migration such as Molloy *et al.* (2011) but not considering political freedom and culture. Countries like India, China and USA are concerned about this movement of their population. The voluntary process of migration is also a field of study very explored by the Brazilian literature. We explore the connection with distance variables and some economic variables that are linked with the gravity model like GDP per capita, population density and unemployment rate with others characteristics such as individual trust, community trust, market orientation, proud being Brazilian, satisfaction with life, freedom politic, corruption, disciplined

person, intention of migrate to another country, critical person and religious diversity. Beyond of this, our study will focuses in the internal migration in Brazil and in the effects of cultural, institutional and religion components. Therefore it is far from clear what happens to the cities where people are moving into, especially when we consider that not every one would be affected the same way. We believe that places with some similarities will provide an pleasant environment to be introduced in the new city. Another effect is the diaspora. Collier and Hoeffler (2018) point that the movement is oriented by people that went before. This way diminish the investment costs of migration since is supported from prior migrants. Our study expands this field of research by looking at the intra-national economic interaction the role of culture has, to our knowledge, not been addressed for Brazil.

In this article, we use the Latin American Public Opinion Project (LAPOP) survey beyond the Brazilian Census at 2010 year. Others variables we will chose in the survey of IBGE, Anuario Estatistico do Brasil. Thus we will chose the variables about birth plate at Brazilian Census at year 2010. And integrate this database to cultural, institutional and religious variables at the 2010 year from LAPOP database. Then we will analyze the push and pull factors of internal migration with the background of the gravitational model applying for this a Poisson Pseudo Maximum Likelihood with Fixed Effects (PPMLFE).

With this model, we will integrate the gravitational model with cultural, institutional and religious distances and these effects in the movements of the people in the Brazilian territory. At the moment, in this field of literature, the act of not considering the cultural, institutional and religion distances are accounting for omitting variables that otherwise bias the coefficient of migration flux.

We expect to find the importance of the cultural, institutional and religion components matters in choosing witch city to migrate in Brazil. And we could say that agglomerations are better in this contexts due to some reasons. First, the migrant tend to choose cities with more opportunities and second movers tend to go to places chosen to another migrant before. So we chose to contribute to this literature in this point. The cultural, institutional and religion aspects are an important power factor that an individual choice is faced. We consider the act of migrate as an investment on which the migrant gets a return after. Beyond this, we consider impediments to mobility, such as geographical distance, require increased investments. Cultural, institutional and religion components are consistent factors that facilitate or not the process of migration. There are similarities that attract people to the process of migration and could generate the diaspora effect like explained by Collier and Hoeffler (2018). Among others things, this study focus on the understanding how the host cultural identity and the cultural distance between the host and origin cities might help us understand this relationship.

The results are important to highlight how the Brazilian society has some liability to migrate to a certain city. We care with some confounding situations that we detail in the empirical analysis. The condition of a people that tend to migrate to a place that is similar to the origin place is a point of concern and we care about this with some strategies. Justo and Neto (2008) the profile of the brazilian migrant using census data 1980, 1991 and 2000 are younger and more educated people. They are usually male and come from a more precarious region. Sachsida *et al.* (2009)

confirms these observations by adding that age and educational level variables affect the decision to migrate. Further Golgher *et al.* (2005) include regional and individual aspects as facts that influence the decision to migrate. One of the stylized facts in the migration literature is positive selection. This is because there are unobserved characteristics of migrants. Chiswick (1999) argues that migrants are generally more aggressive, ambitious, enterprising and motivated. Our article aims to contribute to this analysis.

A large difference in cultures, institutions and religions could, therefore, potentially both impede migration and accelerate its increase. Thus, our article contributes to the migration literature in two ways. First, we improve on existing studies applying the latest methodology in gravity models with a new database (LAPOP) and second, we examine the impact of the cultural, institutional and religion distance between sending and receiving people in Brazilian counties.

Institutions are another important and extensively studied determinant of migration influx. In this aspect,our paper adds to the growing literature on the connections between culture and institutions, see Alesina and Giuliano (2015) for a review.

The organization of this paper is as follows. In the second section, we review the literature on the subject and expose how our approach and its results complement previous findings. The third section explains our empirical strategy. The fourth section presents the data and some descriptive statistics. Section five contains the main results, further investigations on the transmission channel of culture and robustness checks. Section six concludes.

2   Empirical Strategy

First, we will show why existing gravity studies are unable to obtain estimates of the effects of county institutions, cultural traits and religious on internal migration flow. In this estimation, a core model based on the assumption that migration is determined by push and pull factors is presented.

This gravity model of migration suggests that differences in unemployment rate and population density between host and origin counties in Brazil are important factors in the migration decision. While the collinearity issue that we describe at this stage is obvious, we present this trivial step as an opportunity to introduce the design of our analysis as well as some notation.

Finally, we show that it is not possible to identify separate effects of institutions, cultural traits and religion on the flow of migrants. So we calculate cultural, institutional and religious distances to proxy this variables in our model.

The equations are presented in a cross-section way, because we use the 2010 Brazilian Censo year. After this short discussion of the stock and flow data, we provide a more formal description of our model.

First, we have replaced the bilateral migrant costs variables T_{ij} at the log-linearized equation with a vector of migrant cost variables

$$GRAV_{ij}$$

, which we include determinants of bilateral migration influx that we consider that can influence this relation.

