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# Global Uncertainty and International Migration to Western Europe

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JEL Codes: E20, F22; F52.
Keywords: Uncertainty; Terrorism; Migration; September 11, 2001.

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# Global Uncertainty and International Migration to Western Europe*

Hippolyte d'Albis† Ekrame Boubtane‡ Dramane Coulibaly§

**Abstract**

This article quantifies the effects of increasing global geopolitical uncertainty on the size of migration flows to Western Europe. Uncertainty is measured by the number of victims of terrorist attacks worldwide. The effect on migration flows is quantified through the estimation of vector autoregressive models on a panel of 15 European countries and on France, thanks to an original migration dataset. The estimations suggest that the flows of permanent migrants are generally reduced by global terrorism. In particular, the increase in uncertainty that followed the attacks of September 11, 2001, caused an 8% drop in flows to Europe and a 19% drop in flows to France. The effect of global uncertainty on the flow of asylum seekers depends on the country: on average in Europe, asylum applications increase with terrorism, but for France, they decrease with terrorism. This difference can be explained by the geographical position and border control policies of France.

**Keywords**: Uncertainty; Terrorism; Migration; September 11, 2001.
**J.E.L. Codes**: E20, F22; F52.

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# 1 Introduction

Global geopolitical uncertainty has undeniably increased in the 21st century. The uncertainty caused by terrorism, in particular, clearly changed following the attacks of September 11, 2001 (hereafter named 9/11) due to their scale and the ensuing political response. The number of deaths attributed to the 9/11 attacks is similar to that of all transnational terrorist acts perpetrated between 1988 and 2000. There was also recognition of the vulnerability of more developed countries in face of a dramatically increased terrorist threat. 9/11 transformed terrorism into a global issue. The United States became the first sovereign state to declare war on a terrorist group and structured a coalition to deal with what has since been referred to as "global terrorism" (United Nations Special Rapporteur, 2002).

The purpose of this article is to assess whether global terrorism has affected international mobility by examining the case of migration to Europe. The relationship between terrorism and migration is theoretically ambiguous. Like internal conflicts, acts of terrorism generate political and economic global insecurity and are therefore likely to increase the number of people who consider that they are threatened, and either seek asylum or wish to emigrate to a country that is deemed safer. This tends to increase migration pressure.[1] Conversely, the increase in global terrorism may lead the populations of developed countries to have heightened distrust of migration (Davis and Silver, 2004). This may induce the hardening of migration and

[1]For instance, Hatton (2009) showed that "political terror scale" in the origin countries is a powerful driver of asylum flows to OECD countries. Dreher *et al.* (2011) found some evidence that terrorism at home is among drivers of skilled emigration.

asylum policies[2], and therefore a limitation of migration flows. An illustration is given by the European Council (2001) which, following the 9/11 attacks, invited the EU Member States to strengthen controls at external borders, to exercise the utmost vigilance when issuing residence permits and to re-examine the EU approaches to asylum and refugee guarantees and procedures in the light of terrorist threat (Ben Boer and Monar, 2002). And this, within a context that was globally increasingly unfavorable to migration (d'Appollonia and Reich, 2008). In this article, we propose a quantitative analysis to assess which of the two effects prevails.

We assess the effect of global terrorism, measured by the evolution of the number of victims of terrorist incidents worldwide, on migration flows to Western European countries. Two complementary estimates are provided. The first uses annual data from a panel of 15 European countries: it allows us to assess the average response of migration flows to these countries to an exogenous shock affecting global terrorism. We distinguish between net migration –evaluated on the basis of changes in the resident population– and pending asylum applications. The second estimate concerns France. It is based on original migration data, which we have compiled from an administrative database on residence permits. Our database offers more precise information on migration flows than other databases, and frequent enough observations to perform an econometric estimation. Furthermore, it distinguishes the entries of people seeking asylum from those who do not, the reason for admission which may be

[2]There is growing evidence suggesting that terrorist attacks have influenced asylum outcomes. Brodeur and Wright (2019) show that 9/11 resulted in a significant decrease in the likelihood that applicants from Muslim-majority countries are granted asylum in the U.S. Emeriau (2020) examines the effect of the Paris attacks in November 2015 on asylum decisions in France. She finds that Syrians and Iraqis interviewed the day after a terrorist attack were less likely to be granted refugee status.

more or less discretionary, and finally the countries of origin of residence-permit holders. Our approach is based on the estimation of vector autoregressive (VAR) models, following an established tradition in macroeconomics since Sims (1980), where they are used to quantify an economy's response to an exogenous structural shock (that is, the effects of an unusual external event on the economy). With an appropriate identification of shocks, researchers have used this approach to assess the effects of uncertainty shocks on macroeconomic variables (Carriere-Swallow and Cespedes, 2013, Baker et al., 2016). Here, we use VAR models to quantify the effect on migration flows of unexpected changes in terrorism-related global uncertainty. To our knowledge, this approach has not been proposed in the literature. For our study, VAR models have two advantages. First, they allow us to control for endogeneity biases between the model variables. We thus estimate the response of migration flows to an exogenous global terrorism shock by controlling for the economic performances of the host countries. These performances are indeed likely to be affected by the increase in terrorism.[3] The second advantage of VAR models is that they give a dynamic assessment of the response to an exogenous shock. Attacks can have immediate effects on migration, but also delayed effects: VARs, therefore, allow us to assess the persistence of the effects of global terrorism on migration. VAR models thus provide a complementary approach to gravity models that are more suited to study long-run statistical relationships.

We find that global terrorism reduces permanent migration to Europe and that

[3]See for example, Blomberg *et al.* (2004), Gaibulloev and Sandler (2008) and Llussà and Tavares (2011) on output and Blomberg and Hess (2006), Abadie and Gardeazabal (2008), Glick and Taylor (2010) and Mirza and Verdier (2008, 2014) on trade and foreign direct investment. For a recent review of the economic impact of terrorism see Gaibulloev and Sandler (2019).

the 9/11 attacks had a quantitatively significant effect: they caused an 8% drop in the flow of permanent migrants to Europe and a 19% drop in the flow to France (at peak). To contextualize this, we provide evidence of a tightening up in migration policies. The EU Member States were encouraged to strengthen controls at their external borders and, in France, a new migration policy was launched eight months later. The policy reactions to global terrorism seem to have been stronger than the increased migration pressure. Concerning the flow of asylum seekers, we find that the effect of global terrorism depends on the country: on average in Europe, asylum applications increase with terrorism, but for France, they decrease with terrorism. This difference might be due to the geographical position and border control policies of France. It is not generally possible to forbid asylum applications, but a government can take more deterrent actions to discourage and prevent potential applicants from reaching its ports of entry.

Our results complement the stands of literature that studies the economic consequences of global uncertainty (Carriere-Swallow and Cespedes, 2013, Baker et al., 2016). Our work is also related to the several papers that focus on the economic effects of various forms of violence, including war and terrorism such as Blomberg *et al.* (2004), Blomberg and Hess (2006), Gaibulloev and Sandler (2008), Abadie and Gardeazabal (2008), Glick and Taylor (2010), Llussà and Tavares (2011) and Gaibulloev and Sandler (2019) for a recent review. The interaction between immigration and terrorism has also received some attention among political scientists. Several research works documented the consequences of the 9/11 on immigration and asylum policies in Europe (Ben Boer and Monar, 2002; Brouwer, 2003; d'Appollonia

and Reich, 2008). Recent research examines the impact of terrorism on immigration attitude across Europe (Schüller, 2016; Böhmelt *et al.*, 2020). Despite these contributions, there is no previous analysis that quantifies the dynamic effects of global terrorism on migration flows to Europe.

In the remaining of the paper, we present our measure of global terrorism and our VAR models (Section 2). Then, we analyze the effect of global terrorism on migration for a sample of European countries (Section 3) and for France (section 4). Section 5 concludes.

# 2 Identification Strategy

We first briefly describe the measure of global terrorism we are using, provide some descriptive statistics and present the VAR models we have estimated. Specific details related to the various databases are presented in the Appendix.

We use the Global Terrorism Database (GTD) to estimate the number of victims worldwide (i.e. people killed or injured) attributed to terrorist attacks. The GTD thoroughly identifies attacks and their characteristics using a dedicated search algorithm (START, 2018). Figure 1 represents the number of victims per month in the world between 1985 and 2018. The 9/11 attacks clearly stand out as an exceptional event, not only for their unprecedented scale but also for the change in regime they caused. After the 9/11 attacks, there is an upward trend, with two periods when this trend is particularly strong: in 2006 and 2007, during the war in Iraq, and especially between 2011 and 2014, with attacks particularly affecting Syria, Iraq, and Nigeria.

