THE JOURNEY TO SAFETY: CONFLICT-DRIVEN MIGRATION FLOWS IN COLOMBIA

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The Journey to Safety: conflict-driven migration flows in Colombia[1]

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Abstract

While there is a growing econometrics literature on the modeling of conflict and the interactions with trade, there has been relatively little evidence modeling the interregional migration behavior of individuals internally displaced by conflicts. The present paper models the flows of households forced to leave their residence because of violent conflicts in Colombia. Results shed light on the main determinants of what we call *journey to safety*. Violence appears to be one of the most relevant pushing effects together with the absence of institutions and the dissatisfaction with the provision of basic needs. Furthermore, for regions with extreme violence levels, individuals appear to be willing to relocate to more distant locations. On the destination side, most populated regions are more attractive as well as areas with a sufficient level of fulfillment of basic needs.

1. Introduction

Modeling spatial disequilibrium phenomena presents major challenges; in the last two decades, an emerging literature on the modeling of unexpected events has revealed important insights into the understanding of phenomena that are not mediated by a market (see Okuyama and Chang,

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2004). Internal (domestic) conflicts present an altogether different set of challenges; while the events may not be unexpected in the sense of a tornado, earthquake, flood or hurricane, their precise impact (both in terms of timing and location) and the degree to which they influence behavior may not be known or even predictable. Furthermore, while natural disasters affect the whole community and their impact is fairly random, the impact of conflicts on communities is not. It is rather a response to war strategies adopted by armed groups. Hence, it will not necessarily affect the whole community in the same way. The decision made to leave a region may well be significantly influenced by events in surrounding communities (a spatial network push effect) while the choice of destination will clearly be influenced by the perception of this destination as a region of safety (pull effect of the destination area). In other words, it would be unlikely for an individual to move to a place surrounded by conflicts even though the specific destination was relatively "safer."

The successful integration of the displaced population is a key element to avoid an associated economic decline (that might be generated by a region's inability to absorb significant numbers of in-migrants, especially if the latter are not able to participate in the labor force). In light of this, understanding the determinants of forced migration flows gains relevance. On the one hand, identification of push factors might favor the implementation of policies devoted to decrease outflows from areas characterized by high displacement. On the other hand, identifying pull factors will suggest reasons that attract individuals to a specific region. This can, in turn, help the authorities understand the needs of displaced population and contribute to finding ways of accelerating the integration process. Current Colombian legislation mandates that the government should provide assistance to displaced population during the three main stages of the process: prevention, emergency assistance (first three months after displacement), and

stabilization. Understanding the determinants of the flows between regions will assist policy-makers in the optimal allocation of funds provided for all three stages of displacement.

In the next section, we review some of the main events that have characterized recent violent conflicts in Colombia. We describe the origin of the tensions as a controversy between two political parties and its progression that gave birth to the so-called *guerrilla* groups. Drug trafficking fueled the conflict, promoted the emergence of paramilitary groups, and heighted attacks against the civil population. We also highlight some stylized facts about displacement in Colombia by describing the socio-economic determinants and consequences of the process. Section 3 introduces the model that we borrow from classical migration theory. The gravity model as presented in Molho (1986) is adapted to the case of displacement by including violence and neighbors' characteristics as determinants of the migration flows. Section 4 is devoted to the discussion of the results. Section 5 concludes the paper by summarizing the main evidence and providing suggestions for further research.

2. Displacement in Colombia: stylized facts and available evidence

Last century in Colombia was marked by two internal conflicts, which imposed heavy losses upon the civil population. The first conflict, dubbed as *La Violencia*, erupted as a consequence of small local conflicts and a strong political struggle between the two traditional Colombian parties (Liberal and Conservative). The assassination of a major political leader of the Liberal party in 1948 intensified the conflict in the main Colombian cities and moved quickly to rural areas. During this period, attacks against the civil population soared, causing homicides and forced displacement, among other disruptions. Even though official figures for forced

displacement are not available, those for conflict-related deaths estimate that nearly 30,000 people have lost their lives (Echeverry *et al.*, 2001). In addition, the urbanization of the country accelerated, enhanced by massive outflows of the rural population during this period. After a power sharing agreement between both parties was negotiated in 1958, the country experienced a period of relative peace.

However, the conflict never really subsided despite the sharp decline in violence. In the early 1960s, left-wing guerrilla groups, which sought to overthrow the government, emerged. These groups – FARC, ELN and ERP – originated from rural protests against land concentration; their actions were focused in isolated rural areas, and comprised sporadic attacks on government forces and occupation of rural towns (Echeverry *et al.*, 2001). The illegal drug trade fueled the conflict in the late 1970s and early 1980s by providing financial resources to armed groups. Moreover, the drug trade facilitated the creation of right-wing paramilitary groups, who were closely allied with drug barons and landowners, and contested the power of guerrilla movements in many regions. Stronger guerrilla movements and the emergence of paramilitary groups intensified once more the attacks against the civil population.

Aggressions against the civil population are not a causal by-product of the internal conflict, but an explicit and rational war strategy. By attacking the civil population, armed groups seek to consolidate and expand their territorial strongholds, weaken popular support for their opponents, and augment the financial resources (Azam and Hoeffler, 2002). Forced displacement, in particular, has become a widespread strategy to weaken the enemy's population support, clear regions for illegal crop growing and drug trafficking, and expropriate lands and natural resources (Engel and Ibáñez, 2007).

As a consequence of the soaring attacks against the civil population, nowadays more than 3.2 million individuals in Colombia have been forcefully displaced.[3] This figure is equivalent to 7.6 percent of the entire population of the country and is the second largest number of displaced worldwide (Ibáñez and Velásquez, 2009). In addition to the sharp increase during the period between 2000 and 2003, forced displacement has spread throughout the country. Today, more than 90 percent of the Colombian municipalities have received or produced displaced populations. [4] In fact, the number of municipalities affected by forced displacement has risen significantly; while in 1996 only 296 municipalities presented outflows, this figure rose to 1,032 in 2006. Forced displacement is a response to rising violence in the regions, which may be directly targeted to its victims or may increase the perception of risk in the region. Therefore, peaks of violence are sometimes associated with outflows of population seeking refuge from armed groups. People flee after being directly victimized by armed groups (reactive displacement), or to avoid being the victim of an attack (preventive displacement); yet, using survey data from 2,322 displaced households, Ibáñez and Moya, (2006) found that most displacement (86.2%) is a reaction to being a victim of direct attacks. Death threats, massacres, selective homicides, kidnapping and forced recruitment, among others, are violent aggressions adopted by rebel groups frequently identified as causes of displacement of the civil population. Left-wing guerrillas and right-wing paramilitary groups cause most of the forced migration in Colombia; as of December of 2005, guerrillas and paramilitary groups triggered respectively 47 and 17 percent of the displacement events (Ibáñez and Moya, 2006).