And for our purpose, we separate explicitly the three group of variables of interest that measure institutional, cultural and religious aspects of Brazil from both sides (IC_i) and (IC_j). Another concern is include the fixed effects of the counties. So, we regress the same above model with fixed effects to origin and host municipalities. At the literature the inclusion of the multilateral resistance term is an important issue. Normally MRT represent the barriers to migrate. Since we are considering the migration intra-municipality, we define that we do not have barriers to migrate at MRT terms. So we account for the costs, but not to the barriers. Baldwin *et al.* points that the the non-inclusion of the MTR term may bias the coefficients of the cost variables, especially those associated with border dummies. But we are accounting for internal issues.

So in order to isolate the effect of cultural, institutional and religion on the migrants influx, it is important to control for the potential confounding factors discussed in the previous section. For this reason, we use the variables from LAPOP database and calculate the distances at the same way Kogut and Singh (1988). Silva and Tenreyro (2006) demonstrate the presence of these three factors in an exponential multiplicative model that makes it impossible to estimate the coefficients of the gravitational equation using ordinary least squares (OLS). The solution proposed by these authors is the adoption of the non-linear estimator called the Poisson pseudo-maximum likelihood. In addition the conditions of identification of the PPML are incompatible with the identification of the log-linear models.

After this, we need deal with the inconsistency in the presence of heteroscedasticity at this model form. So Silva and Tenreyro (2006) proposes a estimation model with Poisson Pseudo Maximum Likelihood (PPML). So we made additional regressions with the PPML model and then with fixed effects. In this case, we can estimate efficient parameters with characteristics asymptotically efficient. These problems arise in logarithmic transformation due to heteroscedasticity usually present in migrant data. And as pointed by Silva and Tenreyro (2006), this practice of log linearizing the gravity equation results in errors values depending on the covariates of the regression and hence resulting in inconsistent regression even then all observations of the dependent variables are strictly positive like in our case. We construct a database without zeros. 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 of the regressors but are rather heteroskedastic, leading to inconsistent estimates of the elasticity coefficients.

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 into biased and inefficient estimates. However, the PPML estimates the gravity equation in levels instead of taking its logarithms and this is said to avoid the problem posed by using OLS under logarithm transformation. According to them, this model is appropriate: first, the Poisson model takes account of observed heterogeneity. Second, the fixed effects PPML estimation technique gives a natural way to deal with zero valued trade flows because of its multiplicative form. Third, the method also avoids the under-prediction of large trade volumes and flows by generating

estimates of trade flows and not the log of the trade flows. In their 2006 influential paper, they find the PPML estimator, which need not be does not need to be log-linearized, to be the best performing estimator that naturally deal with zero trade flows, consistent and gives the lowest bias among the other estimators.

They therefore suggest it as the new workhorse for the estimation of the typical constant elasticity models, such as the 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 and that the predominance of large proportion of zeros does not affect its performance.

(Baghdadi *et al.* 2013; Head and Mayer 2014) find that the choice of the best estimator is dependent on the specific dataset, and there is no generally best estimator for these three datasets; thus the appropriate estimator for any application is data specific which could be determined using a number of model selection tests. Our dataset, for construction, does not have zero migration flow. We select only the cities with individuals with former movement based on the born place.

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 a fixed-effects PPML approach with these concerns. There are, however, some drawbacks in the fixed effect model in the sense that all time invariant explanatory variables like the perfectly collinearity with the fixed effects would be dropped from the model. Consequently, fixed effect model eliminates some important theoretically relevant variables from the gravity equation which are distance, common language, common borders and the effects of these variables cannot be established. The considerations made above suggest that we need to include in our empirical analysis the PPML model. So, in this paper, following these latest considerations, we estimate the fixed-effects models and include the PPML and report White heteroscedasticity-consistent standard errors as our basic principle for estimating the gravity model of migration influx.

3 Data

The dataset we assemble for the present study is composed of several sources. In this section, we will present our data and our strategy to identify the impact of county cultural, institutional and religion factors on the flow of internal migration in Brazil.

We develop and present our identification strategy in three steps based in the work of Falck *et al.* (2018).

So one of the empirical question of this study is whether internal migrants with certain political and cultural or even religion aspects tend to move to locals with more opportunities proxied by density population of the county of attraction.

The gravity model can not detect that probably the migrants with closer characteristics are more prone to move to places with aspects of the origin destiny. This is an unobserved characteristic that we can not control directly. Then we include the dyadic variable unemployment rate that

can control for local amenities and disamenities for example. When someone chose the place to work, the cost of living in this place and the amenities are counted for the decision.

The dataset that we assemble for the present study is composed basically of four sources: Brazilian Censo, Brazilian Institute of Geography and Statistics (IBGE), Departamento de Informatica do Sistema Unico de Saude (DATASUS), Latin American Public Opinion (LAPOP) and google maps time of the pairs of the cities. The World Value Survey (WVS) could not used because the differences between inter-local and intralocal applications of the model cannot be handled with the available data due to the low number of the observations.

LAPOP use the approaches and innovative methods to carry out targeted national surveys. Brazilian Censo and others variables from IBGE and DATASUS are traditionally collected.

We use a full list of 50 counties in Brazil that are listed at table A.4. Migrants are defined as people living in one county at last ten years and having been born in another county. This is justified by the fact that a migrant normally make the decision of the place and the decision of time period in which must move between locations Molloy *et al.* (2011). And this mean 450 counties pairs randomly selected on a set of 50 counties. We chose the county as the geographic unit of measurement. This is one form in that the data are more available. At Brazilian studies, is more common state datasets. But both suffer the problem of misclassification as pointed by Molloy *et al.* (2011). This could occur because that some between-county movers remain within the same local labor market.