[ Figure 1 ]

We aim at exploring in the VAR approach how higher global uncertainty resulting from terrorist attacks has influenced the dynamic of international migration to Western Europe and to France. To this end, we consider a baseline VAR system including the number of victims of terrorist attacks worldwide alongside with migration and economic variables. It will be shown that restricting to attacks perpetrated outside Europe does not affect the results. The shock we consider is assumed to be a global shock, i.e. which that happens at the same time in all countries. In the panel sample, the synchronizations across European countries due to their strong economic integration may justify the use of global shock (see Carriere-Swallow and Cespedes, 2013 who make a similar assumption). Following Baker et al. (2016), we include the S&P500 stock market index and the Michigan Consumer Sentiment index to ensure that our estimated shock reflects well the global terrorism shock rather than any other global shock. The stock market index is a "first-moment" forward looking variable containing many sources of global information while the Michigan Consumer Sentiment index contains a mix of first-moment and second-moment forward-looking information and allows to capture other types of global uncertainties. Furthemore, as highlighted by Forni and Gambetti (2014), including these two forward-looking variables capturing agents' expectations mitigates the potential anticipation problem in VAR; our estimated shock of global terrorism is thus unlikely to contain any anticipated effect. Moreover, since we do not consider the countries outside Europe, we consider a VARX specification by imposing a "small open economy assumption" such that global terrorism is exogenous to country-specific (economic and migration)

variables. We thus follow Carriere-Swallow and Cespedes (2013) who analyze the effects of global uncertainty for a panel of developed and emerging countries excluding the U.S.. Our preliminary analysis, presented in the Appendix, shows that global variables (the number of victims worldwide of terrorist attacks, the S&P500 index and the Michigan Consumer Sentiment index) are not Granger caused by country-specific variables. Thus, imposing that geopolitical uncertainty is exogenous improve the quality of statistical inference.

Following Lütkepohl (2005), Section 10.6., our VARX can be written as:

$$Y_{it} = \sum_{s=1}^{p} A_s Y_{it-s} + \sum_{s=0}^{q} B_s X_{t-s} + \alpha_i + \varepsilon_{it}, \tag{1}$$

where $i = 1, \ldots, N$ represents the country index in the panel sample ($i = 1$ in the case of France) and $t = 1, \ldots, T$ represents the time index. $Y_{it}$ is a $(4 \times 1)$ vector of endogenous variables that includes economic and migration variables. $X_t$ is a $(3 \times 1)$ vector of common exogenous variables including the number of victims worldwide of terrorist attacks, the S&P500 index and the Michigan Consumer Sentiment index. All variables are taken in logarithms.[4] $A_s$ for $s = 1, \ldots, p$ are fixed $(4 \times 4)$ coefficient matrices, $B_s$ for $s = 0, \ldots, q$ are fixed $(4 \times 1)$ coefficient matrices; $\alpha_i$ is a fixed $(4 \times 1)$ vector of country fixed effects; $\varepsilon_{it}$ is a $(4 \times 1)$ vector of residuals for endogenous variables assumed to have the following characteristics: $E(\varepsilon_{it}) = 0_{4\times1}$, $E(\varepsilon_{it}\varepsilon'_{it}) = \Sigma$ for all $i$ and $t$, $E(\varepsilon_{it}\varepsilon'_{is}) = 0$ for all $t \neq s$.

After having estimated the model, we compute the responses of endogenous vari-

[4]To handle zero and negative values on net migration flow and the flow of asylum seekers, we take log of 1 plus the corresponding rate as as share of population.

ables to an increase of the total number of victims resulting from terrorist attacks -a global terrorism shock. As our focus is part of the multiplier analysis, i.e. the responses of endogenous variables to an exogenous variable (namely, the global terrorism), there is no need to identify the structural shocks of endogenous variables (see Lütkepohl, 2005, Section 10.6).

We assess the robustness of our findings using an alternative to the VARX, the Local Projections (LP) framework developed by Jordà (2005). The LP approach estimates the parameters sequentially at each time horizon and is thus less sensitive to misspecification. At short horizons, LP and VAR (or VARX) are likely to give similar impulse responses, but at long horizons they may provide impulse responses that are substantially different (Plagborg-Møller and Wolf, 2021). However, in very small samples in the time dimension, estimates from LP can be severely biased even in panel data with large cross-section (Herbst and Johannsen, 2021). Therefore, in our robustness analysis, for a sake of relevant comparison of results from the two approaches, we only consider the monthly sample of France (large in the time dimension, $T = 264$) and not the panel sample (small in the time dimension, $T = 34$).

# 3 Consequences of Global Terrorism on Migration Flows to Western European Countries

Let us first consider a European panel. We use annual data from the following 15 Western European countries from 1985 to 2018: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Iceland, Italy, the Netherlands, Norway, Portugal,

Spain, Sweden, and the United Kingdom. These countries are selected on the basis of the availability of economic and migration data for the entire period studied in two international databases (Eurostat, 2020, OECD, 2018); this approach ensures the accessibility and comparability of the data studied. The European countries considered receive most of the asylum applications in the European Union (84% in 2018) and a large share of the sum of all net migration flows in the European Union (91% in 2018).

As in d'Albis *et al.* (2018), we use two variables related to international migration, both of which are obtained from Eurostat data. The first, the flow of asylum seekers, is measured as the number of first applications that are pending at the end of a year, made by people who state that they are unable to return to their countries of origin because of a well-founded fear of being persecuted. Lodging an asylum application with a country entitles the applicant to reside legally in that country while the application is processed, but does not necessarily lead to being granted refugee status. We express the flows of asylum seekers as rates per thousand inhabitants. The second variable is the flow of permanent migrants, which is measured using the net migration (plus adjustment) rate per thousand inhabitants. The flow of permanent migrants therefore includes all immigrants and does not distinguish between nationals and foreigners. The net migration data are produced from population statistics that generally exclude individuals temporarily staying in a country and, among others, asylum seekers. Concerning economic variables, we use real GDP per capita and the unemployment rate to assess macroeconomic performance. Further details are provided in the Appendix.

Our VAR analysis thus uses annual observations for 15 European countries from 1985 to 2018, i.e. $N = 15$ and $T = 34$. Given the dimension of our annual panel data, ordinary least squares (OLS) estimation may suffer from the so-called Nickell bias, (Nickell, 1981) while GMM estimator is recommended for samples with large $N$ and small $T$. Therefore, following d'Albis *et al.* (2018, 2019), the model is estimated by the bias-corrected fixed-effects estimator developed by Hahn and Kuersteiner (2002). Relying on Akaike information criterion (AIC) and Bayesian information criterion (BIC), we set the VARX orders $p = q = 2$ , so that there is no serial correlation remaining in the residual. Using higher lag lengths does not change our finding. Note that prior to estimation, all variables are detrended using a linear deterministic trend, with country-specific trend for country-specific variables.

Our results can be visualized in Figure 2. The effects of an global terrorism shock on the migration and economic variables are provided for every years starting with the year when the shock occurs and continuing till ten years after the shock. The figures show the estimated responses to a one-thousand increase in the number of victims of terrorist attacks and their confidence intervals (see the Appendix for a Table that reports the exact estimates).

[Figure 2]

Although this is not the main focus of the paper, we first note that our estimates reveal the negative effect of global terrorism on European economies. Our result complements recent studies that analyze the economic effect of terrorism. In particular, Blomberg *et al.* (2004), using data from 177 countries over the period from 1968 to 2000, show that terrorist incidents have a negative impact on economic growth.

Gaibulloev and Sandler (2008) also find a negative effect for a panel of 18 European countries between 1971 and 2004. However, Gaibulloev and Sandler (2019) point out that the results in the literature are sometimes not significant or not robust to alternative specifications, and that the magnitude of the effects is generally small. They argue that terrorism most likely reduces growth, but there is insufficient evidence to conclude definitively. Our approach differs from the literature in that it considers terrorism as a global shock. It is therefore closer to studies that assess the effect of global uncertainty on the economy, and conclude that its effect is negative (Meinen and Roehe, 2017 and Charles *et al.*, 2018). Our work can be interpreted as follows: global terrorism increases global uncertainty, which penalizes economies. However, the main focus of our paper is the effect of global terrorism on migration flows. The economic variables are primarily introduced into the VAR as control variables because economic performance positively influence migration flows.

The main focus of our study is to evaluate the effects of global terrorism on migration flows. A few years after an unexpected increase in global terrorism, the migration variables react significantly, but in opposite directions. We find that the response of permanent migration flow is negative between 3 and 8 years after the shock, while that of asylum applications is positive in the year of the shock and up to 2 years after the shock. These results are robust when the global terrorism is measured by the number of victims resulting from terrorist attacks that occurred outside Western Europe (see the Appendix for the corresponding dynamic responses).

In Table 1, we present the responses of the flows of asylum seekers and permanent migrants and of unemployment rate in percentage change with respect to their sample

averages. By using Table 1, one can evaluate the magnitude of the effects of a given shock. For instance, to evaluate the effects of the increase in global uncertainty induced by the 9/11 attacks, the size of the shock is set to the increase of the worldwide number of victims of terrorist attacks in 2001 compared to its 1985-2018 average, which corresponds to a shock that increases the number of victims by 8,156. By multiplying the figures in Table 1 by 8.156, we can deduce that the considered increase has led to a 0.5% reduction in per capita income and an 1.7% increase in the unemployment rate two years after the shock. Moreover, the flow of asylum seekers is increased by 12.4% in the year that followed the shock and the flow of permanent migrants are reduced by 7.6% three years after.

Table 1: Magnitude of the Responses in Western Europe to an Exogenous Increase in Global Terrorism, in %

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Flow of asylum seekers | 1.01* | 1.52* | 0.95* | 0.01 | -0.29 | -0.29 |
| Flow of permanent migrants | 0.38 | 0.40 | -0.74 | -0.93* | -0.80* | -0.62* |
| Real GDP per capita | -0.04* | -0.04* | -0.06* | -0.05* | -0.04* | -0.03* |
| Unemployment rate | 0.09 | 0.15* | 0.21* | 0.22* | 0.19* | 0.15* |

Notes: Year 0 stands for the year of the shock, which correspond to 1,000 victims of terrorist attacks worldwide. * denotes statistical significance at the 10% level.

