Fiscal effort and Internal Migration in Spain

A study of the determinants of internal migration with special attention to the difference in taxes between autonomous communities of Spain

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Abstract
This study examines the determinants of internal migration in Spain. It pays close attention to a key variable that has been little studied so far, taxes. That is, I analyze whether the difference in taxes between the autonomous communities of Spain is a determining factor for Spanish citizens when deciding to move. In addition to taxes, other determinants such as GDP, geographical distance between regions, unemployment and amenities are also analysed. The study is based on the theory of Gravity model and Pooled OLS and fixed effects specifications are used. The findings reveal that the tax effort has a positive effect on migration, but its magnitude is small.
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1. INTRODUCTION

Internal migration is the main determinant of the differential growth of Spanish provinces, so it is interesting to study the variables that affect such migration. The existence of many studies of international migration (Ravlik, M. 2014; Kim, K., Cohen, J.E. 2010) show that the main variables are socio-political, demographic, economic and environmental factors. The contributions of the literature so far on this topic and the significant variables will be developed throughout this paper. This study wants to go further and see whether, in addition to these variables, the tax burden variable is also of great importance or not in influencing the migration movement between autonomous communities in Spain. Therefore, the main question that can summarize this analysis is: Is it possible that taxes are also one of the drivers of internal migration in Spain? And if so, what is the magnitude of the effect?

Spain is a country where there are national laws and autonomous community laws. The latter are created by the autonomous communities themselves, which means that there are differences between the laws of the autonomous communities. It can be seen that some taxes, such as Wealth Tax or Inheritance and Gift Tax, each community has its own criteria and exceptions. In a later section I will present some practical cases where we can clearly see that depending on where you live you are going to pay more or less of a certain tax.

The optimal taxation theory very broadly explained says that taxes should be set in such a way as to maximise social welfare (Mankiw, 2009). On one hand, taxes can be used to redistribute income and reduce inequality but also, they can distort economic behavior (Mirrlees, 1971). In fact, the so-called Pigouvian tax, a concept proposed by Arthur Pigou in his book "The Economics of Welfare", published in 1920. The aim of this kind of taxes is to correct a negative or positive externalities (Pigou, 1920), e.g. the excise tax on tobacco with the objective of reducing cigarette consumption. In the same way that some taxes are used to change human behaviour, taxes can also affect non-targeted behaviour as it might be changing residence place to avoid tax burden. Moving further into the main question of this study, taxation and migration, taxation can also be used as an incentive to attract corporations or large fortunes to a country (Alstadsæter et al. 2019).
Over the years there have been cases where famous celebrities such as the Rolling Stones, the music band U2, multinational companies such as Coca-Cola, Nike, Ikea, Gucci have been attracted to tax havens such as the Netherlands (Browning, 2007). In addition, other celebrities, such as actors, athletes and racing drivers have established their residence in tax shelters such as Monte Carlo, Switzerland, and Dubai (Kleven, H., Landais, C., Muñoz, M., & Stantcheva, S. 2020).

We see that there have been real cases over the years where people move to other countries or falsify their residency to avoid taxes. It is interesting to explore whether this may also be happening in Spain at the level of autonomous communities. Despite its importance in economic theory and the high public interest, very scarce empirical evidence is found on how and to what extent taxes affect the mobility of citizens.

In Spain, as it is mentioned previously, there are notable differences between the taxes of each autonomous communities. Therefore, my main objective is to see if these existing differences in taxation between the autonomous communities is also a variable that explains migratory movements within Spain and to see if those regions with a lower tax effort attract more population.

This study will contribute to the literature by shedding some light on whether taxation is a decisive factor in changing location. A field little studied so far. It also contributes to a certain extent to the study carried out by Maza, A. (2020), where the variables to be taken into account when talking about migratory movements between Spanish provinces are analyzed. It will contribute by demonstrating that taxation is also a variable to be considered or, if the reverse is the case, by discarding its importance in internal migration in Spain. Throughout this paper, the aforementioned study will be presented in more detail.

The remaining of this study is organized as follows. First, we take a brief glance at the previous literature on both the determinants of migration and migration in relation to taxation. Second, I give general ideas about the legal system in Spain and outline the evolution of internal migration from 2008 to 2021 in Spain. Then, I move on to the explanation of concepts and models applied in the analysis. I start with the methodology where I describe the data, the variables, the estimation strategy and finally I analyze the results and present the conclusions.
2. LITERATURE REVIEW

The existing body of documentation on migration is currently immense, therefore, providing a complete theoretical framework on this topic is beyond our scope. As it is not the main part of this study, we will leave aside the literature on trends in migration flows, cost-benefit analyses and in this section, we will focus on articles that explore the determinants of migration, i.e. those factors that affect migration and to what extent.

On the other hand, very few literatures relating migration to taxation has been found. Therefore, this section will be divided into a review of the literature on the determinants of migration on the one hand, and the literature related to taxation on the other hand.

In the migration literature we have as a pioneer Ravenstein (1876, 1885, 1889) a geographer who published a number of articles on international and internal migration. In these articles can be found the well-known “laws of migration” that will be presented in the course of this study.

To better understand the socio-economic characteristics of migrants and the variables that drive migration to the urban area of Monywa, Thet .K. (2014) conducted a study using a factor analysis approach. This approach is a statistical technique that reduces a large set of variables to a smaller set of uncorrelated variables, so that as little information as possible is lost. The study is based on 18 factors, including economic, demographic (fertility, marriage), sociocultural (public transportation, impact of television, good network communication, the cinema, education...), political factors (political factors can encourage or discourage migration) factors. from region to another) and miscellaneous (presence of relatives or acquaintances in urban areas, cultural diversity). Regarding the socioeconomic profile of the migrants, the results were as follows: the majority are between 50 and 59 years old. 87% of migrants are men. The majority of migrants were having low level of education and they are usually self-employed workers. On the other hand, the main factors pushing people to migrate from rural areas to the urban area of Monywa were the desire to improve their standard of living and to be able to benefit from better public services.