The UN Report 2013 points that migrant is the person who stay abroad for more than one year, so our understanding are in line with the UN definition.

Thus, the concept of internal migration is based on where people are born. And, for construction, there are not counties with zero migrant flux. We also exclude from the dataset the counties with the outliers as one migrant.

All of this datasets are from 2010. Of course, the data limitations of a one-year time series cannot report for a temporal order of preferences, but it can offer a hint on the general tendency measured in absolute levels, which is then a matter of further exploitation. Individuals who have moved many times at this 2010 year will be indistinguishable from individuals who have only moved once. If the lifetime is bigger this situation is more common. This could affect the measurement of migrants because some movers will have returned to their birth county after spending some time elsewhere Molloy *et al.* (2011). One of the consequences of that is the fact of the data do not reflect recent migrant decision Molloy *et al.* (2011). About the variables to measure the migration effect, this subject deserves some considerations. Several studies have adopted different variables like birth place, last residence, reasons of migration and duration of residence at the village. About the variables of social distances, we follow Kogut and Singh (1988) and the hypothesize that the more culturally distant the origin county migration in Brazil, lower is the migrant influx to that city. The distance variables were calculated by the Euclidean distance between the origin and destiny.

$$D_{ij}$$

$$=$$

$$sum((I_{ci} - I_{cj})^2)/var$$

We also include the linear distance to offer another way to see the results.

$$D_{ij}$$

$$=$$

$$sum((Ici - Icj)$$

The list of variables chosen by the LAPOP questionnaire are at A.1.

We chose to use the time travel in place of distance in kilometers because we believe that the former incorporate more appropriately the effective distance and account for the infrastructure between the cities. To apply this variable we use the google maps to calculate the time travel as developed by Weber and Péclat (2017).

We work with the fact that individuals with specific characteristics acquired in their birthplaces are prone or not to migrate. Particularly, when dealing with people who have migrated from small towns to large urban agglomerations. And this confirms the effects of the dynamic advantages such as learning, sharing and matching that are associated to large agglomerations. There are some studies, particularly, Chetty and Hendren (2018a, b) that explains the effects of children living in places that could shape their earnings.

At the recent literature, we can observe by some empirical papers using the work force of migration from the labor market (Combes *et al.* 2010; Combes and Gobillon 2015; Glaeser and Mare 2001; Roca and Puga 2017). Thus, movements occurred prior to the period of entry into the labor market are not count as an intrinsic effect that could qualify this type of labor. Then we chose the birth place to better consider our concern about cultural, institutional and religion factors. In brief, this variable could represent the trade-off in income for distance Ritchey (1976). But this variable would misrepresent the psychic costs. In the literature, there are structural attributes and social-psychological attributes. In brief, people more extrovert, less agreeable, less conscientious, more open minded report more likely migration intentions. So, this factors reflect personal traits. About the general cultural aspects we use twelve variables. We use this approach because is notoriously difficult to measure and then we use these variables cited above to highlight the cultural, institutional and religion aspects.

Appendix table A.1 provides an overview of the descriptions and sources of the variables used in this study.

Table A.2 depicts the respective summary statistics like mean, standard deviation, minimum and maximum value of each variable. The table A.4 with complete data used in the present analysis.

4 Results

4.1 Baseline results

In this section, we provide some estimations on gravity models accounting for several issues like heterogeneity and fixed effects. We use the distance proxied by the time travel like introduced

by Weber and Péclat (2017) in this approach of gravity model. In this same context, we include origin and destination GDP, origin and destination population densities, origin and destination unemployment rate to account for the structural attributes used in this study. First, the baseline results are in line with the traditional gravity model because we can se the negative relation between the migration influx and the time between the cities. So we append others variables that are equally important to explain the influx of migrants between Brazilians counties.

The social-psychological attributes used in this study are individual trust, community trust, market orientation, proud being Brazilian, satisfaction with life, freedom politic, corruption, disciplined person, evangelic trust, intention of migrate to another country, critical person and religious diversity. It is important highlight that this factors could be divided in the personal and social. We consider both at our analysis. We include these variables because legal institutions has been shown to be related to cultural features Stulz and Williamson (2003) and we need to rule out this additional information to make sure that our cultural variables only capture the behavioral information of a county. As institutional distance variables we use market orientation, freedom politic, corruption and justice trust. We include the unemployment rate as an indicator of the better adjustment of the labor market. So, in this sense, the greater the unemployment rate is in some county, the greater will be the rate of out-migration and smaller will be the rate of migration flow into the county. It is interesting regard that the migration effect at the county could affect employment change because of the possibility of simultaneous equation bias.

The larger the distance measure, in our case the time travel, the greater the cultural, institutional and religion diversity distance between county i and county j. If the distance measure does not have significance, then we account that is not relevant to explain the people movement. Normally studies observe the trade-off in income for distance. But we work with another point of view. We see the trade-off as an attraction and repulsion system between the people and the time travel. Our results agrees with the arguments of gravity models, saying that large geographic, standing for higher transaction costs and unfamiliarity effects, may attenuate internal migration influx. In our case, we use the time travel to account for the geographic distance. Mobility usually is pro-cyclical, so the economic contraction would be expected to reduce movers intentions as cited by Molloy *et al.* (2011). Our empirical models have a good fitness to the data and explain a substantial proportion of variation in unconditional correlations. The adjusted R-square is relatively high across specifications, generally between 70 per cent. We considered more appropriated to the nature of our problem the PPML with fixed effects. We argue that the individual's culture identity is mainly tied to their religion, institutions and the set of cultural values and beliefs. In summary, we find evidence that the migration influx at 2010 is related to cultural, institutional, religious factors among others.