Permanent migration flows react negatively to global terrorism. As mentioned above, two contradictory forces are at work: on the one hand, terrorism increases the sense of geopolitical insecurity and may lead European countries to tighten their migration policies, for example by granting fewer residence permits; on the other hand, terrorism may constitute an incentive to leave and increase the demand for residence permits. The results of our study suggest that the first effect outweighs the second. A few factual elements help to illustrate this result. Most notably, as a

response to the 9/11 attacks, the European Council invited the EU Member States to strengthen controls at external borders and to exercise the utmost vigilance when issuing residence permits (European Council, 2001, paragraphs 24 and 25). Migration policies are decided by individual states, but a consensus has emerged at the European level to reduce migration. In the face of this hardening, the literature suggests that terrorism is not a very significant push factor. Interestingly, Dreher *et al.* (2011) study immigrant population in 6 OECD countries (Australia, Canada, Germany, France, UK, USA) with three population censuses (1980, 1990, 2000). They show that the relationship between terrorism in the origin country and emigration is not significant. It appears to be significantly positive for skilled immigration only, but this is a minor part of the flow. As for permanent migration to Europe, our results hence suggest that the reaction of migration policies to global terrorism has been stronger than the possible increase in migration pressure. This result will be confirmed by our analysis of France.

In contrast to permanent migration, asylum claims to Europe increase with global terrorism. The two forces discussed above were equally at play, but our results suggest that migration pressure outweighs policy tightening. There is evidence, even in the case of asylum, of a willingness to tighten border controls. Following the 9/11 attacks again, the European Union produced several recommendations urging Member States to strengthen border controls and to apply the exclusion clauses of the convention related to the status of refugees more strictly (European Commission, 2001). It was, in particular, recommended to examine "the relationship between safeguarding internal security and complying with international protection obligations

and instruments" (European Council, 2001, paragraph 29). But these recommendations are more about the granting of refugee status than about the application for asylum. It is difficult -for the European countries taken together- to refuse the filing of these applications. And the demands are increasing with terrorism, as shown by the literature. Using data from the United Nations High Commissioner for Refugees (UNHCR), Hatton (2009) analyzes the origin country determinants of asylum applications from 1982 to 2006 and showed that "political terror scale" is a powerful driver of asylum flows in OECD countries. He finds that going up one level on the terror scale in the origin country increases asylum applications by two third. We, therefore, obtain that global terrorism reduces permanent migration while increasing asylum applications to Europe.

Our estimates suggest that asylum claims increase in Europe with the shocks of global terrorism and, in particular, following the 9/11 attacks. This is not inconsistent with the fact that asylum applications declined overall after 2001. This evolution would have been more marked if the attacks had not taken place. The decrease is mainly due to the end of the war in Kosovo (1998-1999), which reduced the flow of asylum seekers from the Balkans. They were partly replaced by nationals of other nationalities, such as those from the Russian Federation in the context of the war in Chechnya (1999-2003). The number of asylum applications almost doubled in 2002 and 2003 in a very tense context marked by the hostage-taking at the Dubrovka Theater in Moscow on October 23, 2002.[5]

The estimated response is an average for the 15 countries considered. Since

[5]See the UNHCR Position regarding Asylum Seekers and Refugees from the Chechen Republic, Russian Federation, 22 Oct. 2004

the signing of the Schengen Agreement in 1985, the European Union has sought to establish a common framework for migration laws and policies, but they still remain largely defined at the national level. As pointed out by Ben Boer and Monar (2002), there was also a discrepancy between the EU Member States on political strategies relating to issues that spill over from terrorism, in particular the handling of immigration and the political screening of asylum seekers. Importantly, the Schengen convention stipulates in Chapter VII that the Member State which is responsible for the examination of an asylum application is the first country reached by the applicant. The Dublin convention (signed in 1990) and Dublin Regulation of 2003 have strengthened the enforcement of the identification of the responsible Member State. It is therefore quite possible that the reactions of migratory flows to global terrorism are different across countries that compose the panel. Their migration policies are different, as illustrated by Germany's position during the 2015 crisis, which differed strongly from that of its partners. Migrants may also prefer certain destinations, due to geographical or cultural proximity, or due to the migration networks that exist there. It is therefore interesting to analyze the reactions of specific countries. In what follows, we present the case of France.

# 4 Consequences of Global Terrorism on Migration Flows to France

We now turn to our estimates for France. Based on administrative data on residence permits for foreigners collected by the Ministry of the Interior, we construct time

series of migration flows to France. These series are unique because we determine the flow from a foreigner's date of entry in France and not, as is often the case, from the date of issue of their first residence permit. This distinction is important because some of the immigrants who hold a residence permit entered long before obtaining the permit allowing legal residence. We construct the two following flows based on the date of entry in France: (1) asylum seekers and (2) permanent migrants defined as people who have obtained at least a residence permit valid for one year or more and who have not applied for asylum in France. This measure is more precise than that of net migration used for the European panel because it does not include nationals and does exclude emigrants. However, it does not consider European immigrants because they do not need to hold an administrative title to stay in France. Figure 3 shows the annual changes in our two series between 1994 and 2015.

[Figure 3]

Figure 3 shows a clear break in the migration trend in 2001, whether for asylum applications or for permanent migration. After a period of decline until 2007, asylum applications increase again, while permanent migration plateaus. The dynamic of permanent migration calculated from entry dates is very different from that calculated from the start dates of validity of the initial permits, which has been stable since 1998 (d'Albis and Boubtane, 2015). This indicates that many entries in the years 1999-2001 did not result in the issuance of a residence permit of at least one year until later. Following Enders and Sandler (2005), we first carry out an econometric test à la Bai and Perron (Bai and Perron, 1998, 2003) to identify whether our

migration series feature a structural break. The tests confirm that a break occurs for the flow of permanent migrants during year 2001 (see Appendix for details).

We then estimate a VAR model on monthly[6] data with the following variables: the three global uncertainty variables, the two migration variables described above, and two economic variables (the industrial production index and the unemployment rate). This single country VARX with monthly data is estimated by OLS with $p = q = 4$.

As above, our results can be visualized with Figure 4, which shows the dynamic consequences of a global terrorism shock corresponding to a one-thousand increase in the number of victims of terrorist attacks worldwide (see the Appendix for the Table of estimates).

[Figure 4]

Results for France are the following: (i) the reaction of the economy to a global terrorism shock is negative but not significant; (ii) the flows of asylum seekers and permanent migrants decrease significantly during the 2 years following the global terrorism shock. These findings are robust when global terrorism is measured by the number of victims resulting from terrorist attacks that occurred outside Western Europe (see the Appendix). Moreover, using the Local Projections approach does not alter qualitatively the response of migration variables to the global geopolitical uncertainty at short horizons (see the Appendix).

Table 2 gives the estimates that were recomputed in order to express the annual

[6]Original monthly series of industrial production and unemployment rate are seasonally adjusted (OECD, 2019). Migration variables are also seasonally adjusted using the Census X-13 method.

deviation in percentage change. To evaluate the effects induced by the 9/11 terrorist attacks, the size of the shock should be equal to the increase in the number of victims during this month compared to its 1994-2015 monthly average; this corresponds to a shock that would increase the number of victims by 23,437. We deduce that the shock induced by the 9/11 attacks reduced the flows of asylum seekers and permanent migrants by respectively 29.8% and 19.2% in the year that followed the shock.

Table 2: Magnitude of the Responses in France to an Exogenous Increase in Global Terrorism, in %

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Flow of asylum seekers | -0.49 | -1.27* | -0.58* | -0.15 | -0.01 | 0.03 |
| Flow of permanent migrants | -0.36 | -0.82* | -0.29* | -0.10 | -0.04 | -0.03 |
| Industrial production index | 0.00 | -0.05 | -0.05 | -0.03 | -0.02 | -0.02 |
| Unemployment rate | -0.02 | 0.01 | 0.06 | 0.05 | 0.05 | 0.05 |

Notes: Year 0 stands for the year of the shock. Annual responses are averages of monthly responses. * denotes statistical significance at the 10% level.

Unlike the European panel, the flow of asylum seekers to France decreases after an exogenous shock on global terrorism. This difference can be explained as follows: the overall flow of asylum seekers to Europe reacts positively on average to global terrorism, but the strengthening of border controls makes lodging an asylum application in countries that are not located on the external maritime or land borders of Europe more complicated, in particular with the stricter enforcement of the European asylum and immigration policies. The tightening of access controls to "Fortress Europe" was mainly carried out in airports through the introduction of various control measures before boarding (European Parliament and the Council, 2002), which explains why global terrorism reduces the flow of asylum seekers in some countries such as France (which is not, among EU countries, one of the closest to the main

conflict zones). In other European countries, the increase in global terrorism should translate into an increase in asylum applications. This suggests that the European policy has induced some substitutability across receiving countries of asylum seekers.

As for permanent migration, the decline was accompanied by a tightening of migration policies. Politically, an important change occurred in May 2002, with the transition from a Socialist government led by Lionel Jospin to a right-wing government led by Jean-Pierre Raffarin. Nicolas Sarkozy then became the Minister of the Interior and promoted a "chosen" migration policy as a reaction to a migration that he described as "imposed". The main objectives were, on one hand, to facilitate foreign students' stay and recruiting more workers according to France economy' needs, on one hand, and on the other hand, tightening the conditions of family reunification and limiting access to residence for other categories of migration. To assess the concrete effect of this political rhetoric, we perform a new estimation within the flow of permanent migrants by distinguishing those who fall under a more discretionary policy, such as labor or study migration, from those for whom the migration policy is more constrained by rules, like family migration (see the Appendix for more details). The results, presented in Figure 5, reveals that global terrorism has a greater impact on so-called imposed migration (we estimate the uncertainty increase induced by the 9/11 attacks caused a 21% drop one year after the shock) than on so-called chosen migration (11% drop).