[3] The official registry for displaced population – Registro Único de Población Desplazada – informs that, as of November 30 of 2007, 2,272.559 individuals registered as displaced people (www.red.gov.co). Households surveys of the displaced population estimates that only 70% of the displaced population registers in this system (Ibáñez and Velásquez, 2009). Therefore, the total number of displaced individuals amounts to (roughly) 3.2 million people.

[4] Colombia is divided in 32 administrative units called Departments. Each Department is further divided into Municipalities, with a total of 1098 Municipalities in the country. The total extension of the country is roughly 440 thousand squared miles.

Some salient characteristics of the migration process of the forcefully displaced identified through survey analysis by Ibáñez and Moya (2006) are worth mentioning. First, displacement originates mostly in rural areas of the country; thus, many displaced persons were previously dedicated to agricultural activities (57.95%), had access to land, and their educational levels are low (on average 5.68 years of schooling) (Ibáñez and Moya, 2006). Secondly, in contrast to what happens in other countries, massive displacement is an exception in Colombia. While nearly 76.1 percent of displaced migrated individually, only 23.7 percent moved en masse.[5] Thirdly, migration is usually made directly to the destination municipality and not necessarily to nearby towns. Migration in stages is less frequent; only a little more than 11 percent of displaced households migrate to a temporary destination before choosing a final settlement. Migration within department boundaries accounts for 57.6 percent of the total but just 15.2 percent of households move to a place within the municipality. Finally, potential support from family, friends and government programs, distance from origin and anonymity are the main reasons for choosing destination sites. Ibáñez and Moya, (2006) find that support from family and friends is identified as the main reason for the selection of a destination site (65.3% of households), while potential access to government programs for the displaced population seems to play a less crucial role (26.3%). Distance to the origin municipality, although relevant, is less important and closeness is not desirable for some households. However, closeness to the origin was a motivation for the choice of the destination site in 30.3 percent of the cases. On the other hand, 17.1 percent of households surveyed prefer to locate as far as possible from their hometown. Presumably these households are ones that have been traumatized by the violent attacks they endured, and feel safer living far away from their aggressors (Ibáñez and Moya, 2006)

[5] www.red.gov.co Accessed on the 31st of July 2006.

Welfare losses from forced displacement are substantial. Ibáñez and Vélez (2008) estimate welfare losses caused by displacement are 37 percent of the net present value of rural lifetime aggregate consumption. The sudden and considerable loss of physical, human, social and financial capital, and the difficulty of participating in urban labor markets are the main causes of the sharp decline of economic welfare. A well-planned migration is seldom possible. Thus, losses of physical assets are large because selling location-specific assets, such as land, is difficult and many households are forced to abandon or sell their land at a low price especially in cases where the level of violence precludes an ordered departure. In addition, the dynamics of forced migration depreciates human capital: households disintegrate, psychological incapacity of post traumatic stress disorder as a consequence of the conflict is an obstacle that may preclude participation in urban labor markets, and returns from human capital drop since many of the migrants' labor abilities lie in agricultural activities which are not demanded in urban areas. Financial and social capital losses are also noteworthy. Since the displaced population faces significant obstacles to access urban labor markets and lack assets to start a new productive activity, drops in income from asset losses are difficult to recuperate in destination sites (Ibáñez and Moya, 2006). The restricted income generation opportunities and risk-insurance mechanisms available for this population may direct displaced households into poverty traps (Hulme and Shepherd, 2003).

In order to mitigate the impact of forced displacement, the Colombian government has created comprehensive legislation, recognized as some of the most progressive in the world, implemented several special programs for the displaced population, and allotted growing financial resources to these challenges (WRITENET, Colombia , 2006). The Colombian legislation was designed to protect displaced households during three stages of assistance:

prevention, humanitarian emergency assistance, and socioeconomic stabilization. The Humanitarian Emergency Assistance (HEA) provides basic humanitarian aid during the first three months of displacement.[6] After these first three months of HEA, several programs support the process of economic stabilization of displaced households.[7] The flow of special aid is halted only when displaced households are able to provide acceptable living conditions for themselves. In spite of the growing efforts of the government, forced displacement is still prevalent and socioeconomic conditions of displaced individuals are indeed worrisome. Empirical evidence indicates that displaced populations face hardships that are worse than the urban poor and extreme poor in reception municipalities. In addition, socioeconomic conditions appear to worsen after a year of settlement (Ibáñez and Moya, 2006).

It is hard to determine the magnitude of the total government expenditures related to prevention of forced movements and assistance to the displaced population. However, in the report of the Contraloria General de la Nacion,[8] it is estimated that between 2000 and 2003 the entities affiliated with the National System for the Attention of Displaced Population (SNPAID) invested a total of about $(US)216 million in different programs related to displacement. Of these expenditures, about 57% was directed to the stabilization, 35% to emergency attention and only 8% to prevention. Furthermore, even though 57% was assigned to the stabilization stage, its coverage of the total population affected is still minimal.

3. The Model

[6] HEA provides, food, water, housing, medical services, psychological help and nutritional support.

[7] During the socioeconomic stabilization, the government should provide access to land, credits, technical assistance, labor training, basic infrastructure, health coverage, education, job opportunities and housing.

[8] Office of the Comptroller General (2003)

The present paper analyses aggregate inter-municipality flows of displaced individuals in Colombia. Let us clearly state that our purpose is not to model individuals' decision on whether or not to migrate; rather, we intend to identify the main pull and push factors that determine aggregate interregional flows. Furthermore, it is important to clarify that we look only at individuals who have been displaced by violence. Therefore, we do not intend to model the general migration processes in Colombia but rather we concentrate on those movements whose genesis can be traced to the violent conflict. To address this particular problem, we look at traditional migration models and introduce elements specific to the displacement process due to violence.

Migration models can be classified according to different levels at which the migration process is studied. Micro-behavioral models focus on individuals' migration decisions and therefore are developed in the context of discrete choice models (probit, logit or multinomial logit specifications). This framework has been used to study a wide range of problems such as modeling travel behavior, residential mobility and housing choices (see Pellegrini and Fotheringham, 2002 for a recent review). Micro-behavioral models, however, require knowledge of the individuals' characteristics, as they are important determinants of the location choice. In the case of population displaced by violence, this information is usually not available because of security concerns. As an alternative, one could look at aggregate choices and still remain in the context of discrete choice models. In order to do this, it would be necessary to include in the model all the alternative locations in the individual's choice set. With a large number of alternatives, as is the case in this study, the estimation process becomes much more complicated. Furthermore, theoretical assumptions such as the well-known Independence of Irrelevant Alternatives (IIA), required in a multinomial logit context, become almost impossible

to sustain. Since we are not modeling individual decisions, we concentrate on models of aggregate flows, and more specifically on gravity models.

The gravity model has its origins in E.G. Ravenstein's seminal papers "The Laws of Migration" (1885, 1889). In its original formulation, the gravity model defined migration flows from region *i* to region *j* as a function of population at origin (*i*), population at destination (*j*) and distance between the two (d_{ij}). This basic form of the gravity model was then extended (Lowry, 1966) to include economic variables (i.e. wages and unemployment rates). Since then, the gravity model has been applied and improved in various studies on migration (i.e., Neidercorn and Bechdolt, 1969; Plane, 1984; Greenwood *et al.*, 1991; Fik and Mulligan, 1998; Newbold and Peterson, 2001 among many others).