Looking more closely at Spain and in chronological order we will see what factors affect and whether these have changed over time.
Starting with a semiparametric analysis by Adolfo Maza and José Villaverde in 2004. This study analyses the determinants of internal migration among regions in Spain in the period 1995-2002. As independent variables they used net migration rate between regions and the variables they studied are GDP per capita, unemployment, housing cost, population density, human capital and climate. The most outstanding results were that the variables that mainly pull migration are higher income levels and good climatic conditions. To a lesser magnitude, unemployment and housing costs also seem to explain net migration rates. Higher unemployment or housing cost, reduce the attractiveness of a place.

Maza, A. (2020) carries out a recent study focused on internal migration in Spain at the provincial level. This study contributes to a better understanding of the immigration pattern since the economic crisis of 2008. Maza, A. also contributes to shed some light on the distance factor since until then not too many articles took this factor into account. The two general hypotheses that the paper tests are: H1. In relation to age, amenities are more important for the adult population than for the young population; H2. In terms of distance, both economic and social factors are more important for the adult population than for the younger population. To conduct this analysis, the author collects the migration flow data (2008-2018) from the Estadística de Variaciones Residenciales (EVR) of the National Institute of Statistics (INE) of Spain. In order to test his hypotheses, the author uses an additive regression model where the dependent variable is the inter-provincial gross migration rate and as independent variables, he introduces GDP per capita, unemployment, house prices, the climate of the province, the distances between provinces. In the benchmark model using generalized least squares (GLS), he found that internal migration between Spanish provinces is driven by economic factors. People tend to migrate to wealthier provinces and provinces where labour opportunities are greater. As for distance, his results indicate that people tend to move to surrounding provinces. Besides, the most common destinations are Madrid and Barcelona. Regarding age, their analysis confirms that amenities, as factor of migration, are more relevant for adults than for young people. For long-distance movements, the climate condition variable affects positively and significantly. Furthermore, in short distance movements, people move from higher to lower priced housing, while in long distance movements, it seems that people move to provinces where housing prices are higher.
I will now discuss the existing literature on how taxation can act as a factor influencing migration. Most of the work done studying whether taxes affect migration is based on the mobility of people and rich people moving from state to state in United States and this has become a particularly important issue for state governments.

An analysis of migration patterns between states in the United States from 1985 to 1990 was conducted by Conway and Houtenville (2001). They started reviewing previous research and then they examined aggregate state-level data from the 1990 U.S. Census. The researchers discovered that the elderly population tended to avoid moving into states with higher EITC taxes (Earned Income Tax Credit). However, they also found an unexpected outcome where the elderly was less likely to migrate out of states with higher EITC taxes. Besides, death taxes also encourage emigration, depending on how these taxes are measured.

Duncombe, Robbins and Wolf (2003) conducted a study on the migration behavior of elderly individuals within counties between 1985 and 1990. The researchers utilized 1990 Census, county to county data and estimated a model based on discrete choice framework. Their research findings revealed that different types of taxes, such as inheritance taxes, had a negative impact on the likelihood of settling in a particular location although they also found that higher estate tax rates had a positive effect on the probability of residing within a particular state. Besides, factors as climate, economic conditions, and population characteristics, seem to play much larger roles in migration decisions.

Farnham and Sevak (2016) utilized the Health and Retirement Survey to investigate the behavior of empty nest households, who were expected to relocate to areas with low property taxes and education spending. Specifically, they conduct regression analyses to explored if these individuals were able to reduce their property tax burdens after moving. The study found that when empty nesters relocated across state boundaries, they experienced a slight reduction in property taxes but when they moved within the same state, they were unable to achieve any significant reduction in their property tax burdens.

Bakija and Slemrod (2004) explore whether wealthy elderly individuals are more likely to move out of high tax states and relocate to low tax states in order to avoid paying high state taxes. The
authors use data from federal estate tax returns and wealth class between 1965 and 1998. In order to analyze the migration patterns of wealthy individuals following changes in state tax rates, the authors use a conditional logit model and a simple linear regression. They find little evidence to support the idea that rich individuals are fleeing high tax states, then the researchers conclude that the losses would not be substantial relative to the revenue generated by the tax and suggest that other factors, such as climate or job opportunities, may be more important in determining migration patterns among the wealthy.

Agrawal and Foremny (2019) explore the impact of changes in top tax rates on the migration patterns of the wealthy within Spain, this is, the probabilities of moving to another region due to tax changes. Using administrative data between 2002 and 2014 from Spain’s Continuous Sample of Employment Histories and based on the utilities of top income individuals’ equations, the authors find that a one percentage point increase in the top tax rate is associated with a 0.08 percentage point increase in the probability of a high net worth individual leaving the region. However, they also find that the magnitude of this effect is relatively small compared to other factors, such as changes in economic conditions or political instability. The findings suggest that changes in tax rates may not be the primary driver of wealthy individuals' migration decisions.

To conclude this section, as I mentioned earlier, depending on where a person resides, he or she may pay more or less taxes. For instance, Inheritance tax. This tax is due on the acquisition of property inherited or bequeathed as a result of death and the tax rates vary according to the autonomous community where you live. Just to have a clearer idea of what I mean when I talk about differences in taxes paid in each autonomous community, I will give an imaginary case as an example. A 30-year-old single person inherits assets from her father worth €800,000, of which €200,000 correspond to a home. This person would pay more taxes to receive that inheritance in Asturias than in Galicia.
3. LEGAL SYSTEM FRAMEWORK

In accordance with the Spanish Constitution, is organized into 17 regions called autonomous communities and 2 autonomous cities. In this analysis we only take into account the autonomous communities. For a more detailed picture of each autonomous community, see the appendix table 1 with population size and population density. Autonomous communities have their own legal norms within their jurisdiction. These communities are governed by a specific organic law, which regulates their individual competences as well as their taxes. When it comes to taxes, people pay based on where they live, which is determined by their local municipality.