[Figure 5]

Likewise, we separate migration flow according to the countries of origin of immigrants, distinguishing OECD-country nationals from others. Our estimates, pre-

sented in Figure 6, show that people from developing countries are more affected by global terrorism. The drop observed following the shock is much greater (18% one year after a shock whose size equals that of the 9/11 attacks) and more persistent compared to that in the flow of permanent migrants from the more developed countries of OECD (8%). These results suggest that geopolitical uncertainty has not only led the French government to restrict migration, but also to change the composition of migration flows.

[Figure 6]

Finally, given that 9/11 attacks were strongly associated to an Islamic organization, we examine if the responses of migration to global terrorism depends on whether migrants are from mostly Muslim countries or mostly non-Muslim countries (see the Appendix for details). The results reported in Figure 7 show that the decline in permanent migration is larger from Muslim countries (27% one year after a shock whose size equals that of 9/11 attacks) than for non-Muslim countries (17%).

[Figure 7]

# 5 Conclusion

To the best of our knowledge, this paper is the first quantifying the effects of global geopolitical uncertainty measured by the numbers of victims of terrorist attacks on migration flow to Western Europe. We found a negative response of the flow of permanent migrants both for our European panel and France. In the latter case,

we provided examples of changes in immigration policies in the years that followed the 9/11 attacks, which implies a larger effect of terrorism on immigrants coming for family reasons or from non-OECD or Muslim countries. The effect of global terrorism on asylum applications also suggested a change in governments attitudes after 2001, which increased the flow to some European countries and reduced it for others.

Our results clearly show the effect of global terrorism on migration flows but more should be done to identify the effect of global terrorism on migration policies. A possible way would be to distinguish global terrorism from local terrorism, which requires bilateral migration statistics and different estimation technics. It could be also useful for this identification to perform additional country-level analysis provided that detailed data on immigration flows and policies are available. Intrestingly, a few months after 9/11 attacks, Danmark also tighten its migration policy by reducing the benefits offered to non-EU immigrants (Agersnap*et al.*, 2020).

Lastly, our study reveals the need of accurate migration data for quantitative research. For France, 9/11 has no apparent effect on migration flow when computed in the usual way with residence permit data that consider the issuance date. Using the date of the entrance was not only more precise to reconstruct the migration flow but also more relevant the evaluate the effect of terrorism. Collecting data takes time, but the effort pays off.

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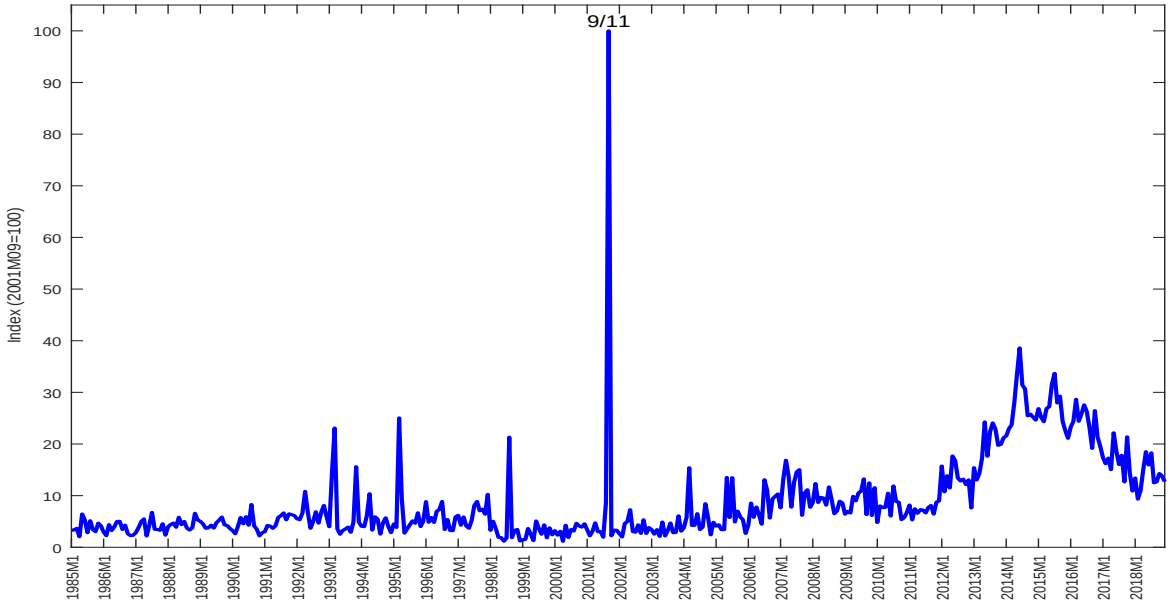
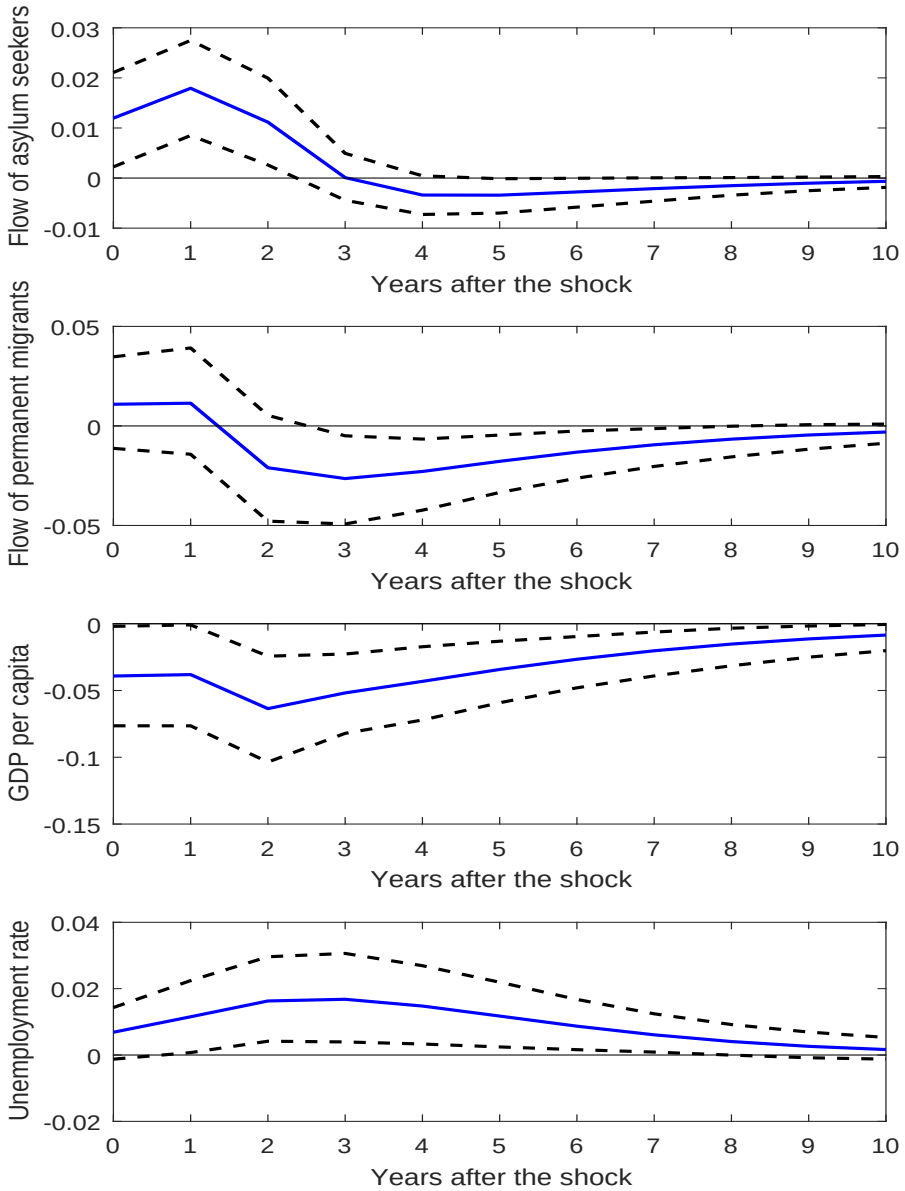
Figure 1: Global Number of Victims of Terrorist Attacks Index, per Month