The gravity model as defined by Molho, (1986) assumes the following general form: [9]

(1) $$M_{ij} = f(A_i, B_j, D_{ij})$$

where M_{ij} is the migration flow (generally measured in terms of number of migrants) between regions i and j, A_i are push factors that produce people movements from the origin region (i), B_j are pull factors that make destination (j) attractive to migrant, and D_{ij} is a measure of the distance between i and j (Molho, 1986; Niedercorn and Bechdolt, 1969).

In the context of a gravity model, distance between origin and destination regions is considered a key determinant of migration. Distance is supposed not only to reflect travel costs but also other type of costs not directly measurable but equally important such as psychological and information costs associated with moving and resettlement.

[9] Gravity models are sometimes referred to in the literature as "spatial interaction models" (Sen and Smith, 1995; Roy and Thill, 2004). An extended literature in the context of international trade exists for this typology of models (i.e. Anderson, 1979; Anderson and Wincoop, 2004)

In the gravity model, migration flows are expected to be positively related to population at origin and destination, while negatively related to the distance between the two areas (Henry *et al.*, 2003). Including population at both origin and destination is important to take into account the increases in flows which result exclusively from increases in population size (i.e. larger flows are expected from more populated regions). Population effects could enter the gravity model in two different ways. The first alternative is to use relative flows or frequencies instead of counts as a dependent variable. However, including both origin and destination population among the explanatory variables might be preferable since it allows identifying the individual effects of population at origin and destination regions on migration (Etzo, 2007).

The so-called *gravity variables* (distance and population) may also be considered as important determinants of Internally Displaced People (IDP) movements. Therefore, the gravity model seems a natural framework to study displacement in Colombia and understand the factors that determine the size of the aggregate flows. General migration theory predicts that movements are more frequent between areas close in space because of lower moving costs and similarities in living conditions. Such rationale may be extended to the case of IDP migration flows. Everything else being equal, we expect that IDPs when forced to abandon their home, will prefer to move as close as possible to their original settlement rather than to a completely different area of the country, minimizing both moving and resettlement costs.

Among the push and pull factors defined in equation (1) traditional interregional models include wages, unemployment, education and other socio-economic characteristics of the origin and destination regions. However, when looking at forced displacement, one must take into consideration factors other than those found in the classical migration literature. Migration and forced displacement are far from being similar. While traditional migrants are seeking to

enhance their economic welfare, displaced people may be willing to trade-off income for improvements in security. Determinants of the decision to move are influenced by different forces in situations of displacement. In particular, all factors related to the intensity of the conflict in the regions are crucial in the specification of the utility of individuals and may influence the "choice" of moving more than traditional migration determinants. From this perspective, the question raised in a paper by Davenport *et al.*, (2003) should be noted:

> "*Why would someone choose to abandon her/his home, livelihood, and social ties in favor of an uncertain future elsewhere? Surely this is not a decision people make lightly nor is it one devoid of complexity: refugees and internally displaced persons typically abandon their housing, belongings, member of their family and long time friends, as well as the lands where they may have lived for generations*".

Among economic costs and benefits considered by the movers, traditional migration theory suggests that individuals evaluate the ability to provide for their own needs and those of their families at alternative locations. Lower income levels at the origin region will tend to push individuals out, increasing outflows. Similarly, higher income levels in region j will pull population toward this region and, consequently, increase inflows coming from all other regions. However, as discussed above, IDP movers may trade off income for enhanced security. Even though economic factors may play a role, individuals feel their lives and those of their relatives threatened and therefore are expected to take into consideration the intensity of the conflict. As long as there is an improvement in security, positive inflows to region j may occur even if there is a loss in net income. A more complete specification of the process would place some uncertainty on the successful completion of the journey itself.

In this work, we propose the inclusion of characteristics of the neighbors of both origin and destination regions to take into account to some extent the spatial nature of the location decision taken by IDPs. We expect that characteristics of neighboring regions will play an important role in the relocation decision. Let us consider a situation in which two regions are very similar, but only one of them is surrounded by neighbors with high economic indicators and low levels of violence. Displaced individuals who are deciding where to go will see their decision influenced and will favor, all other things being equal, the destination with relatively "better" neighbors. However, having neighbors with similar (or better) characteristics does not necessarily have a positive effect on the inflows of a region. For example, being surrounded by very attractive neighbors may lower the incoming flow since people may prefer to move to its neighbors rather than to that region.

Furthermore, one would expect the characteristics of the origin-neighbors to influence the outflow from region *i*. Provided that displacement is closely linked to the strategies of armed groups, a group of regions may be important to armed groups due to its natural resources or because it may serve as a corridor to export illegal drugs and import arms. Therefore, characteristics of origin-neighbors are likely to affect outflows as well.

Including neighbors' characteristics would lead to reformulating equation (1) as follows:

$$M = f\left(A, B, D_{od}, W_o A, W_d B\right) \tag{2}$$

where W_o and W_d are squared non-negative matrices whose elements describe the neighboring relation between observations in the sample. Hence, the term $W_o A$ refers to the characteristics of the neighbors of the origin region while $W_d B$ refers to the destination's neighbors characteristics. For example, when a contiguity criterion is used to describe such relationships,

the elements of this matrix take the value of one if the corresponding spatial units are neighbors (i.e. they share a common edge or vertex) and zero otherwise.[10] All the diagonal elements are generally set to zero under the assumption that none of the spatial units can be considered self-neighbor. Furthermore, different definitions of contiguity are available in the literature ranging from binary to more sophisticated definitions embedded in some distance criteria that can be either cardinal (such as Euclidean distance) or ordinal (such as n nearest neighbors). In practical applications, the matrix is row standardized to avoid some computational issues and to provide a more direct interpretation of the estimated spatial autocorrelation parameter. To compute the spatial lags we use a weights matrix based on a six nearest neighbor criteria.

In a recent paper, LeSage and Pace (2008) have extended the classical cross-section spatial regression model (Anselin, 1988) to the case of origin-destination data. One of the differences between standard spatial econometric models and the model for interregional flows presented in LeSage and Pace (2008) is the dimension of the sample. The former is estimated over a sample that includes observation over n spatial units, whereas the latter model entails $n^2 = N$ origin-destination pairs of observations. Considering this difference in the dimension of the sample when analyzing origin-destination flows, LeSage and Pace (2008) provide a framework to extend the definition of a spatial weights matrix to the cases of observations reflecting flows from origin to destinations rather than simple cross sectional observations over a set of spatial units. LeSage and Pace (2008) define the matrices $W_d = I_n \otimes W$ and $W_o = W \otimes I_n$ that correspond to "destination-based" and "origin-based" neighbors, respectively. Furthermore, borrowing a notion in Griffith and Jones (1980) they observe that W_d should reflect the fact that flows associated with a particular destination will increase or fall depending upon the magnetism of the

[10] A classical reference for an exhaustive treatment of the spatial weight matrices is found in Anselin (1988).

neighboring destination locations. Similarly, W_o reflects the idea that flows from an origin are amplified or lessened in accordance with the characteristics of its neighbors.