In Spain, laws are regulated by the Spanish Constitution. Currently, the Spanish Constitution of 1978 is the keystone of the political system and the legal system in Spain. The constitution was created to establish justice, freedom and to promote the good of the nation. According to the Spanish Constitution (1978), the Autonomous Communities, within their territory, have the power to create their own legal norms with the force of law in those matters that are within their jurisdiction. The autonomy of the communities implies a decentralization of legislative power, with legislative competences divided between the State and the autonomous communities. The relationship between State law and the law of the Autonomous Community is determined by the principle of competence (Article 149\(^1\) of the Spanish Constitution regulates the matters that are the exclusive competence of the State and Article 148\(^2\) establishes the competences that can be assumed by the Autonomous Communities).


This section is to gain a better understanding of the evolution of migration within Spain and the destinations that attract the most migration year after year.

In the following figure we can see that there is one community that stands out above the rest in terms of attractiveness for the population, Madrid. We can see how this city has been increasing its migration flow over the years, but this flow has been decreasing since 2015, when the migration

flows in communities such as Andalucía and Castilla la Mancha have increased. In order to allow a clear visualization, I have not included all the autonomous communities. In figure 2 it is possible to see the migration balance of all the autonomous communities in 2018.

Figure 1. Evolution of Migration balance of the autonomous communities, 2008-2021.

![Migration balance 2008-2021 graph](image)

Source: Own elaboration from data provided by INE, Instituto Nacional de Estadística.

Figure 2. Migration balance of the autonomous communities, 2018.

![Migration balance 2018 map](image)

Source: Instituto Nacional de Estadística.
On the other hand, Cataluña is also one of the autonomous communities that receives a lot of individuals. In the case of both Madrid and Cataluña we observe a sharp reduction in population in 2019, this must be due to the health crisis of that year. The islands (Canary Islands and Balearic Islands) also are noted for receiving and sending a large population.

5. TAX EFFORT

In order to be able to analyze whether the tax differential is also a migration factor, I have considered the tax effort of each autonomous community. When it comes to measuring taxes, there are two well-known indicators, the tax burden and the tax effort. The former refers to the "percentage of national income that is collected by the public sector, through taxes, in a given year" (Pérez, 1972) but this indicator does not reflect the percentage of income that taxpayers spend on government funding. Therefore, in this paper the tax effort indicator is used.

Tax effort takes into account, unlike the tax burden, the fact that a tax rate affects the welfare of people with different income levels differently. For instance, imagine two people with annual incomes of 30,000 and 50,000 euros respectively. If we apply the same tax rate on their income (e.g. 25%), it is reasonable to think that the first person has a higher welfare cost than the second.

The Tax Effort can be defined as Guillem López Casasnovas (2002): "The fiscal or tax effort of a jurisdiction is its actual revenue relative to its fiscal capacity, which is defined as its potential revenue".

The tax effort, also known as Frank's index (1959), is calculated as the quotient between the percentage of public revenue relative to Gross Domestic Product (GDP) and the per capita income of the territory.

\[ TE = \frac{Tax \ revenue}{GDP \ per \ capita} \]

It is usually expressed as a percentage of GDP. A higher tax effort indicates a greater dependency on taxes as a source of government revenue. On the flip side, a lower tax effort suggests
inefficiencies in tax collection or a reluctance to collect taxes, which may limit a government's ability to fund important public programmes and services.

With regard to the most relevant taxes in Spanish autonomous communities are Personal Income Tax, Transfer Tax and Stamp Duty, Wealth Tax and Inheritance and Gift Tax (Spanish Constitution, 1978). It is important to note that the amount of tax paid by each taxpayer may vary depending on the type of tax and the personal circumstances.

6. GRAVITY MODEL

In this section I will introduce the gravity model as it has been widely used to study migration due to its relatively robust forecasts (Ramos, 2016 and Kim, K., Cohen, J.E., 2010).

The Gravity Model of migration is based on Isaac Newton’s law of gravitation. Jan Tinbergen is often credited as the pioneer of the gravity model in its modern form (Tinbergen, 1962). Gravity models hold that flows (international trade, migration, tourism, transportation) between two entities are directly proportional to their size (population or GDP) and inversely proportional to the physical distance between them.

With the increasing available bilateral migration data, this kind of model is becoming more and more used to analyze migration flows. In its most frequently used form, the law of gravity of population migration establishes that

\[ M_{i,j} = G \frac{P_i^\alpha \times P_j^\beta}{D_{i,j}^y} \]  

\( M_{i,j} \) denotes the count of individuals residing in area j who previously lived in area i, typically measured over a period of one or five years. \( P_i^\alpha \) and \( P_j^\beta \) represent the populations of areas i and j, respectively, usually measured at the start of the migration measurement period. \( D_{i,j}^y \) stands for a measure of the distance between areas i and j. The parameters \( \alpha, \beta, \) and \( y \) are variables that need to be estimated, and G is a context-specific constant of proportionality, which depends on factors such as geography and time.
The widespread popularity of this simple model is doubtless due to the simplicity with which the model can be estimated by ordinary least squares after transforming it into logarithmic form (Poot et al. 2016).

\[ \ln M_{i,j} = \delta + \alpha \ln P_i + \beta \ln P_i - \gamma \ln D_{ij} + \varepsilon_{i,j} \] (2)

Like any model, the gravity model also has its advantages and disadvantages (Ramos, 2016). As advantages, these models provide a straightforward framework for understanding the factors that influence trade, migration, and capital flows between countries. Additionally, they can be easily developed from theoretical models like random utility maximization models. There are various methods available to address analytical challenges associated with gravity models, such as using instrumental variables or fixed effects. Furthermore, empirical models derived from gravity models can be easily expanded to incorporate different controls and additional policy variables.

However, there are also a few disadvantages to consider when using gravity models. Firstly, obtaining detailed data from both countries involved in a direct flow can be challenging and not always feasible. This can hinder the estimation of gravity models. These models encounter difficulties when working with data sets that contain negative or zero values. Lastly, interpreting the results of a gravity model may not always be straightforward from a policy perspective due to uncertainties surrounding data completeness and other influential factors.