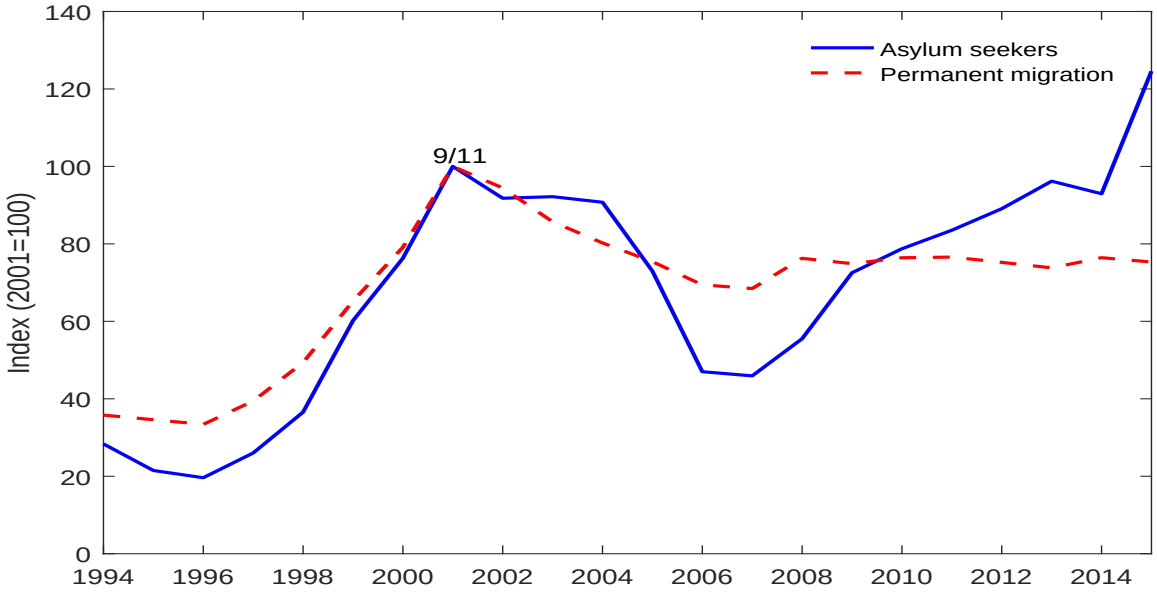

Notes: The number of victims of terrorist attacks with Sep. 2001=100 as reference.
Source: authors' calculations using the Global Terrorism Database.

Figure 2: Migration and Economy Responses in Europe to an Exogenous Increase in Global Terrorism



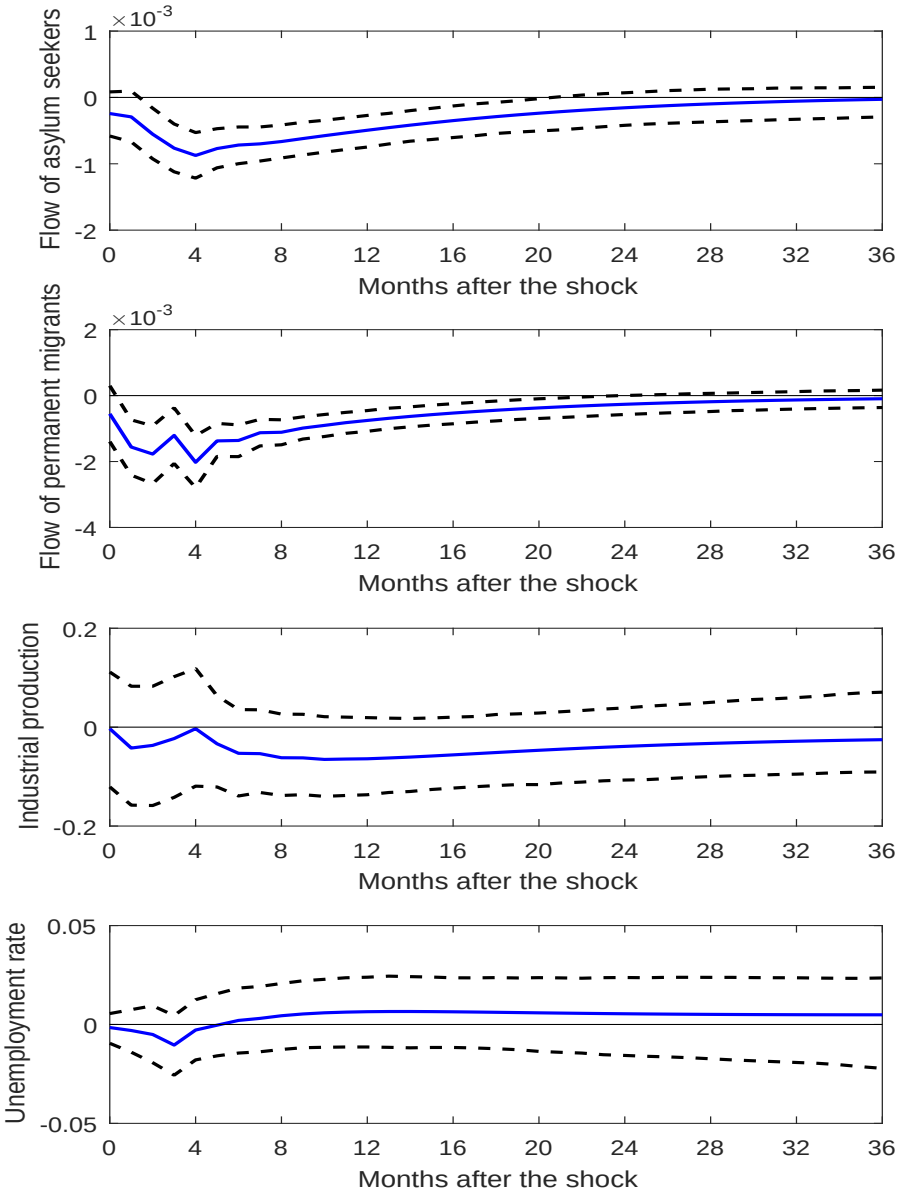

Notes: The solid line gives the estimated impulse response. Dashed lines give the 90% confidence intervals generated by Monte Carlo simulations with 5,000 repetitions. The size of the shock corresponds to 1,000 victims of terrorist attacks worldwide. The responses of migration variables are in per 1,000 points change. The responses of per capita GDP and unemployment rate are in percentage change and percentage points change, respectively.

Figure 3: Migration Flows to France, by Year of Entry



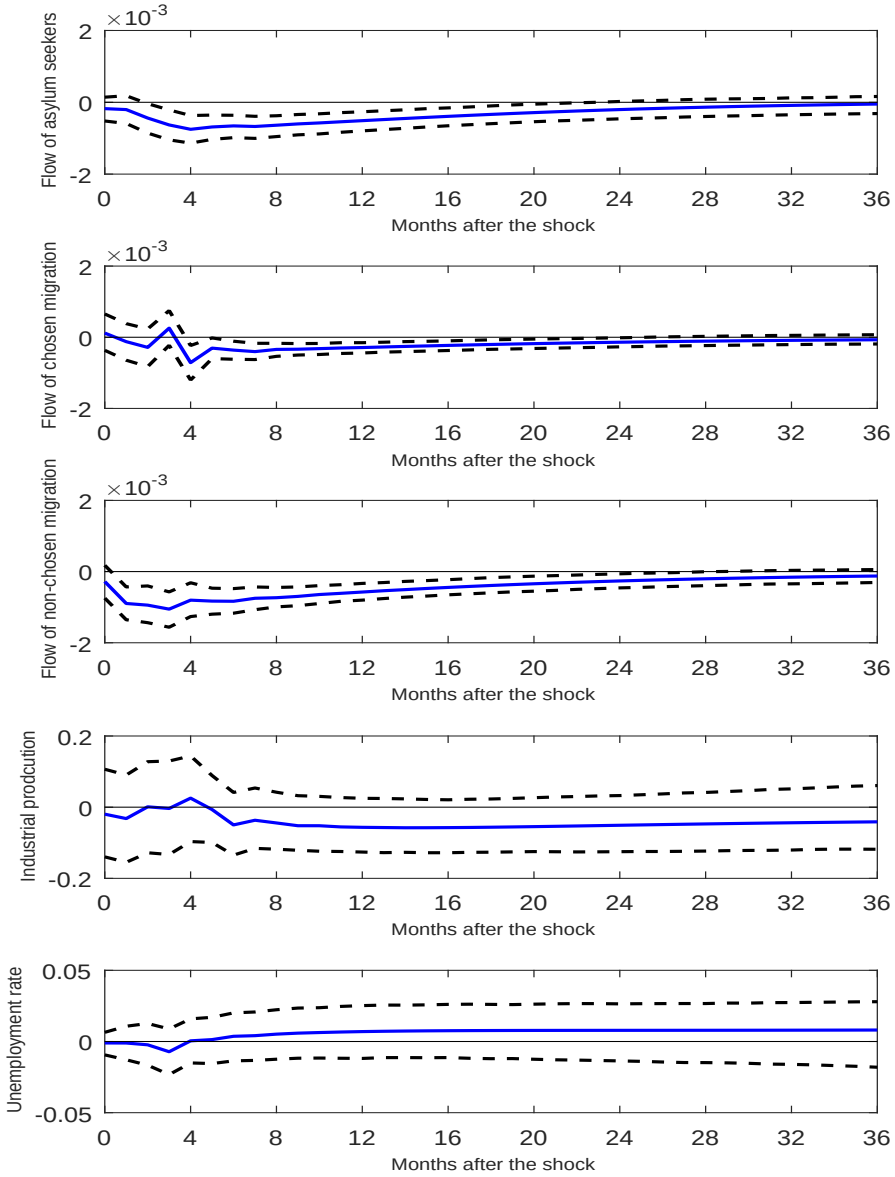

Notes: The flows of asylum seekers and permanent migrants with year 2001=100 as reference. Source: authors' calculations using the administrative data on residence permits from the French Ministry of Interior .

