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Terrorism and Emigration: Does it Depend on the Measure and Sample Used?

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Abstract

The relationship between terrorism and migration is currently an international issue. This paper studies the impact of the total number of victims and the total number of attacks on migration flows. Moreover, I estimate the impact of terrorism on migration flows according to countries' level of development. The main hypothesis is that terrorism can decrease freedom of movement in the poorest countries, and increase migration costs due to higher adaptation costs. At the world level, I find that the number of victims has a positive and significant effect on international emigration, while this is not true for the number of attacks. Interestingly, South-South migration is not affected by terrorism, while the South-North corridor is influenced by both the number of victims and the number of attacks. However, when the development gap between origin and destination increases, these effects tend to shade off.

Keywords: Migration, Terrorism, Psychological costs, Freedom of Movement

JEL: C23, I39, O15

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1 INTRODUCTION

Terrorism is one of the central concern in today's society. After the 09/11 attacks, George W. Bush, President of the United States, declared open the "War on terror". Fifteen years later, our days are still marked by terrorism, both in developed and developing countries. Moreover, in the last two years, Europe has endured a migrant crisis. According to the United Nations High Commissioner for Refugees, the top three nationalities of migrants of the over one million Mediterranean Sea arrivals between January 2015 and March 2016 were Syrian (46.7%), Afghan (20.9%) and Iraqi (9.4%). Precisely three countries directly threatened by the Islamic State (I.S.I.S.). The combination of both the migrant crisis and international terrorism leads to increased xenophobia. Indeed, developed societies tend to follow populist policies, increasing social tensions and rising nationalism. In Europe and the United States, migrants are sometimes seen as a potential source of terrorism. Donald Trump, for instance, recently tried to sign an executive order to temporarily curtail immigration and the rights of refugees in attempt to keep out "radical Islamic terrorists". Concerns about terrorism, migration and the relationship between these two phenomena are more than topical issues: they are at the core of political debates and will determine the future of societies and international peace.

The United Nations' 1566 Security Council Resolution defined terrorism as "criminal acts, including against civilians, committed with the intent to cause death or serious bodily injury, or taking of hostages, with the purpose to provoke a state of terror in the general public or in a group of persons or particular persons, intimidate a population or compel a government or an international organization to do or to abstain from doing any act[...]". Terrorism has economic, social, and political costs. From an economic perspective, terrorism decreases the return on investment, tourism and trade (e.g. Abadie and Gardeazabal [2008] ; Nitsch and Schumacher [2004] ; Enders et al. [1992]). Frey et al. [2007] have shown that the psychological impact of political violence (i.e. terrorism) on the deterioration of life condition might actually be greater than the effect of economic costs. Klein [2007] theorised what she called the *shock strategy*, namely that psychological weakening due to a shock reinforces political instability. This theory can be applied to human violence, as demonstrated by Frey et al. [2007] as well as Campos and Gassebner [2013].

The combination of the economic, social and political costs in addition to the risk of death or injury, can drive individuals to migrate. Every civilian seeks security as well as political

and economic stability. Theoretically, this decision to migrate will depend on the impact of terrorism on their utility, namely on the detrimental effects on utility at home compared to the expected utility after migration. The latter includes the migration costs and the expected utility for migrants in the destination country.

Dreher et al. [2011] focused on the impact of terrorism on emigration for different skill levels. I propose another approach. I test two hypothesis in this paper. Following Frey et al. [2007], I expect a greater impact on migration of the psychological costs induced by terrorism on emigration than the number of attacks solely. To test this, I create an index of “human cost-related terrorism”. It is defined as the total number of victims due to terrorism over the total population in the country impacted. The second measure is the total number of attacks. Then, I look at the impact of these two variables on seven migration corridors. I make the assumption that migration costs depend on the characteristics of countries of origin and destination, and the development gap between them. This paper asks whether a greater development gap reinforces migration costs due to terrorism. This would be the consequence of the differences in culture, leading to an increase of xenophobia in the destination country. Notably, people wanting to avoid the importation of violent political values. I call this a “counter-pull” effect, with an increase in the adaptation costs for migrants. For example, when individuals migrate to richer countries, terrorism at origin might reinforce difficulties to integrate in destination’s society, to find a job or a dwelling. I also suppose that terrorism can drive individuals in a state of shock, following Klein [2007]’s concept. People become more docile after a terrorist shock, and bad governance can be reinforced in the origin country, ultimately leading to a possible decrease in freedom to move.

Consequently, this paper contributes to the literature in several ways. Previous studies have differentiated individuals’ reaction to terrorism according to their level of education. I differentiate migrants’ decision to move according to the measure of terrorism used and the development gap between countries. This paper aims at providing insights for future public policies and help policymakers to understand how migration flows are affected by terror.

The empirical analysis makes use of the United Nations database on migrant stocks between 1960 and 2000. This dataset provides information on 226 origin and destination countries. I construct migration flows by taking first differences of these decennial migrant stocks. This methodology mitigates concerns of possible contemporaneous reverse causality, since migration flows cannot influence terrorism in origin countries before the year of migration.

For the construction of the two terrorism measures, I use the Global Terrorism Database, providing information for the 1970-2014 period. Due to data constraints and the methodology used, I can only compute the emigration rate for 1980, 1990 and 2000.

Considering the large number of zero in migrant flows, I estimate the empirical model using a Poisson estimator. This technique allows me to keep the zero flows in my regression (which would for instance be eliminated if a log transformation was used with an OLS estimation). In order to control for potential omitted variable bias, I use high dimensional fixed effects. Specifically, these consist in origin country fixed effects to control for time invariant origin specific push factors as well as time invariant origin costs. This mostly captures geographic position, since, for instance, coming from an island might increase migration costs due to transport limitations. Furthermore, an important issue in the gravity literature is the multilateral resistance bias, namely the influence of other countries on bilateral migration flows. Therefore, I include destination-year fixed effects,¹ which allow me to control for any changes in immigration policies in destination countries. However, I do not include a dyadic fixed effect in order to avoid collinearity in my regressors and to keep the largest number of observations in my dataset. The database is then split between North and South countries, defined first on the basis of the median of GDP per capita, and subsequently based on percentiles of wealthiness as robustness checks. I still include GDP per capita in the origin countries, in order to control for possible heterogeneity in the GDP per capita distribution among groups of countries. The possible heterogeneity bias at destination is captured by the destination-year fixed effect.