Ritchey (1976) explain that structural and social-psychological attributes contribute in conjunction to the migration flow. Social-psychological attributes are motives, aspirations, values, perceptions and modes of orientation among others. And structural attributes indicates the individual's status in society as lifecycle position. Ritchey (1976) points that few studies examine variables that could be used the community ties in the context of migration. At the international literature of migration, we can see some insights as (Alesina and Giuliano 2015; Collier *et al.* 2014). But at national level, specifically with Brazilian data, this is an issue unexplored yet.

Culture could be defined by the social norms and values, religion beliefs, family structures. This is a difficult field of definition. We select this variables based on this concept. And with this first result, we can note that trust, for example, is a manner to induce some movement of people. Our regression results indicate that migration flux is positively related with proud being Brazilian, satisfaction with life, freedom politic, disciplined person and negatively related to cultural aspects such as individual trust, community trust, justice trust, intention to migrate to another country, critical person, evangelic trust, market orientation and religious diversity at one per cent significance level. This suggests that the smaller the cultural distance between two counties, the higher the probability to a person migrate because of the attraction factor such as freedom politic. This means that the people movement is influenced by how the destiny place think about the dissolution of the Supreme Federal Court. The expected result of this question is negative because we presume that people are attracted to more democratic values at destiny places. But we found positive values to freedom justice indicating that occur the opposite of that. In reality, we have, at the destiny, people more prone to abdicate the justice to reach the economic results. It is relevant when we think about a country that faced a long dictatorial period with satisfactory economic outcome.

Consider two pairs of counties one has the largest cultural distance and the other has the smallest cultural distance - defined by KS measure; a disparity of 0.52 in correlation is observed between the two pairs in case of the freedom politic. The cultural effect is both statistically and economically significant.

Yap (1977) found that population density in the destination is positively correlated with interstate migration. And our results are in line with this results both in case of linear and Euclidean distance values of cultural, institutional and religion effects. While Yap (1977) found that long distances between new and old location reduce the chance for frequent visits back and consider this as a psychic costs. Table A.5 presents the OLS estimation results and we use only as extended model. Our baseline model in the basic specification in column (1), at table **??** the dependent variable is the log of the influx of migrants bet the pairs of cities in Brazil and the time to reach the destiny city is the only explanatory variable. According to the previous theoretical considerations, the coefficient of time is negative and significant, conforming our expectations about this relation.

We test whether twelve cultural, institutional and religious variables are helpful to influence the variations in the migrant flux in Brazilian cities. We believe these variables could affect people's behavior, attitudes and thoughts. It is useful to explain that we include this variables through the principal component analysis as explained at the Empirical Strategy section. Further, we consider that these different variables act in different ways and this might shape people's behavioral patterns within a country such as Brazil. We assume that the farther culturally the destination municipality from the city of origin in Brazil, the less chance of the migrant choosing this destination in contrast to another. Table 1 begins at column (1) with the specification as the basic gravity models with fixed effects. And then we add Euclidean distances to explain the contribution of cultural, institutional and religion at the decision in witch city the mover prefer to stay. Since we are using only migrants data, we are concerned about the choice of the people. More specifically, why city x and not city y. First we include the cultural distances,

then the institutional distances and, at last, the religion distances. About the importance of the variables included at the present model we can observe that the last model explains better with lower pseudo loglikehood statistic.

The distances significant were satisfaction with life, intention to migrate to another country, corruption, evangelic church trust and religion diversity. Our expected signs about the distances are all negative. But some distances variables could improve the attraction for one city instead another. At this point, we found that satisfaction with life and intention to migrate to another country are characteristics that obey the intuitive relation beyond the gravity model. Then the bigger the Euclidean satisfaction with life and intention to migrate to another country distance lower the migration influx to another city in relation to other.

And with religion Euclidean variables as evangelic church trust and religious diversity distances we found a negative relation. More intuitive one and in line with the international literature.

We consider the PPML results with fixed effects the more robust model. Silva and Tenreyro (2006) postulate that estimating gravity equations in their additive form by OLS leads to inconsistency in the presence of heteroskedastic and advice to estimate gravity models in their multiplicative form. So, in this sense, we use this model to provide a extended model at the Apendice section. For more details see in the A.5. As we could observe by the previous results, at this estimation there are a lot of heterogeneity in cultural values and beliefs between the home and host cities. So we believe that PPML results are the more reliable. There are unobserved effects that may affect the results presented in the previous regression tables. Then we inserted OLS regressions with fixed effects for the municipalities of origin and destination to mitigate this problem. At the literature, we also can see evidence in clarifying the fact that there exist endogenous locational choice to residents and local migrants. For example, Card *et al.* (2008) points that there are support to the preference of neighborhoods for race-based tipping. In the same line, Damm (2009) argues that the ability to classify enclaves by exploring a Danish policy of space dispersal under which refugees are placed at random. And the author finds empirical evidence that refugees with unobserved unfavorable characteristics self-select ethnic enclaves. More recently with the debate promoted by (Chetty and Hendren 2018a, b). In this case, we believe that this concerns deserve attention and we regress a model with fixed effects to afford this issues. We do this because we understand that the OLS estimates of migration influx are likely to be downward biased and inconsistent. Further analysis deserves the relation between the cities. So we include the fixed effects at origin and destination with the intention to separate the effects at the origin and destination levels.