Figure 4: Migration and Economy Responses in France to an Exogenous Increase in Global terrorism



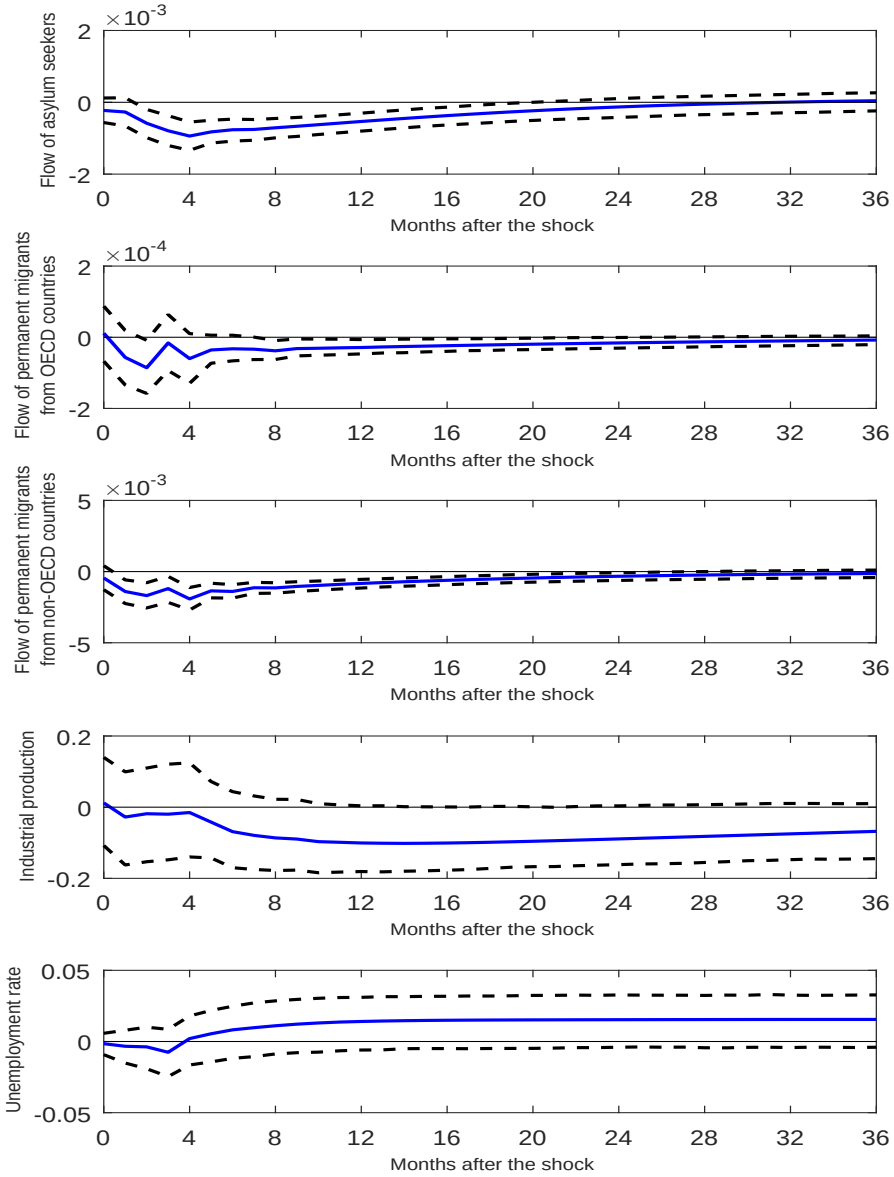

Notes: The solid line gives the estimated impulse response. Dashed lines give the 90% confidence intervals generated by Monte Carlo simulations with 5,000 repetitions. The size of the shock corresponds to 1,000 victims of terrorist attacks worldwide. The responses of migration variables are in per 1,000 points change. The responses of industrial production and unemployment are in percentage change and percentage points change, respectively.

Figure 5: Migration and Economy Responses in France to an Exogenous Increase in Global Terrorism, "Chosen" and "Imposed" Immigration



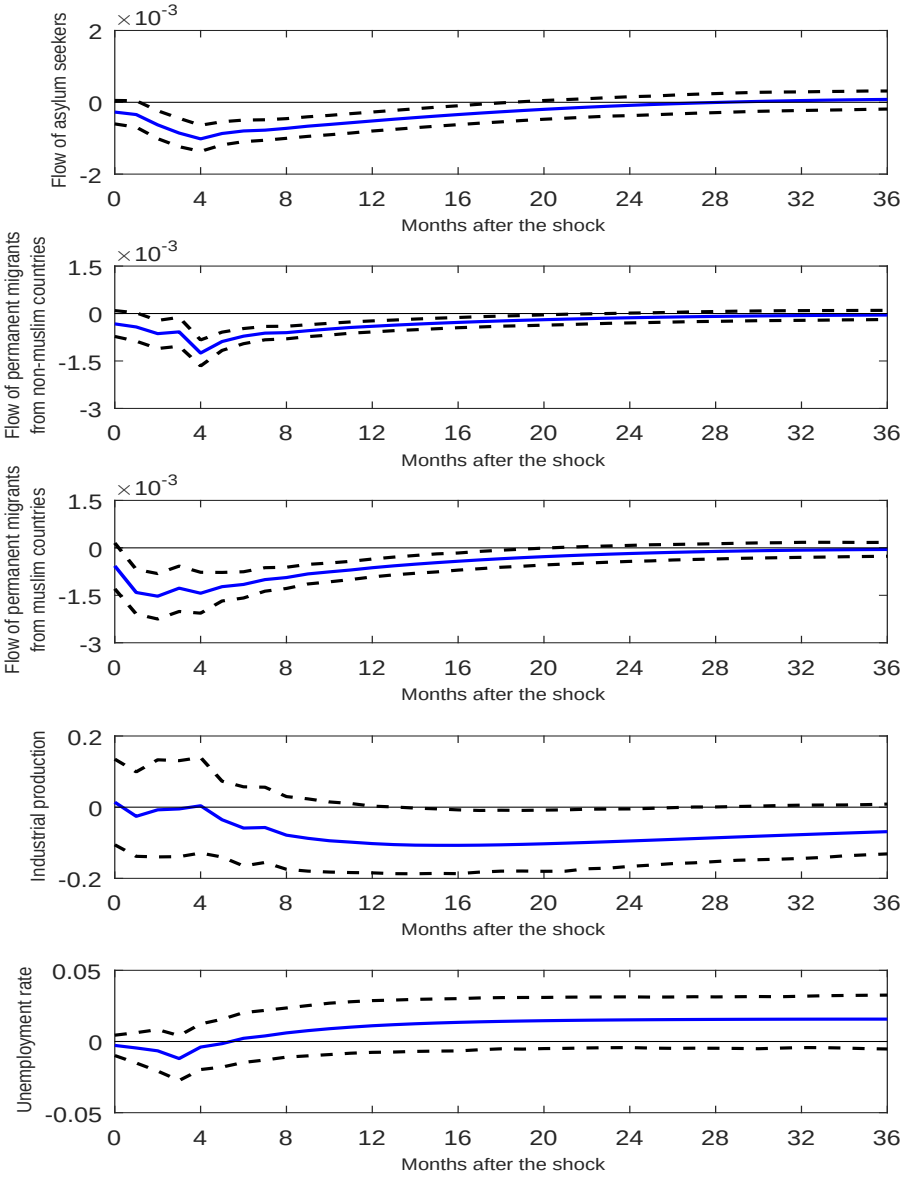

Notes: The solid line gives the estimated impulse response. Dashed lines give the 90% confidence intervals generated by Monte Carlo simulations with 5,000 repetitions. The size of the shock corresponds to 1,000 victims of terrorist attacks worldwide. The responses of migration variables are in per 1,000 points change. The responses of industrial production and unemployment are in percentage change and percentage points change, respectively.

Figure 6: Migration and Economy Responses in France to an Exogenous Increase in Global Terrorism, OECD Origin and Non-OECD Origin




Notes: The solid line gives the estimated impulse response. Dashed lines give the 90% confidence intervals generated by Monte Carlo simulations with 5,000 repetitions. The size of the shock corresponds to 1,000 victims of terrorist attacks worldwide. The responses of migration variables are in per 1,000 points change. The responses of industrial production and unemployment are in percentage change and percentage points change, respectively.

Figure 7: Migration and Economy Responses in France to an Exogenous Increase in Global Terrorism, Muslim Country Origin and Non-Muslim Country Origin




Notes: The solid line gives the estimated impulse response. Dashed lines give the 90% confidence intervals generated by Monte Carlo simulations with 5,000 repetitions. The size of the shock corresponds to 1,000 victims of terrorist attacks worldwide. The responses of migration variables are in per 1,000 points change. The responses of industrial production and unemployment are in percentage change and percentage points change, respectively.

# Appendix

## A-1 Data

**Global Terrorism.** The global terrorism is measured by the total number of victims (i.e. the number of killed and wounded persons) resulting from terrorist incidents that occurred worldwide. Data are from the Global Terrorism Database (GTD) which is an open-source database including information on terrorist events around the world, compiled by the National Consortium for the Study of Terrorism and Responses to Terrorism, University of Maryland (START, 2018). The GTD is adequate to evaluate the effects of global terrorism but, according to us, not necessarily sufficient for regional uncertainty as data for some events are missing. This strategy is also followed by Carriere-Swallow and Cespedes (2013). Note there is a growing literature that measures uncertainty using newspaper coverage frequency; this follows the seminal contribution of Baker et al. (2016) on economic policy uncertainty. For instance, Caldara and Iacoviello (2017) present an indicator of geopolitical risk as perceived by the press. They construct an index by counting the number of occurrences in leading English-language newspapers[7] of articles discussing the geopolitical events (including terrorist threats and acts). This indicator measures the perception of risks as reflected in the media coverage of events. But to measure global terrorism,

[7]They rely on the electronic archives of 11 national and international newspapers: The Boston Globe, Chicago Tribune, The Daily Telegraph, Financial Times, The Globe and Mail, The Guardian, Los Angeles Times, The New York Times, The Times, The Wall Street Journal, and The Washington Post.

we prefer to use the number of victims resulting from those attacks that occurred worldwide from an open-source database.