In this paper, we follow LeSage and Pace (2008) in spirit by using their definition of origin and destination neighbors to define the terms W_oA and W_dB in equation (2). It is important to stress however, that we choose not to follow an explicit spatial econometric approach as in LeSage and Pace (2008) given the characteristics of our dependent variable. As is further discussed in section 5, our dependent variable, the number of IDPs moving from municipality *i* to municipality *j*, has many zero values.

We use a Tobit model (Maddala, 1983; Verbeek, 2003) to properly account for the censored information through the specification of a latent variable that is observed only when it is different from zero. The model is estimated by Maximum Likelihood to guarantee consistent estimation of the vector of parameters (Amemiya, 1973).

To the best of our knowledge, there is currently no theoretical work on the testing and estimation of spatial Tobit models when origin-destination data are being used. Therefore, we concentrate on a formally *a*-spatial specification while introducing space through the consideration of the neighbors' characteristics at both origin and destination. This specification, which has been referred in the literature as a cross-regressive model (Florax and Folmer, 1992; Anselin, 2002), does not require the application of special estimation methods. Furthermore, the interpretation of the model coefficients does not change compared to the linear regression model (for technical details see Anselin, 2006).

We expect that introducing the characteristics of neighboring regions will shed light on the determinants of displacement flows and their direction. By explicitly introducing these variables

in a gravity-based migration model, we are able to test whether origin-neighbors push and destination-neighbors pull factors play an important role in determining displacement flows.

4. The Data

The data used in this study comes from two principal sources. Displacement flows are available from the Presidential Agency for Social Action and International Cooperation[11] (henceforth AS). On the other hand, all other explanatory variables are drawn from CEDE (2005) Municipal Data. Variables are measured for the year 2000 to avoid endogeneity problems since characteristics of the region may change over time as a function of displacement outflows as well as inflows. Table 1 contains a description of all variables used in the study.

<< insert table 1 here>>

Flow data refer to the total number of individuals displaced by municipality between the years 1996 and 2006. Information was available for 1,032 municipalities, providing us with a total sample size of 1,063,992 observations (excluding movements within the same municipality). Although we could consider annual observations, we decided not to take advantage of this information because of a potential problem in the data. In this respect, we must devote a few lines to the description of the way in which displacement figures are calculated. First, the flows made available by AS do not include any other form of migration but displacement. The database includes only individuals who have explicitly declared their status as "displaced" in front of a public authority. Declaring themselves as displaced is a necessary condition to obtain the aid that the government provides to the displaced population (Programa de Atencion a la Poblacion Desplazada). As a consequence, there might be a mismatch between the time people

[11] Agencia Presidencial para la Accion Social y la Cooperacion International

move and when they register. Therefore, using annual observations can be problematic since annual counts may or may not reflect true movements for that year. Hence, we decided to aggregate flows over the years 2001 through 2006. We use the logarithm of the total number of displaced individuals moving from municipality *i* to *j* between 2001 and 2006 as our dependent variable.

One of the strongest stylized facts in the migration literature is the tendency to cluster in space. Different explanations have been offered, mostly related to the "call effect," the search for networks and the attraction of the welfare state (Zavodny, 1999; Bartel, 1989; Borjas, 1998; 1999). In our context of people that have been displaced for violence, support from family and friends is a crucial reason for selecting a destination site. In light of this, we also developed a migrant stock variable by aggregating the total number of displaced between 1996 and 2000.[12] Considering the persistence of displacement flows, if a flow of considerable size occurred from site *i* to *j* in the recent past, we expect it to be large also in the future. Therefore, we anticipate the coefficient for this variable to be positive and strongly significant.

Figure 1 reports quantile maps of inflows and outflows from each region over the two periods, 1996-2000 and 2001-2006. The total number of displaced over the entire period amounts to almost 2.5 million individuals, roughly corresponding to the 5% of the Colombian estimated population for 2008. Most of the movements (about 94%) were registered between 2000 and 2006. Further, the distribution of the displaced population is fairly stable over time if we consider this restricted period (see table 2). The highest number of displaced individuals (almost half million) is registered in 2002, whereas only a few movers (about 10,000) were registered in

[12] Displacement figures were not collected prior to 1996.

1996. In 2006, there were 12 municipalities with at least 1,000 displaced persons. Two of them (Dibulla and Vista Hermosa), displaced more than 2,000 individuals.

GDP per-capita is used in this study as a proxy for income level in each municipality. Although wages would have been a better measure, they are unfortunately not available at the municipal level. The effect of GDP per-capita on outflows from a region may be twofold. Higher GDP per-capita generally implies elevated capital ownership. As a consequence, people in a municipality with higher per-capita GDP levels are more reluctant to move since their decision also involves leaving behind their properties. Following this interpretation, we should expect the value of the coefficient to be negative. However, higher GDP per-capita can also facilitate movements. Individuals may in fact be able to easily absorb moving costs when it becomes necessary to leave their land. Furthermore, paramilitary groups are more interested in controlling municipalities with high GDP levels. This last two interpretations would suggest a positive coefficient; the higher is GDP per-capita, the higher the probability of moving. The effect of GDP per-capita at the destination is instead expected to be positive. Richer municipalities are appealing for potentially offering higher living standards.

Since movers are concerned about providing for their (basic) needs, it is also important to look at other measures of the quality of life in both origin and destination regions. For this purpose, we introduce an index of unsatisfied basic needs. As its name suggests, this index, calculated by the national department of statistics (DANE), provides the percentage of the population whose basic needs (e.g. minimum education level, housing, access to potable water, and minimum calorie intake) are not satisfied. It can be interpreted as a measure of poverty based on an exclusion criterion. We expect income and quality of life indicators to work in the same direction. Higher income and better quality of life in a region should attract individuals to it. On the other hand,

unsatisfactory living conditions will push people to move out of the origin. However, due to the definition of the index, the sign of the parameters should be reversed since better (worse) quality of life implies low (high) levels of the unsatisfied basic needs.

We have repeatedly emphasized that violence is one of the main determinants of displacement movements as much as potential income differentials are the main cause of traditional migration. Therefore, the threat (directly or through a family member) of guerrilla attacks, kidnappings or simply not feeling safe, all constitute strong incentives to relocate. As a measure of the risk perceived, we include an indicator of the level of violence in each municipality. Specifically, we use the number of victims of massacres (per 10,000 inhabitants). Among many candidate indicators for the level of violence, this one presented three relevant advantages. The practical benefit was related to the fact that there were no missing values for the municipalities considered in our analysis. On the other hand, considering simply guerrilla attacks would have been insufficient as paramilitary groups carry a great responsibility in displacement. Massacres are one of the principal and more visible war strategies of paramilitary groups. Connected to this, using this specific indicator excludes the possibility that we could be measuring types of violence other than those directly related to the conflict (such as violence in metropolitan areas). The risk of violence will drive people out from where they live, and the perception of a potential danger in a destination will divert displaced to other locations. Hence we expect violence to be positive at the origin and negative at the destination sites. Municipalities where people feel vulnerable under the threat of violence experience higher outflows.