The empirical analysis provides evidence of a significant impact of terrorism on international migration. Moreover, my findings confirm the greater impact of the human cost associated to terrorism relative to the total number of attacks. This is in line with Frey et al. [2007]'s hypothesis on the importance of psychological factors, and thus with my paper's assumption. Splitting up the sample, the impact of terrorism appears insignificant for North-North migration. For migration originating from the South, I find different results depending on the countries of destination. First, there is no statistical effect of terrorism on South-South migration. This result suggests that people in the South not value migration to another country potentially threatened by the same kind of violence as a solution to escape from terrorism. Admittedly, it would be interesting to see whether I would obtain the same result for temporary or

¹See Feenstra [2015].

internal migration, but the construction of my dataset prevents me from further exploring this. Nonetheless, I find evidence for a significant push effect of terrorism on international migration in South-North corridors. People seek to maximize their utility by avoiding violence, leading to an increase of emigration to the North. When the gap between origin and destination countries increases, the impact of terrorism on emigration decreases. This result might signal a larger sensitivity to migration costs depending on the development gap between countries of origin and destination. The greater the gap between these countries, the greater the impact of terrorism on migration costs. I suggest that this might be due to a distrust effect in richer countries towards people coming from poor countries hit by terrorism. Also, terrorism might decrease freedom of movement at origin for the most affected countries, due to a reinforcing mechanism between bad governance and terrorism.

The remainder of this paper is organized as follows. Section 2 discusses the related literature. In section 3, I will present the theoretical background of this paper. In section 4, the data are detailed, and in section 5, the results and robustness checks are analyzed. Finally, section 6 will conclude this study.

2 RELATED LITERATURE

There is a large literature on the impact of shocks and violence on individuals, economic life and emigration. I will first review the papers focusing on the impact of terrorism on emigration, trying to capture a possible push effect of terrorism on the individual decision to migrate. Then, studies about the importance of psychological trauma will be highlighted. I will describe the theoretical foundations of the gravity models, discussed in well published papers.

2.1 THE EFFECT OF TERRORISM ON EMIGRATION

The relationship between violence and migration is increasingly studied in the recent literature. Dreher et al. [2011] show that terrorism specifically increases skilled emigration. They use a dataset with only six of the OECD countries as possible destinations. The authors suggest that this type of violence decreases the return to education and the expected utility of skilled workers in their home country. However, on average, they find a non-significant effect of terrorism on emigration. They conclude that the impact of terrorism on emigration depends on

the level of education. This selection effect will not be an issue in this paper, since I explicitly look at the average emigration rate. I purposely do not differentiate between education levels.

In the same way, Bohra-Mishra and Massey [2011] studied how armed violence during a period of civil conflict in Nepal influenced the likelihood to migrate. Interestingly, they find that civil conflicts affect migration differently depending on levels of violence. From low to moderate levels of violence, this reduces the odds of migration, while from a certain level of violence, emigration increases.

Following the same idea, Alvarado and Massey [2010] nuanced the impact of violence on emigration. They argue that modest levels of violence can eventually have a negative effect on the emigration rate because people respond to risk by limiting outside mobility. Their study assesses the impact of violence (homicide) in Mexico, Guatemala, Nicaragua and Costa Rica on migration to the United States. They show that people from different countries respond differently, and thus “violence does not appear to have uniform effects on patterns of international migration but depends on broader social and political conditions within particular countries”. Even if this paper focuses on homicides, the results suggest that a non-linear impact of violence on migration might exist, depending on the level of development in the origin countries.

Another paper on terrorism also focuses on a possible non linear effect on migration. Morrison [1993] studies the impact of terrorism on emigration from South America during the period 1976-1981. He shows that violence is a key determinant of migration in a country suffering from endemic political violence. Particularly, an increasing and convex relationship is suggested between violence and migration, with an intensification of this effect when violence escalates. It means that the impact of terrorism on migration might be greater in countries where conflicts are more frequent, namely developing countries.

Edwards [2008] uses a more theoretical approach. The author explains that emigration is positively correlated with the level of violence of civil conflicts, because people rationally try to maximize their utility by reducing the risk of being killed or injured. This study reinforces the need to take into account the intensity of terrorism, and not only the onset of attacks.

2.2 THE EFFECT OF TERRORISM ON PSYCHOLOGICAL TRAUMA

Frey et al. [2009] study how terrorism can be measured to assess its impact on well-being. This paper first details the methodology to measure terrorism. They also present microeconomic techniques to measure the psychological impact of terrorism. They compare the effect of the psychological measure and economic one on life satisfaction. Adapting their methodology to a macroeconomic study, I create two indexes of terrorism: one reflecting the terrorism violence by including the number of victims (psychological-human costs), and the other being solely the number of attacks, without integrating the number of victims. In another paper, Frey et al. [2007] show that the psychological costs have a more detrimental effect on life satisfaction than the total number of attacks. Following their results, I expect a greater impact of the psychological costs on emigration rate.