Continuing our analysis and at the same sense of Collier and Hoeffler (2018), we could see the results with the view of the destination effects of the cultural, institutional and religion variables. This is interesting because with the Euclidean distance analysis we specify the influence of the origin or the destiny effects per si without the specification of the destiny place. It is the analysis of the effects at the influx of the people. We found relevance at the destiny city of almost all variables with exception of evangelic church trust and community trust. These variables play a role at the migration flow. With positive contribution we have some variables at this context as individual trust, proud of being Brazilian, satisfaction with life, intention to migrate to another

country, market orientation and corruption. To another side, we have negative effects to the disciplined person, critical person, freedom politic and justice trust variables. At this level of analysis, we can observe that characteristics as corruption distance are important to the destiny host city. With this variable, we can evaluate the propensity to tolerate the payment of bribes. So in this sense, the greater the value of this variable, the greater the flux of migrants to the destiny city. It is relevant to analyses because expose the level of tolerance to satisfaction with life, corruption, intention to migrate to another country, evangelic trust and religious diversity among others at the Brazilian society in this context of migration flux. So we can infer that this values are attraction elements to the movement of the people to determined level. These are intuitive situations to determine the push factors of the internal migration in Brazil. In the case of the satisfaction with life, because people can leave at your county at certain level because of the dissatisfaction. But not for always. The common sense can expect that people are prone to leave always when there are dissatisfaction, but the economic outcomes can make the people stay at your origin city. Opportunities can shape these movements. In line with this analysis, another variable at this model that deserves some consideration is the unemployment rate. We can see that is relevant to explain the migration flux at the origin and destiny. So we can infer that the decision to migrate is influenced by the economic opportunities at the origin and destiny place. The destiny GDP per capita and the population density are also relevant to explain the movement. It is salient to see the negative role of the destiny GDP per capita. We can see this feature as a consequence to the individual choice to migrate. So the individual tend to see the own opportunities and amenities at the destiny place. And this not means that the GDP per capita is better to all residents that already are at the job market. In conjunction with the satisfaction with life, we can see that people migrate because they can reach more satisfied life with own opportunities.

At the same sense of Schwartz (1973) without origin values since all are migrants and since we are considering only people who actually move, their only decision problem is the choice of a location among the alternative destinations. At the destiny, we found that people are attracted by some characteristics of the destiny people. We detected that at the destiny the people trust more, are more proud to be Brazilian, have more satisfaction with the life, they do not agree with dictatorial regime, believe that is justified, under specific circumstances, to pay bribes, do not trust the Federal Supreme Court, the people are not disciplined, they intend to go abroad, they are friendly, they agree with the implementation of policies to reduce inequality.

5 Conclusion

The present paper provides robust evidence that people chose between the options a city that is in cultural, institutional and religion terms more people satisfied with life, have intention to migrate to another country, tolerate the corruption, have trust at evangelical church and with more religious diversity. accounting for movements that occurred since the born place period. At this process of migration, we have two situations. First that the labor market has lower frictions. Second that high levels of migration may reduce situations in that the provision of local public goods could be affected negatively or that could corrode social ties in other ways. Molloy *et al.*

(2011) cite that lower mobility could raise aggregate well-being and possibly economic output. And we can show at some level this result at brazilian cities. Through the incorporation of variables of culture, institutions and religion that naturally affect the well-being of people in a model that considers the role of population density among other factors, this work sought to provide evidence on the determinants of inter-county migration in Brazil at year 2010. The effect of the variables included in the gravitational model with the novel of the PPML regression accounting for the fixed effects were capable to capture the effect of local attractiveness, be it cultural, institutional or religious, had the expected effects, especially for satisfaction with life, intention of migrate to another country, corruption, evangelic trust and religious diversity. We believe that our findings have important implications for the incipient debate about internal migration in Brazil.

References

ALESINA, A. and GIULIANO, P. (2015). Culture and institutions. *Journal of Economic Literature*, **53** (4), 898–944.

ANDERSON, J. E. and VAN WINCOOP, E. (2003). Gravity with gravitas: a solution to the border puzzle. *American economic review*, **93** (1), 170–192.

BAGHDADI, L., MARTINEZ-ZARZOSO, I. and ZITOUNA, H. (2013). Are rta agreements with environmental provisions reducing emissions? *Journal of International Economics*, **90** (2), 378–390.

BALDWIN, R., TAGLIONI, D. *et al.* (). *Gravity chains: Estimating bilateral trade flows when parts and components trade is important.* w16672.

CARD, D., MAS, A. and ROTHSTEIN, J. (2008). Tipping and the dynamics of segregation. *The Quarterly Journal of Economics*, **123** (1), 177–218.

CHETTY, R. and HENDREN, N. (2018a). The impacts of neighborhoods on intergenerational mobility i: Childhood exposure effects. *The Quarterly Journal of Economics*, **133** (3), 1107–1162.

— and — (2018b). The impacts of neighborhoods on intergenerational mobility ii: County-level estimates. *The Quarterly Journal of Economics*, **133** (3), 1163–1228.

CHISWICK, B. (1999). Are immigrants favorably self-selected? *American Economic Review*, **89** (2), 181–185.