As a counter factor, people feel safe when living in areas with an enhanced presence of institutions. Institutional variables included in our analysis comprise measure of financial, governmental and educational operations. In more detail, we include the number of health

institutions, the number of tax collection offices and the number of schools and libraries in the municipality. Generally speaking, it seems reasonable that the higher the presence of institutions the lower will be the incentive to move. However, the interpretation of the variable reflecting the level of education is not as straightforward as for the other variables. In fact, it can also be interpreted as a measure of human capital present in the region. In other terms, education can be thought of as behaving similarly to the income variable. A large stock of human capital implies higher income level that in turn is associated with larger outflows. On the other hand, using individual data, Engel and Ibañez (2007) suggest that higher education may be negatively related to the decision to move given that more educated people are able to devise better strategies to protect themselves from attacks of illegal armed groups. Besides, institutions can also be considered as a cost reduction factor if measured at the destination. Financial and governmental institutions suggest more active markets and may facilitate the search for new jobs and general settlement in a new region. The presence of educational institutions will also be associated with lower moving costs. Households take into account access to education and the presence of educational institutions facilitates in the adaptation of children to a new area. Closeness to educational facilities means short travel distance to school and therefore lower time and economic costs.

Our model also includes population in 2000. Since our dependent variable is number of migrants rather than migration rate, we believe it is important to account for the demographic dimension of the region. Everything else being equal, higher population levels will correspond to higher outflows simply because of more potential movers. In addition to the reasons widely explained in traditional migration theory and discussed in section 3, larger cities provide anonymity and therefore a sense of protection to displaced individuals.

Traditional migration literature suggests a negative effect of physical distance on the flow between origins and destinations. The main explanation for this negative effect is usually associated with the increasing relationship between moving costs and distance traveled.[13] Since no information is available on moving costs, an alternative proxy was employed: we introduce a conventional measure of distance between the geographic centroids of each pair of municipalities. Since moving costs increase with distance, we expect to see, *ceteris paribus,* larger flows to closer municipalities.

An interaction term distance-violence is also relevant to the present model. The logic behind adding such a variable could be summarized as follows. Distance is supposed to have polar effects on destination choices. However, there will be a percentage of people moving as far away as possible from their original residence. Most likely, those will be the individuals traumatized by violence. Therefore, we expect to find that for municipalities in which the level of violence is extremely high, distance will have a positive rather than a negative effect. The distance-violence interaction variable is created by first generating a dummy variable equal to one for all municipalities belonging to the upper 10% of the violence distribution. Then, we multiply this dummy with the distance variable. If our expectations are correct, we expect the distance-violence interaction term to have a positive coefficient.

We also include an accessibility variable (distance from the capital of the department to which the municipality belongs) under the hypothesis that highly accessible municipalities will exert an attracting power over movers. Besides, accessibility is also expected to enhance outflows. Finally, to capture the effect of amenities (such as climate, coastline, terrain) that are specific to the geographical location of a municipality we include dummy variables for the major natural

[13] As a referee correctly pointed out, distance not only captures out-of-pockets costs, but also psychic costs and information costs.

zones of the country (e.g. Eastern plains, Pacific, Andean and Caribbean zones). While controlling for these differences/similarities in geographical conditions, the dummies can also be considered an indirect measure of "network" effects, in terms for example, of cultural and race affinities.

5. Estimation Results

Table 3 reports the values of the estimated coefficients and the robust standard errors of three (nested) specifications of the gravity model presented in Section 3.[14] The first column (Model 1) refers to a specification that only includes the migrant stock variable and an intercept. Model 2 includes all the variables but not their spatial lags. Finally, Model 3 also includes the spatial lag of the explanatory variables. The labels O and D used in the table indicate respectively variables measured at the origin and at the destination region. The label ON identifies the characteristics of the origin's neighbors and the label DN indicates destination-based neighbors.

The total number of observations in the sample is over 1 million. The number of non-censored observations is slightly smaller than 33,000 corresponding to just over the 3% of the total observations. Table 3 also reports three measures of goodness of fit, namely the McFadden's Pseudo *R*-square, the Akaike information criteria (AIC) and the Schwarz criterion (BIC).[15] Also, considering the elevated number of observations, all these measures suggest that the model fit the data relatively well. The migration stock variable is able to explain by itself more than 8% of the total variability in the dependent variable. Nonetheless, the increase in the goodness of fit measures from the simplest to the richer specification justifies the inclusion of additional

[14] Given that the dependent variable is number of migrants rather than a migration rate, we decided to employ a robust estimator of the variance covariance matrix because of the possible presence of heteroskedasticity.
[15] The AIC penalizes additional parameters less strongly than BIC. Other than that, the two measures are analogous.

variables considered in Model 3. It is also noteworthy that coefficients are very stable across specifications. Therefore, we focus our discussion on the most complete specification rather than including specific comments on the nested specifications.

The first important conclusion stemming from the results is that, as expected with everything else being the same, larger flows are directed to locations closer in space. The negative and very significant coefficient captures all costs (transportation, but also psychic and information costs) that increase with distance. The coefficient for the variable measuring previous migration flows is positive and extremely significant. The "call effect" and the search of networking are particularly important phenomena in the context of displacement.

GDP per-capita at the origin favors displacement flows.[16] Richer individuals are able to easily absorb moving costs. It is interesting to note that per-capita GDP of the origin neighborhood is also positive and significant. The explanation for this is the same as for the positive coefficient of GDP per-capita at destination. Richer municipalities are more attractive to displaced individuals for the reason that they potentially offer higher living standards. This is true for the origin neighbors as well as for the destination neighbors.

The index measuring unsatisfied basic needs has the expected sign in all cases and is strongly significant.[17] Movers are concerned about providing for their (basic) needs and hence quality of life in both origin and destination municipality matters. The lower the quality of life in the origin municipality, the higher the tendency to move out of it. If neighbors of the origin do not have

[16] It is important to note here that the GDP per-capita measure used is an imputed value. We impute municipal GDP from departmental GDP, which are reported every year by the National Statistical Office. In particular, we used information on tax collection for municipalities to infer their contribution to the total productive activities. The contribution is calculated as the total taxes collected by municipality divided by total taxes collected by the department. This share is applied to estimate the municipal GDP.

[17] This is not the case for the coefficient of the variable D_Unsatisfied Basic Needs in Model 2 (which is not significant). Also, it is the only coefficient whose significance changes between the models.

basic needs satisfied either, the outflows from a municipality increase. Accordingly, when the quality of life at the destination is high, the likelihood that the region receives movers increases. If neighbors of a certain destination offer inferior living conditions than the destination itself, the chance of a positive inflow for that region will be larger as is confirmed by the positive (and significant) coefficient for the variable measuring the living standard indicator at the destination neighbors.