In a well known book called *The Shock Doctrine*, Klein [2007] argues that a collective trauma such as a war, an economic crisis, a natural disaster, or a terrorist attack, plunges individuals in a state of shock. She claims that after a shock, people turn more docile, and more incline to follow politic leaders. I suggest two consequences. First, as argued by Campos and Gassebner [2013], terrorism weaken states, and weakened states increase terrorism. I make the hypothesis that this is a consequence of the “docility” effect. Fragile states are more threatened by terrorism, and terrorism induces political instability because of the trauma effect, which reinforces the fragility of these states. This mechanism may decrease freedom of movement, and increase migration costs. Second, I suggest that this psychological shock can be exported. If people are afraid by the terrorist threat, they can turn more suspicious towards immigrants from affected countries. This can lead to an increase in the adaptation costs for immigrants in destination countries.

2.3 THEORETICAL APPROACH ON MIGRATION AND DATASET ISSUE

Özden et al. [2011] provide a complete database on bilateral stocks of migrants for 232 origin countries and 231 destination countries between 1960 and 2000 for each decade, now adopted by the United Nations. Beine and Parsons [2015] used this database, and looked at the impact of climate shocks on international migration. Particularly, they worked on the impact of unexpected short-run climate shocks. Their paper uses a gravity framework, with a Poisson estimator. High frequency migration data are only produced for a very limited number of countries

globally. Therefore, they faced a trade-off between geographic coverage and the frequency of observations. Making strong assumptions about international flows and internal migrations, they provide results on migration enhanced by climatic shocks. They construct their proxy for migration flows by differencing data for contiguous census rounds, as explained before. I use the same technique to compute the migration flows.

Finally, Beine et al. [2015] published a theoretical paper providing complete information on gravity models and a meta-analysis on studies using bilateral data in a gravity framework. The authors decompose the Random Utility Model (RUM), and explain how external variables can influence the willingness to migrate, depending on the effect of these variables on expected utility in the country of origin and in the possible destination countries. In the same way, Ramos [2016] wrote another study on the gravity framework, with a more practical approach and therefore more applied advices. These two papers are used for the theoretical section of this paper.

3 AN INCOME MAXIMIZATION APPROACH

The empirical framework used in this paper relies on an income maximization approach. One of the main advantages of this approach is that it allows to consider the choice of moving to a particular country j among all potential destinations. Indeed, the influence exerted by other destinations on bilateral flows is important and should be controlled for.² This issue has received a lot of attention in the literature, and different methods have been theorized by Eaton and Kortum [2002] as well as Anderson and Van Wincoop [2003]. These methods were gathered by Ramos [2016], who suggests that one possible solution is to include origin-year dummies or destination-year dummies. Terrorism variables are time varying at origin, therefore I will not include origin-year dummies. Nonetheless, including a destination-year dummy $\alpha_{j,t}$ allows me to control for both migration policies at destination and multilateral resistance to migration. Time-invariant origin specific push factors A_i and time-invariant origin costs will be captured by origin country dummies α_i .³

²Bertoli and Moraga [2013] show that an increase of the attractiveness of a destination country k perceived as a close substitute to j will decrease the migration flow between i and j more than the natives staying in i . Thus we definitely need to control for this issue, which they refer to as “multilateral resistance to migration”.

³Admittedly, a dyadic fixed effect α_{ij} would also allow to control for time-invariant characteristics of country pairs such as the distance between them or the presence common language. The latter will, however, not be

Following the methodology from Beine and Parsons [2015], Beine et al. [2015] and Anderson [2011], the empirical analysis relies on a classical random utility maximisation model of migration. Purposely, agents are assumed homogeneous, i.e. not categorised by education level or age.⁴ In this model, each individual decides first whether or not to migrate. Subsequently comes the choice of destination, where individuals are assumed to choose the destination that delivers the highest utility. In this framework, the utility function is log-linear in income, and depends upon both country of origin and possible countries of destination characteristics, as well as on the migration costs. The extension that this paper proposes is the inclusion of terrorism as an additional country of origin characteristic, in order to introduce the effect of violence stemming from terrorist attacks on the utility at home as well as on migration costs.

First, we denote $m_{i,j,t}$ the migration flow from i to j at time t . It is defined as:

$$m_{i,j,t} = p_{i,j,t} \times s_{i,t} \quad (3.1)$$

where $p_{i,j,t}$ is the share of individuals residing in i who move to j at time t , and $s_{i,t}$ the stock of individuals living in i at time t . The aim of the random utility maximization model is to derive $p_{i,j,t}$. First the utility from staying in the origin country can be written as:

$$u_{i,i,t} = \ln(w_{i,t}) + A_{i,t} + \epsilon_{i,t} \quad (3.2)$$

with $w_{i,t}$ representing the wage in country i at time t and A denoting country i 's characteristics (political, demographic, and terrorism intensity). ϵ represents the random term. Then, the following expression represents the utility that an individual living in i at time $t - 1$ would get by migrating to j at time t :

$$u_{i,j,t} = \ln(w_{j,t}) + A_{j,t} - C_{i,j,t} + \epsilon_{j,t} \quad (3.3)$$

where $C_{i,j,t}$ denotes the costs of migrating from i to j at time t . It has to be highlighted that the wage at destination $w_{j,t}$ does not integrate the origin country information due to the assumption of homogeneous agents, while Borjas [1987] has shown that the expected earn-

included in order to preserve the largest possible sample size. Thus I will explicitly control for distance and common language in the regression.