COLLIER, P. and HOEFFLER, A. (2018). Migration, diasporas and culture: An empirical investigation. *Kyklos*, **71** (1), 86–109.

—, — *et al.* (2014). *Migration, Diasporas and Culture: An Empirical Investigation.* Tech. rep.

COMBES, P.-P., DURANTON, G. and GOBILLON, L. (2010). The identification of agglomeration economies. *Journal of economic geography*, **11** (2), 253–266.

— and GOBILLON, L. (2015). The empirics of agglomeration economies. In *Handbook of regional and urban economics*, vol. 5, Elsevier, pp. 247–348.

DA MATA, D., DE ALBUQUERQUE OLIVEIRA, C. W., PIN, C. and RESENDE, G. (2007). Migração, qualificação e desempenho das cidades brasileiras. *Dinâmica dos Municípios. CARVALHO AXY etal. org. Brasília: IPEA*.

DAMM, A. P. (2009). Ethnic enclaves and immigrant labor market outcomes: Quasi-experimental evidence. *Journal of Labor Economics*, **27** (2), 281–314.

DE LIMA, Y. C., DA SILVA FILHO, L. A., CAVALCANTI, D. M. *et al.* (2019). Migração, seleção e diferenciais de renda na região norte do brasil em 2010. *Revista Brasileira de Estudos Regionais e Urbanos*, **13** (1), 141–160.

FALCK, O., LAMELI, A. and RUHOSE, J. (2018). Cultural biases in migration: Estimating non-monetary migration costs. *Papers in Regional Science*, **97** (2), 411–438.

GLAESER, E. L. and MARE, D. C. (2001). Cities and skills. *Journal of labor economics*, **19** (2), 316–342.

GOLGHER, A. B., ROSA, C. H. and ARAÚJO JÚNIOR, A. (2005). The determinants of migration in brazil. In *Proceedings of the 33th Brazilian Economics Meeting. Niterói: Associação Nacional dos Centros de Pós-graduação em Economia*, Citeseer, pp. 1–20.

HEAD, K. and MAYER, T. (2014). Gravity equations: Workhorse, toolkit, and cookbook. In *Handbook of international economics*, vol. 4, Elsevier, pp. 131–195.

JUSTO, W. R. and NETO, R. D. M. S. (2008). O que determina a migração interestadual no brasil?: um modelo espacial para o período 1980-2000. *Revista Econômica do Nordeste*, **39** (4), 428–447.

KLUGMAN, J. (2009). Human development report 2009. overcoming barriers: Human mobility and development. *Overcoming Barriers: Human Mobility and Development (October 5, 2009). UNDP-HDRO Human Development Reports*.

KOGUT, B. and SINGH, H. (1988). The effect of national culture on the choice of entry mode. *Journal of international business studies*, **19** (3), 411–432.

MOLLOY, R., SMITH, C. L. and WOZNIAK, A. (2011). Internal migration in the united states. *Journal of Economic perspectives*, **25** (3), 173–96.

RITCHEY, P. N. (1976). Explanations of migration. *Annual review of sociology*, **2** (1), 363–404.

ROCA, J. D. L. and PUGA, D. (2017). Learning by working in big cities. *The Review of Economic Studies*, **84** (1), 106–142.

SACHSIDA, A., DE CASTRO, P. F., DE MENDONÇA, M. J. C. and ALBUQUERQUE, P. H. (2009). *Perfil do migrante brasileiro*. Tech. rep., Texto para Discussão, Instituto de Pesquisa Econômica Aplicada (IPEA).

SCHWARTZ, A. (1973). Interpreting the effect of distance on migration. *Journal of political economy*, **81** (5), 1153–1169.

SILVA, J. S. and TENREYRO, S. (2006). The log of gravity. *The Review of Economics and statistics*, **88** (4), 641–658.

— and — (2011). Further simulation evidence on the performance of the poisson pseudo-maximum likelihood estimator. *Economics Letters*, **112** (2), 220–222.

STULZ, R. M. and WILLIAMSON, R. (2003). Culture, openness, and finance. *Journal of financial Economics*, **70** (3), 313–349.

WEBER, S. and PÉCLAT, M. (2017). A simple command to calculate travel distance and travel time. *The Stata Journal*, **17** (4), 962–971.

YAP, L. Y. (1977). The attraction of cities: a review of the migration literature. *Journal of Development Economics*, **4** (3), 239–264.

Table 1: Fixed Effects PPML Regressions with cultural, institutional and religion Euclidean distances