The presence of institutions at the origin reduces the incentive to move as confirmed by the negative sign of the variable O_Tax. The interpretation of the coefficient for the variable O_Health is less straightforward. The direction of the flow seems to be influenced by the presence of institutions, given that the estimated coefficient for D_Health is positive and significant. The negative sign of the D_Tax variable might be reflecting some sort of perception that tax pressure is higher at the destination municipality because of the concentrated presence of collection offices. How should we interpret the negative and significant estimated coefficients for the variables ON_Health and ON_Tax? The valuable presence of institutions right across the municipality border can act as a factor inducing people to stay rather than to move. This can be particularly relevant for example for those people living close to the municipality borders. They will not only look at the situation in their own residence, but also take into consideration the surrounding environment in evaluating the decision to move. Everything else being equal, individuals seem to favor destinations whose neighbors are characterized by a significant presence of institutions.

Among the indicators for institutional presence, we also included a measure of the educational level in the municipality. In the previous section, we made the point that the behavior of the educational variable is not necessarily in line with all the other indicators of the institutional

level. In fact, the education coefficient is positive both in the origin and destination municipality. Better presence of educational institutions might suggest that the population in the municipality has higher educational levels and therefore the resettlement process might be less costly. Furthermore, a municipality with higher education levels is also more attractive for the displaced population because it provides better education opportunities for the young people and better social and cultural environments. In the same line of thought, it sounds appropriate that the education variable measured at the origin and destination neighbors has a positive and significant coefficient in both cases.

The coefficient for the violence indicator is significant at the origin, at the destination and both origin and destination neighbors. Furthermore, the interaction term between distance and violence is also strongly significant. For destination regions, the violence variable has a negative and significant effect. Flows to a municipality decline with high levels of violence. People tend to leave their lands when they feel the threat of violence and municipalities with high violence are clearly less attractive to movers. When the surrounding municipalities exhibit an elevated number of massacre victims the outflows are larger. Individuals may be afraid of the conflict intensifying and moving closer to their homes. The violence variable measured at the neighbors of the destination act as deterrent in that they reduce the inflow to that destination. The interaction term, distance-violence, is relevant to the present analysis since the coefficient is positive and significant. Individuals traumatized by violence want to be as far away as possible from the conflicts. The coefficient suggests that larger outflows are observed for more distant locations for those municipalities with extreme levels of violence, i.e. IDP's are traveling farther in order to feel safe and thus reduce the threat of being an object of violence. However, it is important to note that the combined effect of violence and the distance-violence interaction term

is still negative for people from violent origins. For these people, on average, distance is less of a hindrance compared with those from less violent municipalities. [18]

Population and accessibility are two other factors that facilitate inflows. While population has a positive effect on outflows, when a municipality is not accessible individuals will tend to leave (as shown by the positive and significant coefficient of the variable measuring the distance between each municipality and the department capital). The variables for the origin and destination neighbors are significant and present with the expected sign.

A final comment on the dummies; the fact that all the coefficients are significant suggests that controlling for the effect of amenities and geographical-specific characteristics is important. It is interesting to note, for example, that people will be more reluctant to move if they live in the Caribbean part of the country.

6. Final Comments and Conclusions

As we stated in the introduction, one of the main motivations for the present paper is the lack of evidence modeling interregional migration behavior of individuals displaced by conflicts. We started by describing the recent history of violent conflict in Colombia and drawing some stylized facts about displacement. We then presented the empirical model based on some recent advances in spatial econometrics modeling of origin-destination flows. In particular, the model estimated in the present paper can be considered an extension of the traditional gravity model specification including the characteristics of both origin and destination neighbors. We applied this framework to data for displaced population at a municipal level for Colombia.

[18] We are grateful to an anonymous referee for bringing up this point.

Our results suggest that the *journey to safety* of IDPs is determined, as expected, to a great extent by violence together with absence of institutions and the inability to meet basic needs. On the destination side, most populated regions are more attractive as well as areas with a sufficient level of fulfillment of basic needs.

We recognize the limitations of this study to the extent that individual data on displaced population are not used and that the displacement flows are analyzed at an aggregate level. Furthermore, this study is a first step in understanding the dynamics of displacement movements related to the violent conflict in Colombia. On the methodological side, future work should extend the model by taking an explicit spatial econometric approach and exploring the possibility of the presence of spatial autocorrelation not accounted for in this study.

Table 1: Description of Variables. All variables are measured in 2000.

Variable	Description
Displaced	Logarithm of the total number of displaced individuals moving from municipality *i* to municipality *j* between 2001 and 2006
Gdp per-capita 2000	Logarithm of the Municipality GDP per-capita in 2000
Unsatisfied Basic Needs	Index of Unsatisfied Basic Needs per Municipality
Healt	Logarithm of the Number of Health Institutions in the Municipality
Tax	Logarithm of the Number of Tax Collection Offices in the Municipality
Education	Logarithm of the Number of Educational Institutions in the Municipality (Schools and Libraries)
Violence	Logarithm of the Measure of violence (Number of Victims of massacres per 10,000 inhabitants)
Distance from department capital	Logarithm of the Distance from the capital of the Department (Km)
Population in 2000	Logarithm of the Total population in 2000
Displaced Stock	Logarithm of the total number of displaced individuals moving from municipality *i* to municipality *j* between 1996 and 2000
Distance	Logarithm of the Distance between the central point of municipalities *i* and *j*
Distance-O_Violence	Logarithm of the Interaction variable between distance and level of violence in the origin municipality
Oriental	Dummy equal one if the municipality is in the eastern region
Pacifica	Dummy equal one if the municipality is in the pacific region
Caribe	Dummy equal one if the municipality is in the Caribbean region

Table 2: Number of displaced individual by year (period from 1996 to 2006)

Year	Number of Displaced	Percentage
1996	10,862	0.44
1997	38,224	1.54
1998	56,569	2.28
1999	60,543	2.44
2000	345,471	13.90
2001	427,789	17.21
2002	465,335	18.72
2003	264,703	10.65
2004	261,515	10.52
2005	297,826	11.98
2006	256,560	10.32
Totals	2,485,397	100.00

Table 3: Estimation results for three Tobit specifications. The label O indicates variables measured at the origin. The label D indicates variables measured at the destination. The label ON indicates neighbors of the origin region. The label DN indicates neighbors for the destination region. Robust standard errors in parenthesis.
Significance level: *** 1%, ** 5%, * 10%.