⁴See also Sjaastad [1962], and Ortega and Peri [2009] for the introduction of heterogeneity among individuals.

ings of migrants in the destination country is heterogeneous with respect to the conditions of their home countries. Therefore, deriving the expected share of individuals coming from i and moving to j among a full set k of destinations at time t can be written as:

$$\mathbf{E}(p_{i,j,t}) = P[u_{i,j,t} = \max_k u_{i,j,k}] = \frac{N_{i,j,t}}{N_{i,t}} = \frac{e^{\ln(w_{j,t})+A_{j,t}-C_{i,j,t}}}{\sum_k e^{\ln(w_{k,t})+A_{k,t}-C_{i,k,t}}} \quad (3.4)$$

Focusing only on country of origin i , and only on one country of destination j , we get the following equilibrium bilateral migration rate:

$$\frac{N_{i,j,t}}{N_{i,i,t}} = \frac{e^{\ln(w_{j,t})+A_{j,t}-C_{i,j,t}}}{e^{\ln(w_{i,t})+A_{i,t}}} \quad (3.5)$$

where $N_{i,j,t}$ represents the migrant flow between i and j at t , and $N_{i,i,t}$ is the number of natives in country i at time t . We then add logs to obtain a log-linear model, which gives:

$$\ln\left(\frac{N_{i,j,t}}{N_{i,i,t}}\right) = \ln\left(\frac{w_{j,t}}{w_{i,t}}\right) + A_{j,t} - A_{i,t} - C_{i,j,t} \quad (3.6)$$

Terrorism intensity will be integrated as one of the origin country's political characteristics $A_{i,t}$. Formally we get:

$$A_{i,t} = A(\text{Conflicts}_{i,t}, \text{ Terror}_{i,t}) \quad (3.7)$$

where Conflicts is a dummy equal to 1 when there is at least one conflict with more than 1,000 battle related deaths in the origin country during the ten years preceding t . Including this factor as a determinant of political characteristics has two advantages. First, Findley and Young [2012] show that based on the PRIO database, the percentage of war-related terrorism amounted to 56% between 1970 and 2004.⁵ Even if both phenomena are not entirely the same, more than half of terrorist attacks can be related to civil conflicts. This justifies to control for this variable in order to avoid endogeneity through an omitted variable bias. Second, it allows to reflect political stability in a country. If we focus on political regimes, by including the Polity IV index for instance, the theoretical impact of democracy index on emigration is *a priori* unknown. Indeed, repressive political regimes might increase residents' desire to leave, but also the costs of migration since these regimes might, for example, be less willing to deliver visa to those who want to emigrate. Democratic regimes, on the other hand, can be associated

⁵Meaning before, after, or during a conflict.

with lower desires to leave, and hence, lower migration.

Terror is the main characteristic of interest, and is composed of two variables. One is representing the psychological-human cost, inspired by the index developed by Dreher et al. [2011], and the study by Frey et al. [2007].⁶ It takes the following form:

$$Terror_{i,t} = \frac{deaths_{i,t} + wounded_{i,t}}{population_{i,t}} \quad (3.8)$$

The second terrorism measure is the total number of attacks the ten years before t , without any distinction across the types of violence.

Destination countries' characteristics $A_{j,t}$ are captured by the destination-year fixed effect. The migration cost function can then be written as follows:

$$C_{i,j,t} = C(M_{i,j,t}, d_{i,j}, l_{i,j}, x_{j,t}, x_j, x_i) \quad (3.9)$$

Beine et al. [2011] as well as McKenzie and Rapoport [2010] have shown that migration costs are a decreasing function of migrant networks ($M_{i,j,t}$) which are hence expected to exert a positive influence on migration flows.⁷ Migration costs also depend upon dyadic time-invariant factors, such as the distance between the origin and destination countries ($d_{i,j}$) as well as their linguistic proximity ($l_{i,j}$). I do not include contiguity here because of missing values for the poorest countries and/or countries with borders changes, such as West Bank and Gaza, Serbia, etc. I need to include these countries in my regression, since they are part of the countries most threatened by political violence. Migration costs also depend upon country's specific factors which do not vary over time (x_i and x_j) such as their geographic position. It also depends on time-varying factors in destination countries ($x_{j,t}$) such as binding constraints in immigration policies.⁸

⁶Note, however, that I create an index only composed of victims of terrorist attacks. The number of attacks is for my second variable.

⁷Beine et al. [2011] McKenzie and Rapoport [2010], among others, have found that a larger network leads to lower cost of migration through better information on border crossing, or housing services. It relaxes credit constraints, and has a substitution effect with education.

⁸See Mayda [2010] and Anderson and Van Wincoop [2003] for further explanations on the role of policy constraints, and how they may weaken both pull and push factors for migration.

The final form of the empirical model is then defined as:

$$\ln\left(\frac{N_{i,j,t}}{N_{i,i,t}}\right) = \ln(w_{j,t}) - \ln(w_{i,t}) - A(Pol_{i,t}) - A(Terror_{i,t}) - C(M_{i,j,t}) - C(d_{i,j}) - C(l_{i,j}) - C(x_{j,t}) - C(x_j) - C(x_i) + \epsilon_{j,t} \quad (3.10)$$

4 DATA

4.1 MIGRATION VARIABLE

There are several definitions of migrants. The determinants of an international migrant might be based on country of birth, country of citizenship, purpose of visit or visa type, and place of last permanence residence or duration of stay.

Bilateral migration data imply a trade-off between data on a complete range of countries and frequency of censuses. Stock of migrants are available with the Özden et al. [2011] database.⁹ It details bilateral migration stocks between 226 origin and destination countries, but is limited to five census rounds each decade between 1960 and 2000. This database considers as a migrant every individual living in another country than their country of birth. The OECD dataset on migration flows delivers yearly data between 1975 and 2014 but only with the 35 OECD countries as possible destinations. There are other databases on migration but with limited data as well. As shown by Özden et al. [2011], South-South migration represents the largest fraction of bilateral stocks compared to others corridors.¹⁰ South countries are also more threatened by terrorist attacks.¹¹ In addition, the purpose of my paper is to assess the impact of terrorism on a large set of countries. Therefore, I will rely on the United Nations dataset constructed by Özden et al. [2011]. It is important to highlight that due to the construction of my database, I cannot capture temporary migrations. I can only measure the average emigration rate, which can lead to an underestimation of the actual flows (particularly South-South ones since there are more porous borders and therefore potentially more temporary migration flows).

⁹Which has been adopted by the United Nations.