	(1) original	(2) cultural	(3) cultural, institutional	(4) cultural institutional religion
time travel	-0.20***	-0.20***	-0.20***	-0.19***
	[0.01]	[0.01]	[0.01]	[0.01]
destiny GDP	-0.97***	-0.73***	-0.65**	-0.73**
	[0.18]	[0.28]	[0.30]	[0.31]
origin GDP	-0.70**	-0.41	-0.36	-0.46
	[0.32]	[0.39]	[0.38]	[0.37]
destiny population	0.43***	0.38***	0.34***	0.36***
	[0.07]	[0.09]	[0.10]	[0.10]
origin population	0.26***	0.19*	0.17	0.19*
	[0.09]	[0.11]	[0.11]	[0.10]
origin unemployment	0.90***	0.70**	0.79***	0.85***
	[0.29]	[0.30]	[0.31]	[0.29]
destiny unemployment	0.77***	0.61***	0.71***	0.72***
	[0.15]	[0.18]	[0.20]	[0.21]
individual trust		0.01	0.01	0.00
		[0.01]	[0.01]	[0.01]
community trust		0.00	0.00	0.00
		[0.00]	[0.00]	[0.00]
being brazilian proud		0.00	0.00	0.00
		[0.01]	[0.01]	[0.01]
satisfaction with life		-0.01**	-0.01**	-0.01**
		[0.01]	[0.01]	[0.00]
disciplined person		0.01	0.01	0.01
		[0.01]	[0.01]	[0.01]
intention to migrate to another country		-0.00	-0.00	-0.01*
		[0.00]	[0.00]	[0.00]
critical person		0.01	0.01*	0.01
		[0.01]	[0.01]	[0.01]
market orientation			-0.00	-0.01
			[0.01]	[0.01]
freedom politic			-0.01	-0.01
			[0.01]	[0.01]
justice trust			-0.01*	-0.01
			[0.01]	[0.01]
corruption			-0.02***	-0.02***
			[0.01]	[0.01]
evangelic church trust				-0.01*
				[0.01]
religious diversity				-0.45**
				[0.18]
Constant	13.84***	9.49**	8.07*	9.74**
	[2.90]	[4.69]	[4.77]	[4.86]
Obs	450	450	450	450
pseudo R2	0.1168	0.1177	0.1188	0.1196
wald chi2	2833.87	10571.18	8395.10	3537.18
log pseudolik	-750.49	-749.71	-748.77	-748.11

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Notes: The table Robust standard errors in brackets and the variables migration flux, travel time, GDP per capita, density population and unemployment rate are in logarithm. In all equations standard deviations are robust to heteroskedastic by the white method.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: PPML Fixed Effects Regressions with destiny cultural, institutional and religion values

dep. var.	(1) lnM
time travel	-0.20***
	[0.01]
destiny GDP	0.93***
	[0.12]
origin GDP	-0.70**
	[0.32]
origin population	0.26***
	[0.09]
destiny population	-0.40***
	[0.10]
origin unemployment	0.90***
	[0.29]
destiny unemployment	0.07
	[0.11]
d.individual trust	0.72***
	[0.20]
d.community trust	0.15
	[0.47]
d.proud being Brazilian	0.28*
	[0.16]
d.satisfaction with life	2.17***
	[0.43]
d.disciplined person	-0.87***
	[0.24]
d.intention to migrate to another country	4.85***
	[1.63]
d.critical person	-0.87***
	[0.19]
d.market orientation	0.65***
	[0.13]
d.freedom politic	-1.56*
	[0.83]
d.corruption	11.71***
	[1.81]
d.justice trust	-0.70***
	[0.18]
d.evangelic church trust	0.06
	[0.07]
Constant	-7.70*
	[4.18]
Observations	450

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Notes: The table Robust standard errors in brackets and the variables migration flux, travel time, GDP per capita, density population and unemployment rate are in logarithm. In all equations standard deviations are robust to heteroskedastic by the white method.

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

A   Appendix – additional figures and tables

Table A.1: Data Description

	Variable
Migration flux	value of flow of migrants in logarithm
destiny GDP	destiny current GDP in logarithm
origin GDP	origin's current GDP in logarithm
time travel	bilateral Google Maps time in logarithm
origin population	density population of origin's county in logarithm
destiny population	density population of destiny's county in logarithm
origin unemployment	percentage of the population aged 16 and over, economically active, unemployed of origin's county
destiny unemployment	percentage of the population aged 16 and over, economically active, unemployed of destiny's county
individual trust	Speaking of the people here, you would say that the people here are: (1) Very reliable (2) Something reliable (3) Little reliable (4) Unreliable
community trust	Speaking of the people here, would you say that the people in your communi (1) Very trustworthy (2) More or less trustworthy (3) Little reliable (4) Unre
proud being Brazilian	How far have you been Are you proud to be Brazilian? 1-7 higher, better.
satisfaction with life	In general, to what extent do you Are you satisfied with your life? (1) Very satisfied (2) Unsatisfied (3) Little dissatisfied (4) Very dissatisfied
freedom politic	Do you believe that when the country is facing difficulties is it justifiable tha the president of the republic dissolves the Supreme Federal Court? (1) Yes, justified.(2) No, not justified
corruption	Do you think that, as things stand, sometimes it is justifiable to pay a bribe
market 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 senten
justice trust	To what extent do you have confidence in the Federal Supreme Court? 1-7 h
religious diversity	What is your religion if you have? Catholic, Evangelical Protestant, Other n None, Pentecostal Evangelical, Mormon or Church of Jesus Christ of Latter- Kardecist Spiritist, Jewish, Are you an atheist / Don't believe in God, Jehov
disciplined person	Dependable and disciplined person.
intention to migrate to another country	Do you intend to live or work in another country in the next three years?(1) Yes (2) No
critical person	A critical and quarrelsome person.1-7 higher, better
evangelic church trust	To what extent do you have confidence in the Evangelical Church? 1-7 highe