7. METHODOLOGY

In the elaboration of the econometric model, it is important to consider the economic theory, the econometric model, the statistical assumptions and the data (Uriel, 2019).

The migration literature has been building up around the gravity model and the recent empirical literature (Cavalleri et all, 2021) that has given rise to a wide and varied range of precise estimates. This model is very appealing for identifying the determinants of migration, especially when we have bilateral data (Ramos, 2016, p.1). Therefore, in order to carry out this analysis and to be able to study the effect of tax differences between autonomous communities on migration, I propose to use a gravity model as benchmark model that considers the migration flow from each Spanish
region to others regions inside the country in order to identify those factors, among them, tax effort, that have a significant influence on the variation of migration between the autonomous communities. Variables identified as significant by previous studies and the economic literature discussed in the preceding sections (GDP, distance, unemployment rates, amenities) will be added to the model throughout the analysis and I will pay attention to the key explanatory variable of this paper, the tax effort.

7.1 Data and variables

As it is common in the migration literature (Ramos and Suriñach, 2017; Maza, 2020) and in gravity model literature (Albornoz and Tonon, 2020), I will formulate the gravity model in a logarithmic form as a simplification of the model to facilitate its estimation and following Matyas, L. (1997), the econometric representation of the gravity model takes the form of a triple-indexed model.

\[
\ln M_{i,j,t} = \alpha + \beta_1 \ln GDP_{j,t-1} + \beta_2 \ln GDP_{i,t-1} + \beta_3 \ln Dist_{i,j} + \beta_4 UR_{j,i,t-1} + \beta_5 Temp_{j,i} + \beta_5 TE_{j,i,t-1} + \epsilon_{i,j,t}
\]  

(3)

Where \((i,j)\) indicates the pair of autonomous communities under consideration, and \((t)\) refers to time, year. Prior to proceeding, it is crucial to provide an explanation of the variables incorporated in the model and highlight the databases utilized:

\(M_{i,j,t}\) refers to the number of persons migrating from autonomous community \((i)\) to autonomous community \((j)\) in year \((t)\). Migration Statistics are compiled based on the statistical processing of the variations recorded in the Municipal Census database. Data were collected from the Contabilidad Regional de España (INE).

\(GDP_{i,t-1}\) and \(GDP_{j,t-1}\) denotes the nominal Gross Domestic Product of community of origin and destination, respectively. It is measured in thousands of euros and it refers to the GDP of the previous year \((t-1)\). As we have seen above in the gravity model, the wealth gap between territories is one of the factors that determine the migration decision. Data were collected from the Contabilidad Regional de España (INE). Although population or GDP per capita could also be used (Ramos and Suriñach, 2017; Maza, 2020), total GDP variable has been used following the
general gravity model formula for flows (Matyas, L, 1997; Tinbergen, 1962). In addition, GDP per capita variable is already included in the tax effort measure.

$Dist_{i,j}$. As the autonomous community itself is a set of provinces and not a specific place, the distance refers to the kilometres between the centres of the pairs of communities. Data were pulled out from https://www.distanciasentreciudades.com/

$UR_{j,i,t−1}$ refers to unemployment rates of the previous year. This variable is expressed as unemployment rate of destination (j) over unemployment rate of origen (i). I have decided to do it this way because when a person makes the decision to move, they compare their situation of origin with that of the other destinations. Data were collected from the Contabilidad Regional de España (INE).

$Temp_{j,i}$ denotes the temperature of the autonomous community. In line with the findings of Partridge and Rickman (2003) when analyzing migration factors, in addition to economic factors, psychosocial factors such as quality of life, climate, etc. are also taken into account. For this purpose, I include a climate variable. The average temperature varies throughout the seasons, but since our dataset is based on annual data, I have included the average annual temperature for the year 2015. I have chosen to focus on one random year because the difference in average temperature between years is minimal. The data for this variable are sourced from various annual reports published by the INE.

$TE_{j,i,t−1}$ means tax effort. This variable is calculated by dividing the tax revenue collected by destination community (j) over origin community (i) in the year (t-1). Data were collected from the Spanish tax agency.

The main reasons to lagged variables in the analysis are: first, when people decide to move, they consider the socio-economic factors from the previous periods, at least a year before. Second, using lagged variables helps to address any issues related to cause-and-effect relationships that can arise in migration models.

In the following table the descriptive statistics are shown. It is included the mean, standard deviation, minimum and maximum values of the variables used in the analysis. The data set
contains 3808 observations for the years 2008 to 2021. The base data is constructed in such a way as to observe how many individuals go from a place of origin to a place of destination, so for simplicity and to avoid redundancy only the descriptive statistics of the variables of the place of origin are shown, which as it was expected are the same as those of the place of destination.

Table 2. Descriptive Statistics (non-logarithm values)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migration</td>
<td>3808</td>
<td>1324.593</td>
<td>2206.644</td>
<td>30</td>
<td>26278</td>
</tr>
<tr>
<td>Male migration</td>
<td>3808</td>
<td>701.846</td>
<td>1151.215</td>
<td>12</td>
<td>13979</td>
</tr>
<tr>
<td>Female migration</td>
<td>3808</td>
<td>622.727</td>
<td>1058.464</td>
<td>10</td>
<td>12299</td>
</tr>
<tr>
<td>Unemployment</td>
<td>3808</td>
<td>18.381</td>
<td>6.635</td>
<td>5.8</td>
<td>36.77</td>
</tr>
<tr>
<td>GDP pc</td>
<td>3808</td>
<td>11164.176</td>
<td>1933.661</td>
<td>7729</td>
<td>15813</td>
</tr>
<tr>
<td>GDP</td>
<td>3808</td>
<td>6.499e+10</td>
<td>6.331e+10</td>
<td>7.546e+09</td>
<td>2.420e+11</td>
</tr>
<tr>
<td>Distance (km)</td>
<td>3808</td>
<td>571.14</td>
<td>471.093</td>
<td>82</td>
<td>2052</td>
</tr>
<tr>
<td>Tax effort</td>
<td>3808</td>
<td>.132</td>
<td>.073</td>
<td>.013</td>
<td>.394</td>
</tr>
<tr>
<td>Temperature</td>
<td>3808</td>
<td>16.152</td>
<td>2.169</td>
<td>12.53</td>
<td>20</td>
</tr>
</tbody>
</table>

7.2 Estimation strategy

The use of least squares to perform regression analysis has become one of the most effective and popular methods due to its very attractive statistical properties (Gujarati, 2004). However, this method might be questioned as it omits the dimensions of space and time so that in the case of a gravity model, the estimators may be inconsistent and biased when using several time periods (Ávila, 2017).