¹⁰Between 1960 and 2000, South-South migration: largest fraction (from 54 to 44% of total) ; North-North migration: decreasing component (from 24 to 18%) ; South-North migration: growing component (from 10 to 33%).

¹¹See Table 4.4.

Table 4.1: Summary Statistics for Migration between 1970 and 2000

	mean	sd	min	max
Stock of migrants from i to j	2,813	57,327	0	9,367,910
Migrants flows from i to j	402	27011	0	4,705,677
Population in country i	24,800,000	102,000,000	7,488	1,260,000,000
Total immigrants in country i	619,196	2,141,607	0	34,800,000
Natives in country i	24,100,000	101,000,000	4,310	1,260,000,000
Emigration rate of i	0.00005	0.034	0	1.45
Observations	159,390			

To construct the dependent variable, I first start by deriving the number of natives in countries of origin at time t . To do so, I use the data on population of origin countries at t from the *World Development Indicators*, and subtract from it the total number of immigrants in countries of origin in the same year. It gives an approximation of the total number of natives in country i at time t , which is the denominator of my dependant variable.

Then I derive the numerator. As said before, the database only provides data on stocks of migrants for each decade between 1960 and 2000. To derive the migrant flows between i and j at t (with t corresponding to 1970, 1980, 1990 and 2000), I subtract the stock of migrants from i to j at $t - 10$ from the stock of bilateral migrants in this corridor at t . This approximation gives by construction a high proportion of zero. It also gives negatives values when bilateral migrants stocks between two countries decline over time. This can be due to return migration, new migration to a third country, or migrants death. I will thus not consider the decreases of migrant stocks in this paper, that is the negative computed migrant flows. They are mostly driven by Serbia during the fall of USSR, therefore due in a large proportion to political border changes, and not return migrations.

4.2 TERRORISM INDEX CONSTRUCTION

The *Global Terrorism Database* is the most complete database on terrorism, ranging from 1970 to 2014. I extract from this resource the exact location of each attack, as well as the total number of death and wounded due to terrorism. I then derive the total number of victims (deaths and wounded) in a country i during the last ten years before t with the size of the population at t . I compute the psychological human costs of terrorism by dividing the total number of victims for each decade by countries' population where violence took place. My second vari-

able is the total number of attacks for each decade. As I only got data from 1970 onwards, I can only start to compute the total number of attacks and victims from 1970 to 1979, to create observations for 1980.

Table 4.2: Summary Statistics for Terrorism per decade between 1970 and 2000 - Whole sample

	mean	sd	min	max
Death	201	966	0	10,930
Wounded	195	754	0	7,661
Attacks	100	369	0	4,223
Terrorism index	0.00004	0.0002	0	0.003
Observations	159,390			

Table 4.3: Summary Statistics for Terrorism per decade between 1970 and 2000 - North sample (median definition)

	mean	sd	min	max
Death	67	376	0	5,501
Wounded	117	496	0	6,858
Attacks	81	282	0	2,833
Terrorism index	0.00002	0.00006	0	0.0005
Observations	86,940			

The distribution of victims between South and North is unequal. Overall, the accumulated number of deaths and wounded for each decade is around 396, which gives an index of violence on average equal to 0.00004. I split the sample between countries below the GDP per capita median (South countries) and countries above (North ones). When we look only at North countries, the average index of terror is around 0.00002. In the South however the index of violence is three times higher, with on average 5.4 times more death each decade than in North countries. These statistics confirm that South countries are more threatened by terrorism. This reinforces the need to use the most complete migration dataset, in order to include the poorest countries. The total number of attacks is also higher in poorer countries.

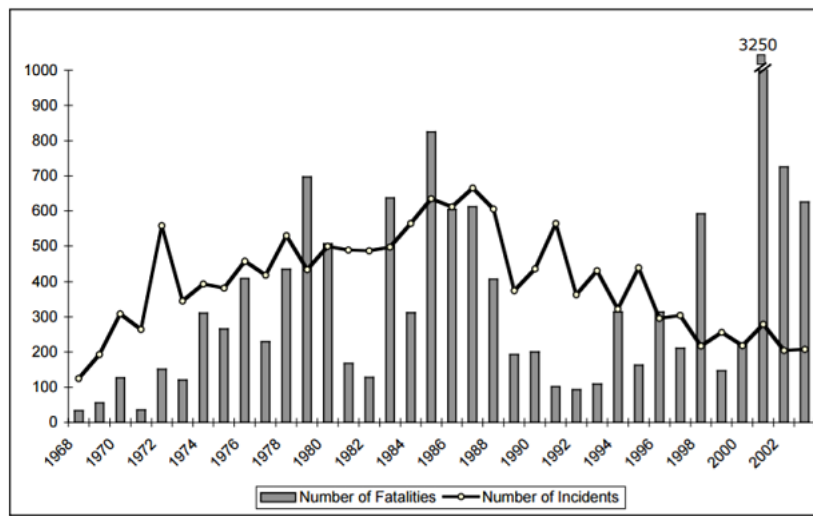
It is important to recall that due to data constraints, I can only look at the 1980-2000 period. Figure 1, taken from Frey et al. [2007], presents the evolution of the violence per attack between 1968 and 2004. We can see that the number of fatalities per attack increase since 2000, reinforcing the necessity to differentiate human costs from the number of attacks.

Table 4.4: Summary Statistics for Terrorism per decade between 1970 and 2000 - South sample (median definition)

	mean	sd	min	max
Death	363	1,355	0	10,930
Wounded	288	969	0	7,661
Attacks	122	451	0	4,223
Terrorism	0.00006	0.0003	0	0.003
Observations	72,450			

We can imagine that the current rise of the Islamic threat and its international activities have reinforced this rise of violence, and thus, the total human costs of terrorism. It may have deepened the distortions between North and South countries in terms of attacks and victims, since it was born in the Middle East (South), and progressively expands to the North.