Dependent Variable: Displaced	**Model 1**	**Model 2**	**Model 3**
General variables			
Intercept	-8.133***	-32.966***	-39.390***
	(0.029)	(0.235)	(0.346)
Displaced Stock	3.597***	1.161***	1.105***
	(0.022)	(0.013)	(0.012)
Distance		-0.087***	-0.087***
		(0.001)	(0.001)
Distance-O_Violence		0.006***	0.006***
		(0.001)	(0.001)
Origin Variables			
O_Gdp per-capita 2000		0.063***	0.0397**
		(0.006)	(0.006)
O_Unsatisfied Basic Needs		1.609***	0.845***
		(0.022)	(0.031)
O_Healt		0.054***	0.060***
		(0.019)	(0.019)
O_Tax		-0.335***	-0.248***
		(0.028)	(0.028)
O_Education		0.168***	0.123***
		(0.012)	(0.013)
O_Violence		0.100***	0.065***
		(0.023)	(0.022)
O_Distance from department capital		0.105***	0.026***
		(0.008)	(0.009)
O_Population in 2000		1.140***	0.943***
		(0.013)	(0.014)
Destination Variables			
D_Gdp per-capita 2000		0.111***	0.128***
		(0.007)	(0.007)
D_Unsatisfied Basic Needs		-0.002	-0.253***
		(0.021)	(0.031)
D_Healt		0.085***	0.116***
		(0.019)	(0.019)
D_Tax		-0.599***	-0.504***
		(0.021)	(0.022)
D_Education		0.128***	0.129***
		(0.011)	(0.012)
D_Violence		-0.198***	-0.185***
		(0.015)	(0.015)
D_Distance from department capital		-0.283***	-0.227***
		(0.008)	(0.009)
D_Population in 2000		1.256***	1.185***
		(0.012)	(0.013)

Origin Neighbors' Variables			
ON_Gdp per-capita 2000			-0.029**
			(0.014)
ON_Unsatisfied Basic Needs			1.043***
			(0.043)
ON_Health			-0.069
			(0.053)
ON_Tax			-0.250**
			(0.121)
ON_Education			0.046
			(0.031)
ON_Violence			0.631***
			(0.038)
ON_Distance from department capital			0.230***
			(0.017)
ON_Population in 2000			0.600***
			(0.025)
Destination Neighbors' Variables			
DN_Gdp per-capita 2000			-0.109***
			(0.014)
DN_Unsatisfied Basic Needs			0.574***
			(0.045)
DN_Health			0.272***
			(0.051)
DN_Tax			0.185**
			(0.091)
DN_Education			0.088***
			(0.030)
DN_Violence			-0.213***
			(0.038)
DN_Distance from department capital			-0.152***
			(0.017)
DN_ Population in 2000			0.064***
			(0.023)
Dummies			
O_oriental		2.230***	2.213***
		(0.027)	(0.030)
O_pacifica		0.134***	-0.095***
		(0.027)	(0.028)
O_caribe		-0.308***	-0.719***
		(0.030)	(0.033)
D_oriental		1.046***	1.040***
		(0.033)	(0.035)
D_pacifica		0.019	-0.128***
		(0.027)	(0.029)
D_caribe		0.636***	0.332***
		(0.030)	(0.035)
Number of observations	1,063,992	1,063,992	1,063,992
Number of uncensored observations	32,988	32,988	32,988
Pseudo R-square	0.0835	0.3129	0.3194
Log pseudolikelihood	-188,181	-141,077	-139,751
AIC	376,369	282,208	279,588
BIC	376,405	282,529	280,099

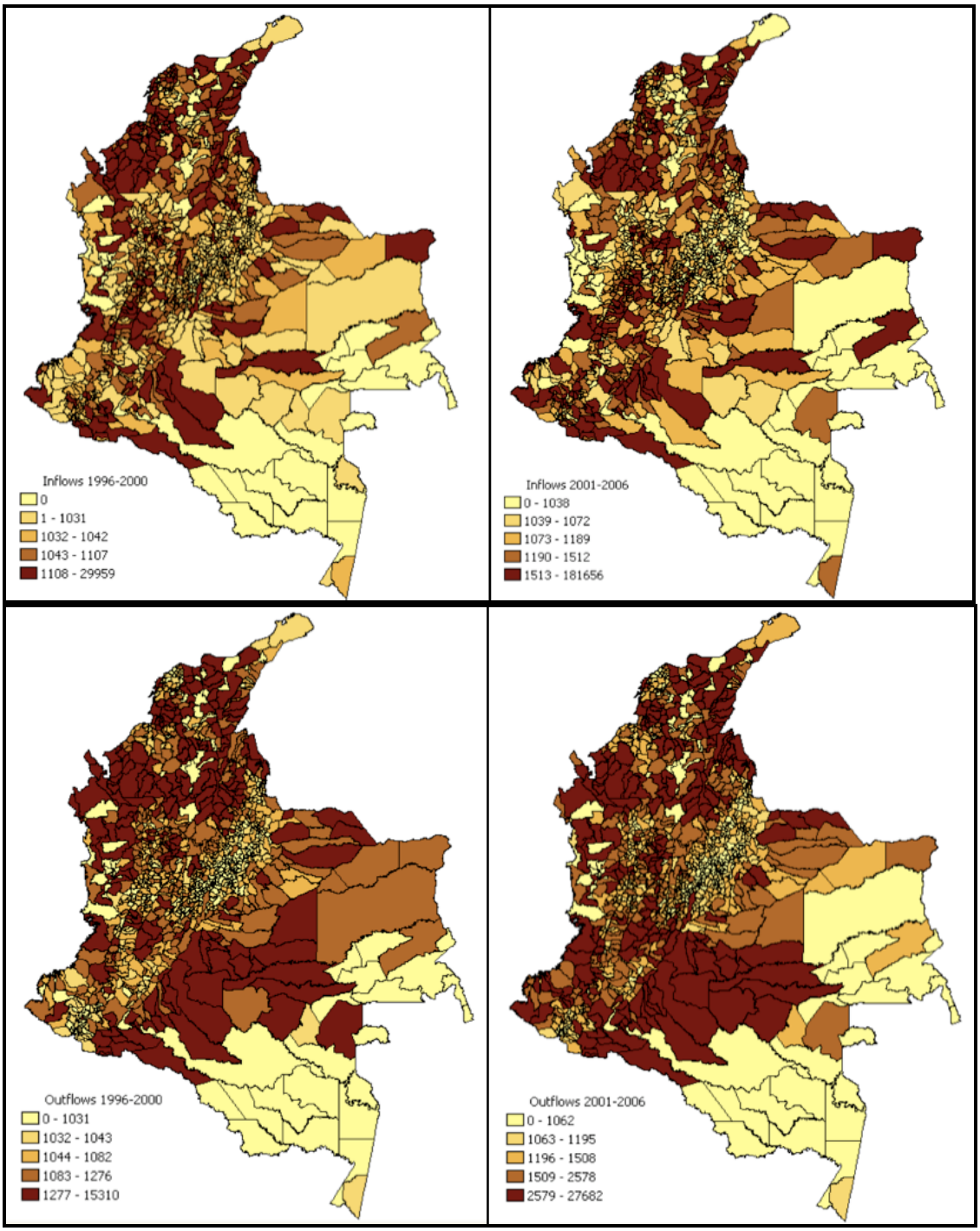

Figure 1: Quantile maps of inflows and outflows over the periods ranging from 1996 to 2000 and from 2001 to 2006.