Table A.2: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
flow of migrants in logarithm	3.96	1.55	0.75	8.79	450
destiny GDP	9.92	0.53	8.44	10.98	450
origin GDP	9.93	0.52	8.33	10.98	450
time travel	6.88	1.03	3.35	8.49	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 rate	1.96	0.32	0.89	2.94	450
destiny unemployment rate	1.88	0.37	0.89	2.65	450
Euclidean religious distance	0.14	0.09	0.01	0.56	450
Euclidean market orientation distance	2.02	3.22	0	24.23	450
Euclidean individual trust distance	1.87	3.34	0	23.72	450
Euclidean community trust distance	2.2	3.86	0	30.5	450
Euclidean proud being Brazilian distance	1.89	3.45	0	27.56	450
Euclidean satisfaction with life distance	1.77	2.52	0	14.19	450
Euclidean freedom politic distance	2.23	5.84	0	50.47	450
Euclidean corruption distance	1.91	3.28	0	21.19	450
Euclidean justice trust distance	2.19	3.06	0	20.82	450
Euclidean disciplined person distance	2.14	5.28	0	58.12	450
Euclidean intention to migrate to another country distance	2.2	3.08	0	19.43	450
Euclidean critical person distance	1.76	2.68	0	20.93	450
Euclidean religious diversity distance	1.94	3.01	0	30.46	450
d.individual trust	2.36	0.34	1.13	2.79	450
d.community trust	2.18	0.24	1.4	2.88	450
d.market orientation	6.01	0.45	4.23	7	450
d.proud being Brazilian	6.44	0.38	4.97	7	450
d.satisfaction with life	1.56	0.19	1.17	2.05	450
d.freedom politic	1.87	0.08	1.42	2	450
d.corruption	0.08	0.07	0	0.36	450
d.religious diversity	2.28	0.5	1.1	3.43	450
d.justice trust	4.23	0.58	2.59	5.79	450
d.disciplined person	5.58	0.46	2.57	6.60	450
d.intention to migrate to another country	1.87	0.08	1.64	2	450
d.critical person	3.52	0.46	1.8	4.45	450
d.evangelic trust	4.73	0.6	2.93	6.04	450

Table A.3: Summary Expected Signs

Variable	Expected Sign
destiny GDP	-
origin GDP	-
time travel	-
origin population	+
destiny population	+
origin unemployment	+
destiny unemployment	+
Euclidean religious diversity distance	-
Euclidean market orientation distance	-
Euclidean individual trust distance	-
Euclidean community trust distance	-
Euclidean proud being Brazilian distance	-
Euclidean satisfaction with life distance	-
Euclidean freedom politic distance	-
Euclidean corruption distance	-
Euclidean justice trust distance	-
Euclidean disciplined people distance	-
Euclidean intention to migrate to another country distance	-
Euclidean critical person distance	-
Euclidean evangelic church trust distance	-
d.individual trust	-
d.community trust	-
d.market orientation	-
d.proud being Brazilian	-
d.satisfaction with life	-
d.freedom politic	-
d.corruption	-
d.religious diversity	-
d.justice trust	-
d.disciplined people	-
d.intention to migrate to another country	-
d.critical person	-
d.evangelic church trust	-

Table A.4: List of the 50 counties included in this study

Aloandia	Goiania	Mogi das Cruzes	Sao Lourenco
Belem	Itagiba	Passos	Senador Guiomard
Belo Horizonte	Itaguaje	Possoes	Sao Jose dos Campos
Brasilia	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.5: OLS Regressions with cultural, institutional and religion Euclidean distances

	(1) original	(2) cultural	(3) cultural, institutional	(4) cultural institutional religion
time travel	-0.84***	-0.83***	-0.82***	-0.80***
	[0.06]	[0.06]	[0.06]	[0.06]
destiny GDP	-3.65***	-2.91**	-2.32*	-2.44
	[0.86]	[1.29]	[1.37]	[1.49]
origin GDP	-2.00	-0.88	-0.48	-0.78
	[1.55]	[1.85]	[1.81]	[1.74]
destiny population	1.70***	1.55***	1.32***	1.34***
	[0.33]	[0.42]	[0.46]	[0.49]
origin population	0.79*	0.52	0.37	0.44
	[0.44]	[0.51]	[0.51]	[0.49]
origin unemployment	2.85**	2.04	2.58*	2.78**
	[1.31]	[1.43]	[1.42]	[1.36]
destiny unemployment	2.68***	2.20**	2.77***	2.71***
	[0.72]	[0.88]	[0.97]	[1.00]
individual trust		0.02	0.03	0.02
		[0.03]	[0.03]	[0.03]
community trust		0.02	0.01	0.02
		[0.02]	[0.02]	[0.02]
proud being Brazilian		-0.02	-0.01	-0.00
		[0.03]	[0.03]	[0.03]
satisfaction with life		-0.04*	-0.04*	-0.05**
		[0.02]	[0.02]	[0.02]
disciplined person		0.03	0.04	0.04
		[0.03]	[0.03]	[0.03]
intention to migrate to another country		-0.02	-0.02	-0.03
		[0.02]	[0.02]	[0.02]
critical person		0.05*	0.05**	0.05*
		[0.03]	[0.03]	[0.03]
market orientation			-0.02	-0.03
			[0.03]	[0.03]
freedom politic			-0.03	-0.03
			[0.03]	[0.03]
justice trust			-0.06**	-0.05**
			[0.02]	[0.02]
corruption			-0.06**	-0.06**
			[0.03]	[0.03]
evangelic church trust				-0.03
				[0.03]
religious diversity				-1.91**
				[0.79]
Constant	46.74***	31.50	21.25	25.10
	[14.05]	[21.95]	[22.18]	[22.82]
Observations	450	450	450	450
R-squared	0.72	0.73	0.74	0.74

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Notes: The table Robust standard errors in brackets and the variables migration flux, travel time, GDP per capita, density population and unemployment rate are in logarithm. In all equations standard deviations are robust to heteroskedastic by the white method.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.