Figure 1: International terrorism, 1968-2003, number of incidents and number of fatalities



Source: US Department of State (various years) and Sandler and Enders (2004).

4.3 OTHER CONTROLS

The remaining variables come from several sources. I calculate the GDP per capita with the *World Development Indicators* constructed by the World Bank. It is important to notice that, due to missing data on the poorest countries, I use the average GDP per capita of the region where they belong as proxy for the latter.

The Conflicts dummy takes the value 1 if there is at least one conflict in the origin country involving 1,000 related battle deaths for one year during the ten-year period to which a particular flow corresponds. Thus if there is at least one conflict with that number of deaths during one year between 1970 and 1979, the dummy takes the value 1 for the year 1980. This information is extracted from the *UCDP/PRIO* database. This dataset considers extra-systemic conflicts, interstate wars, intrastate wars and internationalized intrastate wars. I use *UCDP/PRIO* instead of *Correlates of War* or *State failure* because of the detailed information on the motive, the type of conflicts and the threshold considered. It allows me to attribute each war to the country(ies) where the conflict took place.

The network of country i in country j at time t is considered as the bilateral migrant stock in the beginning year to which a flow corresponds. Therefore, the data come from the same database than my dependent variable, namely the *United Nations database on bilateral migrant stocks*. The remaining geographical and linguistic dyadic factors come from the *CEPII* database.¹² The language dummy takes the value one when at least 9% of both populations in a country-pair speak the same language.

Once all the data are merged, I have 231 origin and destination countries in my database.

5 RESULTS AND ROBUSTNESS CHECKS

In this section, I present the results and use them to discuss my hypothesis. First, I include the different measures of terrorism. I want to test if psychological related costs do matter more than the number of attacks to explain emigration. In other words, if this hypothesis is confirmed, the number of victims would increase the emigration rate more than solely the number of attacks. Second, I assume that individuals will respond differently to terror according to the level of development of the home and destination countries. I establish this hypothesis using a utility maximisation framework, arguing that the greater the development gap between two countries, the greater the increase of migration costs. I suggest two explanations.

On the one hand, this can be due to a psychological state of shock after terrorist attacks.¹³ Following this kind of shock, people are more incline to follow politic leaders. In the least developed countries, precisely the most attacked countries, people can thus be easily

¹²See Mayer and Zignago [2011].

¹³As explained before, see Klein [2007].

manipulated, and then suffer from bad governance. In today's Nigeria for instance, people are so poor and so threatened by daily political violence that most of them "passively" endure bad governance (corruption and political instability mostly). This bad governance will increase terrorism, and the least developed countries are then stuck in a trap. This trap may conduct to higher migration costs due to a potential impact on freedom of movement. To test this hypothesis, I should include an interaction term between Terrorism and a bad governance index (reflecting bad institutions or corrupt policies for example). However, once again, due to data limitations and the objective to integrate the greatest number of South countries in my study, I cannot test it. Indeed, this would drop most of the countries in the 10% percentiles that I want to study. Yet I strongly believe that this interaction term would be interesting to include in future papers.

On the other hand, the fear of terrorism has no frontier. People might react more adversely to immigration in richer countries after terrorist attacks, to avoid contagion of potentially dangerous political ideas. This can lead to an increase of xenophobia in destination countries. This moral cost induced by distrust for immigrants can decrease their capacity of integration in destination's society. This can also have an adverse effect on the probability to find a job, or to find facilities to learn a new language for example. This xenophobia effect can be considered as a "counter-pull" factor, and therefore decrease migration flows.

5.1 RESULTS

In Table 1, I separate South and North countries according to their level of development. To do so I use the median of GDP per capita each year.¹⁴ South countries are those below the median, while North countries are those above.

Columns (1) and (2) stand for the whole sample, columns (3) and (4) for the North-North corridor, columns (5) and (6) focus on South-North migrations, and columns (7) and (8) provide results for South-South flows.

The main coefficients of interest (Terrorism and Attacks) are in levels, while emigration rate is a logged variable. Therefore, if the independent variable increases by one unit (which is an enormous increase, since it would mean a number of victims equal to the whole country population) then the dependent variable increases by $\beta * 100$ percent. The logged variables

¹⁴Median: 2023.385 U.S. dollars in 1980, 2237.955 in 1990 and 2126.832 in 2000.

are elasticities, such as a 1% change corresponds to an equivalent percentage change of the dependent variable equal to the size of the coefficient. For the dummies, it can also be interpreted as a percentage change when the dummy switches from 0 to 1.

Table 1: Impact of terrorism on emigration rate: median level

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	W-W	W-W	N-N median	N-N median	S-N median	S-N median	S-S median	S-S median
Log GDP origin	-0.04 (0.09)	-0.03 (0.09)	-0.26 (0.21)	-0.26 (0.21)	-0.06 (0.16)	-0.0006 (0.16)	-0.21 (0.16)	-0.21 (0.16)
Log Network	0.34*** (0.02)	0.34*** (0.02)	0.21*** (0.03)	0.21*** (0.03)	0.44*** (0.05)	0.44*** (0.05)	0.40*** (0.05)	0.40*** (0.05)
Conflicts	0.40*** (0.15)	0.41*** (0.16)	0.56** (0.28)	0.57** (0.27)	0.13 (0.18)	0.19 (0.19)	-0.11 (0.29)	-0.08 (0.29)
Terrorism	206.30** (101.40)		131.90 (814.20)		626.40*** (117.70)		-217.80 (359.70)	
Log Distance	-0.90*** (0.07)	-0.90*** (0.07)	-0.91*** (0.08)	-0.91*** (0.08)	-1.01*** (0.09)	-1.20*** (0.15)	-1.07*** (0.10)	-1.07*** (0.10)
Common Language	1.22*** (0.18)	1.22*** (0.18)	2.05*** (0.25)	2.05*** (0.25)	0.98*** (0.17)	1.40*** (0.47)	0.57** (0.23)	0.57** (0.23)
Attacks		0.00015 (0.00012)		0.0002 (0.0004)		0.0004*** (0.0001)		-0.0005 (0.0004)
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	103,031	103,031	27,164	27,164	26,364	26,364	23,781	23,781