To address these issues, panel data can be used. This technique captures the individual characteristics (of each country pair) that may lead to non-random behaviour of the variables, as well as the underlying time series. Following Hsiao (2003, 2005), panel data is able to control for individual heterogeneity, provide more informative data, the sample size also increases, which provides greater variability, more degrees of freedom, greater efficiency and less collinearity among variables. Besides, panel data are more suitable for studying the dynamics of the fit.
This analysis uses panel data showing migration flows and characteristics of each region from 2008 to 2021. From the panel data model specification, a pooled, a fixed-effect and a random-effect approaches are used.

In order to determine the influence of each of the factors that have been taken into account to analyse migration flows, specifically internal migration between the autonomous communities of Spain, a balanced panel data set has been used to correctly specify the proposed model and capture the characteristics of each region and the effect of time. To test the hypotheses, our dependent variables of interest are male migration, female migration. I will consider the utilization of pooled OLS, Fixed Effects and Random Effects methods.

The analysis will start with a pooled regression model. Pooled data regression model is one type of model that considers all coefficients constant with respect to time, this is, both intercepts and slope coefficients ($\alpha_{i,t} = \alpha$). For this model, data can be pooled together and an ordinary least squares (OLS) regression model can be applied (Hiestand, 2005). Moreover, this method does not consider any differences between individuals or between time periods; the approach is useful for explaining initial models, the values and signs of the explanatory variables considered. This model has some disadvantages. By omitting individual characteristics and time effects, problems of heteroscedasticity and autocorrelation may be present (Ávila, 2017) since each individual may have unobservable characteristics that change over time and therefore also affect the dependent variable. Therefore, the OLS estimator is not efficient. In this case, it is better to apply Generalized Least Squares (GLS) method to obtain BLUE (Best Linear Unbiased Estimator) estimators when the disturbances present heteroskedasticity (Uriel, 2019).

In line of Bertoli and Fernandez-Huertas Moraga (2013) to avoid the bias due to the Multilateral Resistance to Migration, it is important to control time shocks and time-invariant unobserved heterogeneity of the regions, adding year fixed effects and origin and destination region fixed effects.

The fixed effects regression model is one type of model that considers that the differences between individuals can be captured with different constant terms. Therefore, for each individual $\alpha_i$ must be estimated. These distinctions arise from omitted variables that change across individuals. They key assumption of this method is that the individual effects are independent of each other.
effects would be equivalent to estimate a model by OLS with the same number of dummy variables as individuals (Ávila, 2017).

Lastly, random effects approach considers that each individual has a different intersection \( \alpha_{i,t} \) which is a random variable. Applying OLS estimation in this method, the estimators are consistent but not efficient as the disturbance terms for an individual at two different points in time are correlated. To solve drawbacks such as the one mentioned above, the Generalized Least Squares (GLS) method would be appropriate because its estimates are larger than those obtained by OLS when the basic assumptions of the Classical Linear Regression Model are not met, and when they are met, it yields similar results to those obtained by the OLS method (Wooldridge, 2013).

In section 8, for the purpose of verifying which of the methodologies proved to be the most appropriate, Breusch-Pagan LM and Hausman tests are conducted.

8. EMPIRICAL RESULTS AND ANALYSIS

This section provides results of estimations obtained applying Pooled OLS and fixed effects methods and an analysis of these results in relation to existing literature.

8.1 Empirical Results

The hypotheses of this analysis would be the following:

\[ H_0: \text{fiscal effort is not determinant in the decision to migrate.} \]

\[ H_a: \text{the fiscal effort is determinant in the decision to migrate.} \]

In order to test the hypotheses, I estimated three different models, the pooled OLS regression model, the fixed effect and random effect models. In addition, the three models are evaluated to decide statistically on the most suitable model.
First of all, we will perform a Variance Inflation Factor (VIF) test to evaluate multicollinearity. Multicollinearity exists when the explanatory variables are correlated with each other. This can impact the stability and robustness of the model, as small changes in the data can lead to large changes in the estimated coefficients. This can therefore undermine their reliability (Dougherty, 2016). In appendix, Table 3 shows the results for VIF test, the mean VIF is 1.049 and the VIF for all individual variables are under 5. VIF results confirm the lack of multicollinearity between variables.

Second, in order to detect heteroskedasticity, a Breusch-Pagan test was conducted. This test was introduced by Trevor Breusch and Adrian Pagan in 1979. The test examines whether the variance of the errors in a regression model is consistent across different values of the independent variables. It is a $\chi^2$ test. Results are shown in table 3 in the appendix. The p-value obtained from the Breusch-Pagan test was 0.46, 0.4 and 0.4 for natural log migration, male migration and female migration respectively, the null hypothesis is accepted at 1% of significance ($\alpha = 0.01$) which means that the variance of errors is not influenced by the independent variables, then the assumption of homoscedasticity is valid.

After multicollinearity and heteroskedasticity tests, I performance a Breusch and Pagan Lagrangian multiplier test for random effects. This test is used to assess whether random effects are significant in panel data models. Table 4 with results are in the appendix. We can confirm that the random effects estimates are significant for the three run regressions.

Finally, for the choice between fixed effects and random effects regressions, the Hausman test is carried out. The Hausman test compares fixed effects and random effects models by testing the assumption that the individual effects are not correlated with the other variables in the model. In the appendix, table 6 shows that the individual effects are correlated with the other variables, null hypothesis is rejected, it indicates that using a random effects model might lead to biased estimates. Therefore, I will use fixed effects method in the three regressions and in order to make comparisons I will also use the pooled OLS method.