**Economic Conditions.** The two main economic variables we consider are the standard of living and the unemployment rate. The standard of living is measured by the annual real GDP per capita in the panel sample and by the monthly industrial production index in the France's sample. The industrial production index is available at a monthly basis for the entire time window we consider. Other relevant indictors (including the index for services) are more recent. Note that monthly series of industrial production and unemployment rate, which obtained from the OECD Main Economic Indicators database (OECD, 2019) are seasonally adjusted. Annual data are taken from OECD Economic Outlook (OECD, 2018). In addition to these main economic variables, we consider the S&P500 index and the Michigan Consumer Sentiment Index (University of Michigan, 2020) for global economic and financial conditions.

**Migration Flows (European Panel).** The data on population statistics and asylum applicants are taken from Eurostat (2020). The first variable used to evaluate international migration is the flow of asylum seekers, which is measured by the annual first asylum applications pending at the end of the year from Eurostat asylum and managed migration ($mig$) database, series codes $migr - asyctz$ and $migr - asyappctza$. Second, we consider the flow of permanent migrants, which is measured by the net migration including statistical adjustment. The data are from Eurostat Population change ($demo - gind$) database, series code $cnmigratrt$. Net migration accounts for the difference between immigration and emigration during

the year, and is produced at regular basis by the national statistical offices in order to produce estimates of the total resident population. Note that asylum seekers are not considered to be part of the resident population, they are generally not included in the population statistics that are used by Eurostat to produce net migration data. For asylum applications, an alternative data source would be the UNHCR data (used for example in Hatton, 2009). The UNHCR has regularly produced data on asylum applications in OECD countries and other countries of the World. Compared to Eurostat (2020) data, the main advantage of the UNHCR data consists on their coverage. But we believe that Eurostat (2020) data are the best available data on asylum seekers in Western European countries. Moreover, these data are comparable and more accurate than the UNHCR data which suffer from a number of limitations, the most problematic is the double counting of individuals seeking asylum in Europe (see OECD, 2016, p.29 for a comprehensive discussion).

**Migration Fows (France).** Data on monthly migration flows are computed using residence permits information collected in the central foreigners register, what is known as AGDREF (*Application de Gestion des Dossiers de Ressortissants Etrangers en France*). The AGDREF register was created in 1993 to combine the data on residence permits with all other administrative details on permit holders. It is managed by the French Ministry of the Interior and an updated photography of it is provided every year to the French Institute for Demographic Studies (INED). We are using these annual files.[8] A more extensive description of AGDREF can be found in d'Albis and Boubtane (2015). We first consider the number of registered asylum seekers by

[8]Given the scope of AGDREF data, the access is restricted to authorized persons. Such authorization can be obtained from the Ministry of Interior, Place Beauvau 75008 Paris, France.

month of entry in France from AGDREF data. Our sample includes all third-country nationals (i.e. not citizens of the European Economic Area member countries or the Switzerland)[9] who applied for asylum in France. Second, the flow of permanent migrants is measured by the monthly immigration flow of third-country nationals who received a first residence permits valid for at least one year -permanent migrants- and who have not filed an application for asylum in France. The AGDREF data allow a precise distinction among the migration flows, between the two categories of entry. The flow of permanent migrants does not include the asylum seekers becoming permanent migrants (i.e., who received a residence permit valid for one year or more). Given that migration flows are subject to seasonal fluctuations and calendar effects, we seasonally adjust monthly migration variables in our second sample using the Census X-13 method. One of the contributions of our paper is to produce original statistics on migration flows in France. Currently, the available data refer to the number of residence permit by year of issue and to the number of pending asylum applications by year or month of application. On the one hand, data on the number of residence permit are processed by the Ministry of the Interior from AGDREF register, and on the other data on the number of asylum applications are processed by the French Office for the Protection of Refugees and Stateless Persons from a specific register dedicated to the handling and management of asylum cases. None of them provides details on data processing. In addition of the comparability problem over time of available data on migration to France, their temporal coverage is too lim-

[9]The AGDREF register records all foreigners for whom a residence permit is required to settle in France; therefore, it does not contain reliable information on nationals of the European Economic Area and Switzerland as they no longer need a residence permit to settle in France. Note that these data do not contain information on foreigners departures.

ited to allow for an accurate estimation of VAR models. Importantly, our migration series are constructed from one source: AGDREF. Indeed, asylum seekers receive temporary permit which they are given pending a decision on their application for international protection. Given that all issued permits are recorded in AGDREF, we construct a comparable time series on the asylum seekers. We proceed in the same way that in d'Albis and Boubtane (2018) to compute the third-country nationals who applied for asylum in France. Following the methodology described in d'Albis and Boubtane (2015), we construct the flow of permanent migrants, defined as the holders of residence permits valid between 1994 and 2017, for at least one year. It should be notes that asylum seekers who are recognized as refugees or beneficiaries of subsidiary protection or who obtain another permanent type residence permit are included in the holders of residence permits valid for at least one year. So, those holders who has lodged an asylum application (recorded in the flow of asylum seekers) are excluded from the flow of permanent migrants. The date of reference for migration statistics is often the date when the permit was granted or the date of the asylum application. In this paper, the date of reference for our migration series is the date of entry in France. The available data from AGDREF at the time of writing allow us to use the information about the holders of valid residence permits between 1994 and 2017. This allows us to get a reliable measure of immigrants who arrived in France between 1994 and 2015. Given that administrative procedures take some time in France and that there are delays between the date of entry, the date of issue and the date of registration in AGDREF, we observe a declining trend in the flow of permanent migrants arrived in 2016 and 2017 that could be explained simply by a

delay in the registration in AGDREF. Based on information on the reasons for issuing residence permit, we distinguish between "chosen" versus "imposed" immigration flows, this terminology stemming from the French political debate on the control of immigration flows. The first category, "chosen" flow of permanent migrants, includes the holders of permits issued for work and study purposes, while the second category, "imposed" flow, includes the holders of permits issued for family and other purposes. There are two family reunification groups: foreign relatives of French citizens and foreign relatives of migrants already settled in France. The other reasons category includes third-country nationals who were admitted for humanitarian reasons who did not apply for asylum (victims of trafficking in human beings and/or sexual violence and individuals who obtained a residence permit on medical grounds), those who arrived minors in France, those who have been regularized after a period of more than ten years of continuous residence, those who received work accident annuity, veterans and retired persons. Our series of migration flows clearly show a break in 2001, both for the flows of asylum seekers and permanent migrants (Figure 3). Following a period of decline until 2007, the flow of asylum seekers rises while the flow of permanent migrants remains stable. The decomposition by country of origin shows that the flow of permanent migrants from more developed OECD countries (Australia, Canada, New-Zealand and Japan) which represents less than 10% of total flow, continued to decline after 2007, while the flow of those from less developed countries remained stable. The trend of "imposed" flow of permanent migrants is less clear: it increased slightly between 2007 and 2012 and seems to have declined since then. The "chosen" flow of permanent migrants shows an overall upward trend

since 2006, although a decrease was observed between 2008 and 2012. At the end of the period, the "chosen" and "imposed" flows are similar, given to the pronounced increase in international students choosing France. Finally, we consider a country to be a "Muslim country", if Islam is the first religion according to the classification of the Central Intelligence Agency (www.cia.gov/the-world-factbook/) and the Pew Research Center (www.pewforum.org/2015/04/02/religious-projections-2010-2050/).

## A-2 Testing for Granger Causality/Block Exogeneity

Let us first setup the VAR model as an unrestricted VAR:

$$Z_{it} = \sum_{s=1}^{p} \Gamma_s Z_{it-s} + \alpha_i + \varepsilon_{it}, \tag{A-1}$$

where $Z_{it}$ is a $(6 \times 1)$ vector that contains all variables under consideration (the number of victims worldwide of terrorist attacks, the S&P500 index, the Michigan Consumer Sentiment index, the flow of permanent migrants, the flow of asylum seekers, real GDP per capita, unemployment rate). Let us denotes variable $k$ in $Z_{it}$ by $z_{it}^k$. For $z_{it}^k$, the corresponding line in Equation (A-1) writes:

$$z_{it}^k = \sum_{s=1}^{p} \sum_{\substack{k' \neq k \\ k'=1}}^{6} \gamma_s^{k'} z_{it-s}^{k'} + \alpha_i^k + \varepsilon_{it}^k, \tag{A-2}$$

where $\alpha_i^k$ and $\varepsilon_{it}^k$ are the correspondent univariate country fixed effects and error of variable $k$. To check for the relevance of our VARX specification, we test for the block exogeneity (VAR Granger Causality). That is, for each variable $k$, we

test whether the past values of a variable $k'$ contain information that are helpful to predict variable $k$, given that the past values of all variables are considered. Formally, in Equation (A-2), we test $H_0 : \gamma_1^{k'} = \gamma_2^{k'} = ... = \gamma_p^{k'} = 0$ for each variable $k'$ separately. The test statistics is a Wald statistic following under the null hypothesis a chi-squared distribution of degree of freedom equal to the number of constraints to be tested, which corresponds to the lag length $p$. The results, reported in Table A-1, show evidence that the past values of any country variables (real GDP per capita, unemployment, flow of asylum seekers, flow of permanent migrants) are not useful to predict any global variables (i.e. number of victims worldwide of terrorist attacks, S&P500 index, Michigan Consumer Sentiment index), which confirms that global variables are block-exogenous with respect to country variables.