Robust standard errors in parentheses

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

Overall, we can notice that most of the control variables' coefficients are very stable across corridors. First, a larger diaspora always leads to a greater emigration rate. This is in accordance with the literature on migration.¹⁵ In the same way, the GDP per capita in origin countries is never significant. Mayda [2010] explains this result as a lack of financial push factor effect, while GDP per capita at destination does play a significant pull role in her estimation (already controlled for through destination-year fixed effect in my regressions). The two dyadic time invariant variables are also consistently significant. The language dummy is always significant across sub-samples as well, and has a positive impact on emigration. It decreases learning costs, and therefore migration costs.

I first focus on columns (1) and (2). At the world level, the presence of conflict seems to deteriorate enough the expected utility at home to have a positive and significant effect on the

¹⁵See for example McKenzie and Rapoport [2010], Parsons and Vézina [2014], Hatton and Williamson [2005] and Pedersen et al. [2008].

emigration rate. By comparing the two terrorism variables, we can observe that the human cost has overall a positive and significant effect while the number of attacks is not significant. The results are in line with one of the paper's assumption: the violence of attacks seems to play a push effect on individuals, while solely the number of attacks does not. This can be explained by the greater detrimental effect of the psychological costs on well-being. This result tends to confirm my first assumption.

For the North-North corridor, results are different. Columns (3) and (4) only keep origin and destination countries with a GDP per capita above the median. I find that terrorism does not play any role on the emigration rate in this corridor. I suspect that this kind of violence does not have a sufficient influence on individuals' expected utility in the richest countries. Accordingly, good conditions of life and binding costs of migration can explain these results.

Columns (5) and (6) show a positive impact of terrorism on the emigration rate, with no effect of conflicts. This result might be explained by the global destruction and costs involved by wars. Wars induce an important deterioration of utility at origin and an increase in the migration costs, since countries at war can reduce the freedom of movement by trying to maintain an internal security (curfew is a good example). I suggest that it is not the case of terrorism, or in a lower proportion. The results show that the terrorism impact is very different. Terrorism is an unpredictable political violence aiming at spreading fear among societies. I suggest that terrorism and conflicts decrease utility at home and increase migration costs differently. More precisely, due to the high number of fatalities to consider conflicts, and following the hypothesis that human costs have a great impact on well-being, this violence might have a greater negative effect on expected utility at home than terrorism. In the same way, migration costs might be increased in a less sensitive way in the case of terrorism than for conflicts, for the security reasons cited above (restrictions during wars). Note that the number of terrorist attacks has a positive and significant effect on emigration as well. This suggests that, when we look at relatively close levels of development, an increase in the number of attacks, without distinction about the number of victims, is sufficient to increase emigration. In other words, in that case, the number of attacks decreases enough the expected utility at home and has a low impact on migration costs, such as the expected utility at destination turns greater.

Looking at columns (7) and (8), we can observe that the South-South corridor is not affected by terrorism. I suggest that crossing borders from South to South is easier due to more porous separations, and therefore lead to more temporary migrations that I cannot capture.

South countries are more affected by terrorism. This supposes that, in this corridor, terrorism has bad influences on expected utility at home, on migration cost and on expected utility at destination. When individuals rationally maximize their utility, long term displacement to another South country may not be attractive enough since the destination country might also be under this kind of violence in the long run. It is also necessary to recall that due to the construction of my dependent variable, I cannot capture a possible increase in temporary migrations. I can thus only conclude on the average effect of terrorism on international emigration rate.

5.2 ROBUSTNESS CHECKS

Table 2: Impact of terrorism on emigration rate, percentile levels

VARIABLES	(1) N-N 90% perc.	(2) N-N 90% perc.	(3) S-S 10% perc.	(4) S-S 10% perc.	(5) S-N 10%-90% perc.	(6) S-N 10%-90% perc.
Log GDP origin	2.52*** (0.81)	2.40*** (0.87)	-0.26 (0.29)	-0.24 (0.28)	-0.50 (0.23)	-0.61 (0.28)
Log Network	0.16** (0.07)	0.14*** (0.06)	0.54*** (0.05)	0.54*** (0.05)	0.32*** (0.03)	0.32*** (0.03)
Conflicts	0 (omitted)	0 (omitted)	0.38 (0.38)	0.40 (0.40)	-0.26 (0.41)	-0.19 (0.43)
Terrorism	-32,465 (21,548)		-430.00 (933.70)		356.55* (186.25)	
Log Distance	-1.18*** (0.15)	-1.20*** (0.15)	-0.98*** (0.12)	-0.98*** (0.12)	-1.73*** (0.18)	-1.74*** (0.18)
Common Language	1.39*** (0.45)	1.40*** (0.47)	0.36** (0.15)	0.35** (0.15)	1.10*** (0.22)	1.10*** (0.22)
Attacks		-0.0017 (0.0027)		-0.002 (0.004)		0.0004 (0.0002)
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,026	1,026	5,978	5,978	1,104	1,104

Robust standard errors in parentheses

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

To test the robustness of my results, I look at the impact of terror on emigration for the poorest and the richest countries. The table 2 presents the results for the countries in the 90% percentiles of GDP per capita,¹⁶ and for those in the 10% percentiles.¹⁷

¹⁶90% percentiles: 11,176 U.S. dollars in 1980, 18,986 in 1990 and 24,124 in 2000.

¹⁷10% percentiles: 354 U.S. dollars in 1980, 320 in 1990 and 281 in 2000.