Prior to proceeding with the results obtained in this analysis, in the following table I present the expected signs of the variables basing on the previous literature I went through the text.
Table 7: Expected signs of the explanatory variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male migration</th>
<th>Female migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Distance</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Unemployment</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Amenities</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Taxes</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

As we can see, migration is expected to have a positive relationship with income, GDP, GDP per capita, wealth in general which is linked to expecting a positive sign with services, amenities. The main pull factors to migration to a region or other country is to improve wellbeing or quality of life which is related to a greater provision of services and an improvement in salaries (Thet. K, 2014; Greenwood, 1985; Treyz et. al., 1993).

Regarding distance, it is expected to be negative according the gravity model (Ravenstein, 1885). The further away one region is from another, the less migration flows between them. A variety of socio-economic factors such as transport costs, difficulties in settling in a new environment, lack of family support, among others, that discourage moving to a distant place.

In general, people move, among other reasons, to look for work, so the expected relationship between migration and unemployment is negative. When there are higher unemployment rates in a certain region, it discourages people from migrating to that region because they are less likely to find employment opportunities there (Maza & Villaverde, 2004). On the other hand, the relationship between fees and migration is somewhat unclear. It depends on many factors such as salary level, occupation (musicians, footballers, artists, among others, are more likely to move because of taxes) (Kleven et al, 2020).

The differences between the factors that affect men and women when they decide to move have not been explored much in the previous literature. The reasons of women often differ more from those of men when it comes to international migration. Some of the reasons why women tend to leave their country include economic, social, familial, and political factors as well as rejection of access to education, employment, and healthcare and the lack of respect for basic human rights. In many societies, women are marginalized from such rights so migrating is a "door" to new
opportunities (De Leon Siantz, 2013; Sultana and Fatima, 2017). As this study is looking at internal migration, it is not expected that there will be much difference between genders. After all, both men and women are seeking to improve their lives.

Table 8 shows estimation of the regressions when pooled OLS method is apply, this is, when no distinction between individuals is considered. The coefficient related to GDP is the expected sign, positive and it is significant. Individuals have a tendency to move to richer places. The coefficient for unemployment rates is negative and significant, so in line on moving a richer place, people also tend to migrate to regions with higher opportunities of employment. The coefficient linked to temperature is negative and statistically significant. As we have discussed throughout this study, distance is a strong determinant of migration and, as we would expect, its coefficient is both negative and significant. Finally, the coefficient of the key explanatory variable of this study, fiscal effort, appears negative and is statistically significant. This suggests that people relocate to regions with a lower tax effort.

The coefficients in migration, male migration and female migration regressions are very similar. The only variable where it is possible to see a minimal difference between men and women migration is distance. It seems to be that women move to more proximal regions although this difference is almost negligible.

Table 8: Determinants of migration, male migration and female migration in 17 autonomous communities in Spain during 2008 to 2021.

<table>
<thead>
<tr>
<th>Method of estimation</th>
<th>Ln Migration (1)</th>
<th>Ln Male Migration (2)</th>
<th>Ln Female Migration (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln gdp product</td>
<td>0.872*** (0.008)</td>
<td>0.013 (0.044)</td>
<td>0.871*** (0.008)</td>
</tr>
<tr>
<td>Ln distance</td>
<td>-0.42*** (0.014)</td>
<td>(Omitted)</td>
<td>-0.402*** (0.014)</td>
</tr>
<tr>
<td>temperature</td>
<td>-0.027*** (0.004)</td>
<td>(Omitted)</td>
<td>-0.028*** (0.004)</td>
</tr>
<tr>
<td>unemployment</td>
<td>-0.272*** (0.032)</td>
<td>-0.162*** (0.018)</td>
<td>-0.27*** (0.032)</td>
</tr>
</tbody>
</table>

Notes: Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.
Table 8 also reports results obtained when estimating fixed effects model. As can be seen, the estimations of the three regressions are quite similar. Only coefficients linked to unemployment and tax effort are significant. On the one hand, the unemployment coefficient remains negative as expected and in line with Pooled OLS estimates and previous literature. On the other hand, the coefficient for fiscal effort is positive. A shocking result as it is the opposite of Pooled OLS and what was expected. In this case, the GDP variable which is used as proxy of wages, richness, shows positive but insignificant so it turns out to be statistically equal to zero.

Distance variable does not vary over time so this variable will be omitted when using the fixed effects model. To deal with the omission of distance, in this study the distance has been modified to vary every year. Following Wei S. (1996), I design a variable called remoteness as a proxy for distance. This variable is calculated as:

\[
\ln \text{remoteness} = \ln \left( \frac{\text{Distance}_{i,j} \times \text{GDP}_{j,t}}{\text{GDP}_{\text{Spain},t}} \right)
\]
Table 9. Determinants of migration, male migration and female migration in 17 autonomous communities in Spain during 2008 to 2021, including remoteness as proxy of distance.

<table>
<thead>
<tr>
<th>Method of estimation</th>
<th>Ln Migration</th>
<th>Ln Male Migration</th>
<th>Ln Female Migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln_gdp_product</td>
<td>-0.036 (0.045)</td>
<td>-0.061 (0.05)</td>
<td>-0.003 (0.049)</td>
</tr>
<tr>
<td>ln remoteness</td>
<td>0.47*** (0.117)</td>
<td>0.64*** (0.129)</td>
<td>0.288** (0.127)</td>
</tr>
<tr>
<td>diff_temperature</td>
<td>(Omitted)</td>
<td>(Omitted)</td>
<td>(Omitted)</td>
</tr>
<tr>
<td>unemployment_over</td>
<td>-0.144*** (0.019)</td>
<td>-0.179*** (0.021)</td>
<td>-0.102*** (0.02)</td>
</tr>
<tr>
<td>taxeffortover</td>
<td>0.014*** (0.005)</td>
<td>0.013** (0.006)</td>
<td>0.014** (0.006)</td>
</tr>
<tr>
<td>Constant</td>
<td>3.807* (2.206)</td>
<td>2.788 (2.42)</td>
<td>3.115 (2.4)</td>
</tr>
</tbody>
</table>

R-squared 0.244 0.247 0.174
Observations 3808 3808 3808

Standard errors in parentheses. Significance level: *** p<0.01, ** p<0.05, * p<0.1

Source: Own elaboration from data provided by INE, Instituto Nacional de Estadística.