References

Amemiya T. (1973) “Regression Analysis when the dependent variable is truncated normal” *Econometrica*, 41 (6): 997-1016.

Anderson J.E. (1979) “A Theoretical Foundation for the Gravity Model, American Economic Review” 69 (1): 106-116.

Anderson J.E. and E. van Wincoop (2004) “Trade Costs” *Journal of Economic Literature*, 42 (3): 691-751.

Anselin L. (1988) Spatial Econometrics: Methods and Models, Kluwer Academic Publisher, Dordrecht, The Netherland.

Anselin, L. (2002) “Under the Hood: Issues in the Specification and Interpretation of Spatial Regression Models.” Agricultural Economics 17(2002):247–67.Production Functions.” Journal of Farm Economics 39(1957):8–20.

Anselin, L. (2006) “Spatial Econometrics,” In T.C. Mills and K. Patterson (Eds.), Palgrave Handbook of Econometrics: Volume 1, Econometric Theory. Basingstoke, Palgrave Macmillan, 2006: 901-969.

Azam, J.P. and A. Hoeffler (2002) “Violence against Civilians in Civil Wars: Looting or Terror?” Journal of Peace Research 39(4): 461-85.

Bartel A.P. (1989) “Where do the new US immigrants live?” *Journal of Labor Economics*, 7: 371- 391.

Borjas G.J. (1998) “To Ghetto or Not to Ghetto: Ethnicity and Residential Segregation” *Journal of Urban Economics*, 44: 253-283.

Borjas G.J. (1999) “Does immigration and welfare magnet” *Journal of Labor Economics*, 17(4): 607- 637

Contraloría General de la Nación (2003) “La Política Pública Sobre Desplazamiento Forzado en Colombia: ¿Sólo buenas Intenciones?” Contraloría Delegada para el Sector Defensa, Justicia y Seguridad Dirección de Estudios Sectoriales.

Davenport C.A., W.H. Moore and S.C. Poe (2003) “Sometimes You Just Have to Leave: Domestic Threats and Forced Migration 1964-1989” *International Interactions*, 29: 27-55.

Echeverry J.C., Navas V. and Salazar N. (2001) “Do we look like the rest of the world? The Colombian conflict in the international context” in *Economy Crime and Conflict*, (A Martinez eds.), Banco Santander Hispano.

Engel S. and A.M. Ibáñez (2007) "Displacement due to violence in Colombia: A household level analysis" *Economic Development and Cultural Change*, 55 (2): 335-365.

Etzo, I. (2007) "Determinants of interregional migration in Italy: A panel data analysis" *Munich Personal RePEc Archive (MPRA) Paper No. 5307*

Fik T.J. and G.F. Mulligan (1998) "Functional form and spatial interaction models" *Environmental and Planning A,* 30 (8): 1497-1507.

Florax, R. and H. Folmer (1992). "Specification and estimation of spatial linear regression models: Monte Carlo evaluation of pre-test estimators" *Regional Science and Urban Economics*, 22: 405-432.

Greenwood M.J., G.L. Hunt, D.S. Rickman, and G.I. Treyz (1991) "Migration, Regional Equilibrium, and the Estimation of Compensating Differentials" *American Economic Review*, 81 (5): 1382-1390.

Griffith D.A. and K.G. Jones (1980) "Explorations into the Relationship between spatial structure and spatial interaction" *Environment and Planning A,* 12, 187-201.

Henry, S., Boyle, P. and Lambin, Eric F. (2003) "Modelling inter-provincial migration in Burkina Faso, West Africa: the role of sociodemographic and environmental factors" *Applied Geography*, 23: 115-136.

Hulme D. and A. Shepherd (2003) "Conceptualizing chronic poverty" *World Development,* 31 (3): 403-423.

Ibáñez A.M. and A. Moya (2006) "The Impact of Intra-State Conflict on Economic Welfare and Consumption Smoothing: Empirical Evidence for the Displaced Population in Colombia" *HiCN Working Paper No. 23.*

Ibáñez A.M. and C.E. Velásquez (2009) "Identifying victims from Civil Conflicts: An evaluation of Forced Displaced Households in Colombia " *Journal of Peace Research,* 46(3): *forthcoming.*

Ibáñez A.M. and C.E. Velez (2008) Civil Conflict and Forced Migration: The Micro Determinants and the Welfare Losses of Displacement in Colombia, *World Development,* 36(4): 659-676.

LeSage J.P. and R.K. Pace (2008) "Spatial Econometric Modeling of Origin-Destination flows" *Journal of Regional Sciences*, 48(5): 941-967.

Lowry I.S. (1966) *Migration and Metropolitan Growth: Two Analytical Models*, Chandler Publishing Company, San Francisco, CA.

Maddala G.S. (1983) *Limited-dependent and Qualitative Variables in Econometrics*, Cambridge University Press, Cambridge, UK.

Molho I. (1986) “Theories of Migration: A Review” *Scottish Journal of Political Economy*, 33(4): 396-419.

Neidercorn J.H. and B.V. Bechdolt (1969) “An Economic Derivation of the ‘Gravity Law’ of Spatial Interaction” *Journal of Regional Science*, 9: 273-282.

Newbold K.B. and D.A. Peterson (2001) “Distance Weighted Migration Measures” *Papers in Regional Science*, 80: 371-380.

Okuyama Y. and S.E. Chang (2004) *Modeling Spatial and Economic Impacts of Disasters*, Springer-Verlag, Berlin.

Plane D.A. (1984) “Migration Space: Doubly Constrained Gravity Model Mapping of Relative Interstate Separation” *Annals of Association of American Geographers*, 74: 244-256.

Pellegrini, P.A. and Fotheringham, A.S. (2002) “Modelling Spatial Choice: a Review and Synthesis in a Migration Context” *Progress in Human geography*, 26(4): 487-510.

Ravenstein E.G. (1885) “The laws of migration” *Journal of the Statistical Society of London*, 48(2): 167-235.

Ravenstein E.G. (1889) “The laws of migration” *Journal of the Royal Statistical Society*, 52(2): 241-305.

Roy J.R. and J.C. Thill (2004) “Spatial interaction modeling” *Papers in regional Science*, 83 (1): 339-361.

Sen A. and T.E. Smith (1995) *Gravity Models of Spatial Interaction Behavior*, Heidelberg: Springer-Verlag.

Verbeek M. (2003) *A Guide to Modern Econometrics (Second Edition)*, John Wiley and Sons Ltd., West Sussex, England.

Zavodny M. (1999) “Determinants of recent immigrants location choices” International Migration review, 33(4): 1014-1030.

WRITENET, Colombia (2006). Desplazamiento interno - políticas y problemas, June 2006. UNHCR Refworld. http://www.unhcr.org/refworld/docid/48abd52f0.html