The variable Conflicts is not significant anymore. Alvarado and Massey [2010] suggest that violence has a non linear impact on emigration. Indeed, they explain that people might respond differently according to the level of risk. The poorest countries being victims of the most violent wars, a non-linear effect of violence on migration could explain the results for this variable.

Columns (1) and (2) confirm the previous results. Indeed, when looking at the richest countries at origin and destination, terrorism does not distort enough the expected utility between home and destination to increase emigration rate. This confirms that terrorism has a greater negative effect on poorer countries. The theory about a positive relationship between the development gap and the increase in migration costs due to terrorism also holds. Following this idea, origin and destination countries are homogeneous in this sample, thus terrorism has a smaller effect on migration costs. Note that GDP per capita at origin is positive and significant. This reflects a non-linear effect of GDP per capita at origin according to the corridor that we look at.

When we look specifically at the poorest countries in columns (3) and (4), we can observe that the South-South corridor is still not affected by terrorism. I assume that this is due to the absence of temporary and internal migrations in my dataset, as previously explained for regressions (7) and (8) in the Table 1. Theoretically, the impact of terrorism is integrated in origin countries individuals' expected utility and migration costs. But both origin and destination countries, in this corridor, are potentially threatened by terrorism. Individuals have therefore no incentive to migrate in the long run. They will thus maximize their utility by staying at home. They can also temporary migrate, or move in their own country.

Columns (7) and (8) provide very interesting results. When we look at migration flows between the poorest and the wealthiest countries, the impact of terrorism on emigration rate is weakened compared to regressions (5) and (6) in Table 1. Note first that there are only few observations due to the GDP per capita thresholds used. Therefore, we have to be careful on the interpretations of the coefficients. Still, the terror index magnitude is divided by two, and the number of attacks turns non-significant. First, these results confirm that psychological costs have a greater impact on international emigration than the total number of attacks. Also, they confirm that the greater is the development gap between origin and destination countries, the greater will be the impact of terrorism on the increase of migration costs (and the lower the magnitude of the terror index). A large gap in development levels between origin and desti-

nation countries induces large differences in culture, and may have a multiplier effect on the costs of adaptation for migrants coming from countries intensively hit by terrorism. Immigrants will not be accepted, will be suspected, and perceived as unpredictable and potential rings for international terrorism in the most developed societies. In addition, the shock theory may be more pronounced in the least developed countries. Lack of education and lack of wealth can increase individuals' docility after a terrorist shock. As explained, this can ultimately lead to a trap effect with bad governance, and might have a negative repercussion on freedom of movement.

The results show that the impact of terrorism on emigration does not uniquely depend on the education level of migrants, but also on the definition of terrorism and the specific origin and destination countries that we look at. Taking a larger set of countries in my database has allowed me to provide possible insights for public policies to manage migrations flows induced by terrorism.

6 CONCLUSION

I use a gravity model with Poisson estimations to assess the impact of terrorism on the average emigration rate. My first contribution is to differentiate two measures of terrorism: the human costs induced by terrorist attacks, and the total number of attacks. Usually, this distinction is made for microeconomic study. I adapt it to a macroeconomic paper. I proxy the human costs by dividing the total number of victims (deaths and wounded) by the population at origin, and compute the total number of attacks, using the *Global Terrorism Database*. Then, I measure their respective impact on the emigration rate computed with the United Nations database on migrant stocks. My second contribution is to consider heterogeneity of reaction according to countries' level of development, and not individual education. I split my sample to obtain results for seven different corridors.

This paper proposes to study the impact of terrorism on emigration with a different approach than the previous literature. First, I wanted to test if psychological costs of terrorism had a greater impact on migration flows than the number of attacks. Second, I assumed that individuals react differently to terror according to the level of development of their home and destination countries. I established this hypothesis using a utility maximisation framework, arguing that the greater the development gap between two countries, the greater the impact

of terror on migration costs. I also supposed a negative effect of terrorism on freedom of movement in the least developed countries. Theoretically, the literature demonstrated that fragile states are more hit by terrorism. I add that terrorism may further weaken the poorest countries, and lead to a trap effect potentially harmful for freedom of movement.

I found that, at the world level, human costs have an effect on emigration rate, while the total number of attacks does not. Terrorism has no impact on migrations neither on North-North corridors nor on South-South ones. I suggest that South-South international migrations would be a temporary solution. Since the South is more threatened by terrorism, long term migration to another South country might not protect from the danger, and thus not maximize migrants utility. However, in those countries, the effect of terrorism on temporary and internal migrations can be important. I cannot capture this effect with the database used. Therefore, studying the impact of terrorism on internal and temporary migrations in the South may be a promising path for future research.

The impact of terrorism on South-North migrations is a negative function of the gap between origin and destination countries. I found a positive effect of both the number of victims and the total number of attacks on emigration from South to North when taking the median definition. Nevertheless, I find a reduction in the significance and magnitude of those coefficients when applying a more important gap between origin and destination countries. The total number of attacks even turns non significant, and the human costs' magnitude is divided by two. The main hypothesis of this study are consistent with these results.

This paper provides some insights for policymakers. Terrorism does increase migration flows from developing to developed countries. I made the hypothesis that it can lead to a "counter-pull" effect in the richest countries, notably through an increase of xenophobia. Consequently, managing migration flows coming from countries threatened by terrorism has to be a priority for developed countries' public policy, in order to avoid the rise of populist politics.

Today, the world is facing numerous challenges, among which mass migration and Islamic terrorist attacks are of utmost concern. Given the cross-border nature of these shocks, supra-national collaboration (in the form of bilateral, regional and global policy responses) to deal with these concerns is more needed than ever. These global challenges can induce countries' withdrawal from cooperative politics, or, on the contrary, increase regional integration. This study could therefore be extended by looking at countries' reaction in terms of international cooperation to these global challenges.

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