In the table 9, results including remoteness variable are show. Results are very similar to those reported in table 8. The coefficient related to GDP is insignificant. The coefficient of the remoteness variable is positive and significant. Remoteness variable is kind of captures the relative importance of the destination in the country and also incorporates geographical distance. Unemployment is negative, fiscal effort is again positive and both are significant.

8.2 Analysis of results

Individuals move to locations with more opportunities to do business, find employment, in general, they are places with greater wealth, better services and higher quality of life. In the results we can see that in all specifications the unemployment variable, both applying pooled OLS and fixed effects, is negative, which is consistent with previous literature.
However, throughout the literature we have seen that the effect of taxes on the decision to migrate is not straightforward. In this analysis I also get mixed results. When we use the Pooled OLS method, where it is assumed that all regions are equal, there is no difference between individuals and over time, the results show that individuals tend to move to those places with the lowest tax effort. In concrete terms, for every unit increase in the tax effort in a region, migration to that region will be reduced by about 4%. In contrast, when using the fixed effects method, the parameter associated with the fiscal effort is positive. That is, when the tax burden increases by one unit in the destination region, migration to that destination increases by approximately 1.4%.

There are several reasons why people would prefer to move to a region with lower taxes. Cost savings: living in a region with lower taxes means paying less income, property and consumption taxes. This increases the purchasing power and savings capacity of households. Higher financial profitability: it is possible that in these regions with lower taxes, more favourable tax policies for investment and self-employment may be pursued. This would imply higher returns and financial benefits. Also, they could offer more flexible financial regulations and financial privacy, which may be attractive. As with international migration, some individuals may seek to move to other regions with lower taxes in order to protect their assets and wealth from higher tax burdens in their home regions.

On the other hand, there are also different reasons why a person would decide to move to a region with higher taxes. More and better public services: regions with higher taxes are better able to offer better public services such as quality education, quality and accessible medical care, infrastructures, etc. Lower inequality if higher taxes contribute to more redistributive policies that seek to reduce economic inequality. There are people who do not mind paying high taxes as long as they go to finance social aid programs, for instance. Although accessibility to employment has more to do with the development of the community and the economic sector it is focused on, in some ways, having higher taxes could indirectly mean having a more developed labor market and offering higher wages. In Spain there is one exception, which is the autonomous community of Madrid. Madrid, the capital of Spain, is one of the communities with the lowest tax payments and at the same time one of the most developed and with the greatest employment opportunities. On the other hands, communities as Cataluña and
Andalucía, it is possible to see that employment opportunity increase with a higher fiscal effort. In the following figures 3 and 4, it can be appreciated that Andalucía has a very relatively very low fiscal effort but also high rate of unemployment. Cataluña, on the contrary, has one of the highest tax efforts in the country, but its unemployment rate is considerably lower.

Figure 3. Evolution of fiscal effort in Andalucía, Madrid and Cataluña during 2008 and 2021.

![Fiscal Effort 2008-2021](image)

Source: own elaboration from data provided by INE.

Figure 4. Evolution of unemployment rate in Andalucía, Madrid and Cataluña during 2008 and 2021.

![Unemployment rate 2008-2021](image)

Source: own elaboration from data provided by INE.
Finally, although not strictly related, paying more taxes often offers a higher quality of life. In terms of security, environment, high life expectancy and so on.

Needless to say, these reasons do not apply to all individuals and the decision to move from one region to another depends on individual preferences and circumstances. In this context, it is also of interest that the economic situation or occupation of a person can affect his or her decision to move to pay less tax. For example, David and Dirk (2019) found in their analysis that entrepreneurs and workers with higher skills are more sensitive to taxes. There are several authors who have done analysis on this topic, where it is possible to see that individuals who are engaged in specific sectors such as music, sport, cinema are more driven by taxes when making such a decision (for instance, Kleven, Landais, and Saez 2013). On the other hand, temperature variable, despite being negative and significant, there is not enough evidence to ensure a clear positive or negative sign relationship with migration. People can get away from extreme cold but also from extreme heat. Once again, it depends on individual preferences.

9. CONCLUSION

The purpose of this study was to investigate the determinants of internal migration between autonomous communities. This study adds an extra variable that has barely been studied in the literature on migration, namely fiscal effort. The findings of this study are in line with previous literature, individuals tend to move to places with more wealth and job opportunities and distance discourages migration. Conversely, we also find results that are dissonant with the literature. The effect of taxes on the migration decision seems to be positive but the magnitude of the effect is minimal. In his seminal paper in 1956, Charles Tiebout analyzed how public goods how attracts individuals to reside in particular communities. Tiebout argued that individuals can "vote" by moving to a different community if they are unsatisfied with the quantity or quality of local public goods provided. Communities that invest more in public goods will attract individuals who place a high value on those goods, while communities with lower levels of provision may attract people with lower preferences. Tiebout's model suggests that local governments have an incentive to cater to the preferences of individuals because they rely on property or income tax revenue, which is
affected by the number and affluence of residents. By providing the desired public goods, communities can attract a larger tax base, enabling them to fund the services through increased revenue. On the other hand, a question arises, is employment what attracts people or are people who create employment? Jane Jacobs argues in her book "The economy of cities" from 1969, that job creation is directly related to the size and composition of a city's population. As more people move to an area, the demand for various services increases, leading to job creation. This, in turn, draws more people to the city, creating a cycle of population growth and economic expansion.

For future studies, the effect of taxes on migration could be analyzed, taking into account a single type of tax, for example, the tax on donations and inheritance. It would also be interesting to differentiate the population by age cohort and wealth level. Following Todaro (1980), there is a direct relationship between income and migration. According to his theory, individuals tend to migrate from low-income areas to high-income areas in search of better economic opportunities. Then, it will be worth using the income variable to explain migration between regions. Using the annual temperature average is leaving aside the consideration of essential data such as seasons of the year, heat waves, rainy seasons, drought zones, etc. As a solution to this, a coast variable could be used in future researches.

Throughout this study we have also encountered limitations. It would be interesting to see if there is a difference in the results according to the age of the population, but due to data limitations it has not been possible to make this distinction. Moreover, the period chosen is from 2008 to 2021 for two reasons: first, the bubble economy and the 2008 crisis could affect the analysis. Even taking data close to 2008 could already be affecting it. And second, for data availability.

Taking into account the results of the analysis and seeing that taxation somehow affects to the decision to migrate, policy makers should consider the impact of taxation on migration, as well as the impact of migration on the tax system. Tax systems should be designed to be efficient and equitable, taking into account the distributional consequences of migration.
REFERENCES


Pérez de Ayala, J.L. (1972): “Reflexiones y sugerencias sobre los estudios en torno al «esfuerzo fiscal»”, en Revista de Economía Política, N º 60


## APPENDIX

### Table 1: population size and population density.

<table>
<thead>
<tr>
<th>Provinces</th>
<th>Population size</th>
<th>Km2</th>
<th>Population density</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAIN</td>
<td>50</td>
<td>46624382</td>
<td>505990</td>
</tr>
<tr>
<td>Andalucia</td>
<td>8</td>
<td>8399043</td>
<td>87599</td>
</tr>
<tr>
<td>Aragon</td>
<td>3</td>
<td>1317847</td>
<td>47720</td>
</tr>
<tr>
<td>Asturias</td>
<td>1</td>
<td>1051229</td>
<td>10604</td>
</tr>
<tr>
<td>Balearic Islands</td>
<td>1</td>
<td>1104479</td>
<td>4992</td>
</tr>
<tr>
<td>Canary Islands</td>
<td>2</td>
<td>2100306</td>
<td>7447</td>
</tr>
<tr>
<td>Cantabria</td>
<td>1</td>
<td>585179</td>
<td>5321</td>
</tr>
<tr>
<td>Castilla y Leon</td>
<td>9</td>
<td>2472052</td>
<td>94224</td>
</tr>
<tr>
<td>Castilla-La Mancha</td>
<td>5</td>
<td>2059191</td>
<td>79461</td>
</tr>
<tr>
<td>Cataluña</td>
<td>4</td>
<td>7508106</td>
<td>32113</td>
</tr>
<tr>
<td>Comunidad Valenciana</td>
<td>3</td>
<td>4980689</td>
<td>23255</td>
</tr>
<tr>
<td>Extremadura</td>
<td>2</td>
<td>1092997</td>
<td>41634</td>
</tr>
<tr>
<td>Galicia</td>
<td>4</td>
<td>2732347</td>
<td>29575</td>
</tr>
<tr>
<td>Madrid</td>
<td>1</td>
<td>6436996</td>
<td>8028</td>
</tr>
<tr>
<td>Murcia</td>
<td>1</td>
<td>1467288</td>
<td>11314</td>
</tr>
<tr>
<td>Navarra</td>
<td>1</td>
<td>640476</td>
<td>10391</td>
</tr>
<tr>
<td>País Vasco</td>
<td>3</td>
<td>2189257</td>
<td>7234</td>
</tr>
<tr>
<td>La Rioja</td>
<td>1</td>
<td>317053</td>
<td>5045</td>
</tr>
<tr>
<td>Ceuta (autonomous city)</td>
<td>-</td>
<td>84263</td>
<td>20</td>
</tr>
<tr>
<td>Melilla (autonomous city)</td>
<td>-</td>
<td>85584</td>
<td>12</td>
</tr>
</tbody>
</table>

Source: own elaboration. Data from INE.
Table 3: variance inflation factor

<table>
<thead>
<tr>
<th></th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>taxeffortover</td>
<td>1.092</td>
<td>.916</td>
</tr>
<tr>
<td>diff temperature</td>
<td>1.082</td>
<td>.924</td>
</tr>
<tr>
<td>ln distance</td>
<td>1.016</td>
<td>.985</td>
</tr>
<tr>
<td>ln gdp product</td>
<td>1.007</td>
<td>.993</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>1.049</td>
<td></td>
</tr>
</tbody>
</table>

Source: own elaboration. Data from INE.

Table 4: Breusch-Pagan test for heteroskedasticity

<table>
<thead>
<tr>
<th></th>
<th>Ln migration</th>
<th>Ln male migration</th>
<th>Ln female migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>H0:</td>
<td>Constant variance</td>
<td>Constant variance</td>
<td>Constant variance</td>
</tr>
<tr>
<td>Chi2</td>
<td>0.54</td>
<td>0.72</td>
<td>0.72</td>
</tr>
<tr>
<td>Prob&gt;chi2</td>
<td>0.4618</td>
<td>0.3968</td>
<td>0.3968</td>
</tr>
</tbody>
</table>

Source: own elaboration. Data from INE.

Table 5. Lagrange Multiplier Test for Random Effects.

H0: random effects are insignificant.

<table>
<thead>
<tr>
<th></th>
<th>Ln migration</th>
<th>Ln male migration</th>
<th>Ln female migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chibar2</td>
<td>19817.02</td>
<td>19230.66</td>
<td>19755.50</td>
</tr>
<tr>
<td>Prob &gt; chibar2</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Own elaboration. Data from INE.
Table 6: Hausman test.

H0: fixed effects and random effects estimates are consistent but random effects estimates are efficient.

<table>
<thead>
<tr>
<th></th>
<th>Ln migration</th>
<th>Ln male migration</th>
<th>Ln female migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi2</td>
<td>195.40</td>
<td>190.90</td>
<td>159.94</td>
</tr>
<tr>
<td>Prob&gt;chi2</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Own elaboration. Data from INE.