## A-3 Testing for Structural Break in Immigration to France

### With Known Break Date

To test for a structural break around September, 2001 in migration time series, we take advantage of monthly data of France. As in Enders and Sandler (2005), we consider the following autoregressive (AR) model on migration series $y_t$ with the before and after 9/11 dummy variable:

$$y_t = \alpha + \sum_{i=1}^{p} \gamma_i y_{t-i} + \delta D_t + \varepsilon_t \tag{A-3}$$

where $D_t$ is the before and after 9/11 dummy variable, i.e $D_t = 0$ if $t < 2001M09$ and $D_t = 1$ if $t \geq 2001M09$. Then, $\delta$ represents the permanent impact of 9/11 on

Table A-1: VAR Granger Causality/Block Exogeneity

| *Dependent variable: number of victims worldwide of terrorist attacks* | | |
|---|---|---|
| Excluded | Test Statistics | P-value |
| S&P500 index | 49.9224 | 0.0000 |
| Michigan Consumer Sentiment index | 0.6862 | 0.7096 |
| Flow of asylum seekers | 1.49E-14 | 1.0000 |
| Flow of permanent migrants | 2.55E-13 | 1.0000 |
| Real GDP per capita | 1.10E-14 | 1.0000 |
| Unemployment | 9.05E-15 | 1.0000 |
| *Dependent variable: S&P500 index* | | |
| Excluded | Test Statistics | P-value |
| Number of victims worldwide of terrorist attacks | 22.1629 | 0.0000 |
| Michigan Consumer Sentiment index | 117.5485 | 0.0000 |
| Flow of asylum seekers | 4.12E-14 | 1.0000 |
| Flow of permanent migrants | 1.53E-13 | 1.0000 |
| Real GDP per capita | 1.93E-14 | 1.0000 |
| Unemployment | 4.88E-14 | 1.0000 |
| *Dependent variable: Michigan Consumer Sentiment Index* | | |
| Excluded | Test Statistics | P-value |
| Number of victims worldwide of terrorist attacks | 19.3635 | 0.0000 |
| S&P500 index | 1.1614 | 0.0000 |
| Flow of asylum seekers | 1.08E-13 | 1.0000 |
| Flow of permanent migrants | 4.46E-13 | 1.0000 |
| Real GDP per capita | 3.35E-14 | 1.0000 |
| Unemployment | 7.86E-14 | 1.0000 |

Note: The test statistics is a Wald statistic which follows, under the null hypothesis, a chi-squared distribution of 2 (the number of constraints that corresponds to the lag length).

migration series $y_t$. Testing for a break occurring after 9/11 corresponds to test the significance of $\delta$. The lag length $p$ is selected using the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) and so that there is not serial correlation in the residual. For the flow of permanent migrants $p = 11$ and the flow of asylum seekers $p = 6$.

Table A-2: Break test with known break date

| Variable | Coefficient | P-value |
|---|---|---|
| Flow of permanent migrants | -0.041 | 0.004 |
| | (0.014) | |
| Flow of asylum seekers | -0.007 | 0.561 |
| | (0.013) | |

Notes: Coefficient reported correspond to, in the autoregressive regression, the coefficient of dummy variable representing 9/11 so that if $D_t$ if $t < 2001M09$ and $D_t = 1$ if $t \geq 2001M09$. Standard errors are parenthesis and p-value of significance testing are reported.

For both migration flows (permanent migrants and asylum seekers), Table A-2 reports the estimation of the coefficient $\delta$ of 9/11 of dummy variable and the p-value of its significance testing. For the flow of permanent migrants, the estimated coefficient of 9/11 dummy is negative and significant at 1% level of significance. While the estimated coefficient for the flow of asylum seekers is negative but not significant. These results highlight that after 9/11 there was a permanent significant decline in the flow of permanent migrants in France. Even through graphic visual, the series of asylum seekers exhibits some shift after 9/11, this shift was just temporary.

**With Unknown Break Date**

The previous results are obtained assuming one known break occurred at 9/11. However, it is possible to have multiple breaks occurring at dates which may not be exactly 9/11. Therefore, following Enders and Sandler (2005), we rely on Bai-Perron procedure (Bai and Perron, 1998, 2003) that can estimate a time series model with multiple structural breaks occurring at unknown dates. This procedure has the advantage to endogenously determine the number of breaks and their timing while estimating the model coefficients. The Bai-Perron specification in our AR context

takes the following form:

$$y_t = \sum_{i=1}^{p} \gamma_i y_{t-i} + \sum_{j=0}^{m} \delta_j D_{jt} + \varepsilon_t \tag{A-4}$$

where $j = 0, 1, ..., m$, $m$ is the number of breaks (giving $m+1$ regimes) with $D_{jt} = 1$ if $T_j \leq t < T_{j+1}$ and $D_{jt} = 0$ otherwise, and with $T_0 = 1$ and $T_{m+1} = T + 1$ (break date corresponds to be the first date of the subsequent regime). There are $m$ possible breaks or $m+1$ possible regimes in Equation (A-4) that are characterized by changing in the intercepts $\delta_j$ in the autoregressive process. Given the period covered by our sample (22 years), we set the maximum number possible breaks to three. We also set the minimum regime size to 20% of the sample (4.40 years). We consider the Bai-Perron sequential testing procedure which tests the null hypothesis $m = l$ against the alternative $m = l + 1$ until the null hypothesis cannot be rejected. Its uses a F-type test statistic that has a non-standard distribution whose critical values are tabulated in Bai and Perron (2003).

Table A-3: Break test with unknown break date

| Break Test | Test-statistic | Critical Value | Beak date |
|---|---|---|---|
| Flow of permanent migrants | | | |
| $m = 0$ vs. $m = 1$ | 9.35 | 8.22 | 2001M08 |
| $m = 1$ vs. $m = 2$ | 8.80 | 9.71 | - |
| Flow of asylum seekers | | | |
| $m = 0$ vs. $m = 1$ | 3.32 | 8.22 | - |

Notes: $m$ represents the number of breaks. Test-statistic is a F-type test statistic that has non-standard distribution ; its critical values are tabulated in Bai and Perron (2003). Critical values reported correspond to the 5% level of significance. Break date corresponds to be the first date of the subsequent regime.

The results of Bai-Perron procedure, reported in Table A-3, show evidence of a

break in autoregressive process for permanent migration flow but not for the flow of asylum applicants. The Bai-Perron sequential testing procedure identifies only one break in the autoregressive process of permanent migration with a new regime beginning in 2001M08, which is only one month before 9/11.

## A-4 VAR Models: Additional Results

### Panel of Western European Countries

Table A-4, reports the estimated coefficients of the responses of migration and economic variables to a shock on global terrorism. It conveys the same information as Figure 2.

Table A-4: Responses in Western Europe to an Exogenous Increase in Global Terrorism

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Flow of asylum seekers | 0.012* | 0.018* | 0.011* | 0.000 | -0.003 | -0.003 |
| Flow of permanent migrants | 0.011 | 0.011 | -0.021 | -0.026* | -0.023* | -0.018* |
| Real GDP per capita | -0.039* | -0.038* | -0.064* | -0.052* | -0.043* | -0.034* |
| Unemployment rate | 0.007 | 0.012* | 0.016* | 0.017* | 0.015* | 0.012* |

Notes: Year 0 stands for the year of the shock, which corresponds to a one-thousand increase in the number of victims of terrorist attacks worldwide. The responses of migration variables are in per 1,000 points change. The responses of migration variables are in per 1,000 points change. The responses of industrial production and unemployment are in percentage change and percentage points change, respectively. * denotes statistical significance at the 10% level.

Table 1 is a simple transformation of Table A-4, where we divide the values related to the flows of asylum seekers and permanent migrants and to the unemployment rate by their sample average: 1.18 and 2.85 per 1,000 inhabitants and 7.7%, respectively.

When global terrorism is measured by the number of victims resulting form terrorist attacks that occurred outside Western Europe, our results are unchanged. The

corresponding dynamic responses of migration and economy are provided in Figure A-1, which is qualitatively similar to 2.

[Figure A-1]

**France**

Table A-5 reports the estimated coefficients of the responses of migration and economic variables in France to a shock on global terrorism. It is the counterpart of Figure 4.

Table A-5: Responses in France to an Exogenous Increase in Global Terrorism

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|
| Flow of asylum seekers | 0.0002 | -0.0006* | -0.0003* | -0.0001 | 0.0000 | 0.0000 |
| Flow of permanent migrants | -0.0006 | -0.0013* | -0.0004* | -0.0002 | -0.0001 | 0.0000 |
| Industrial production index | -0.0031 | -0.0469 | -0.0504 | -0.0305 | -0.0224 | -0.0202 |
| Unemployment rate | -0.0016 | 0.0010 | 0.0061 | 0.0050 | 0.0050 | 0.0054 |

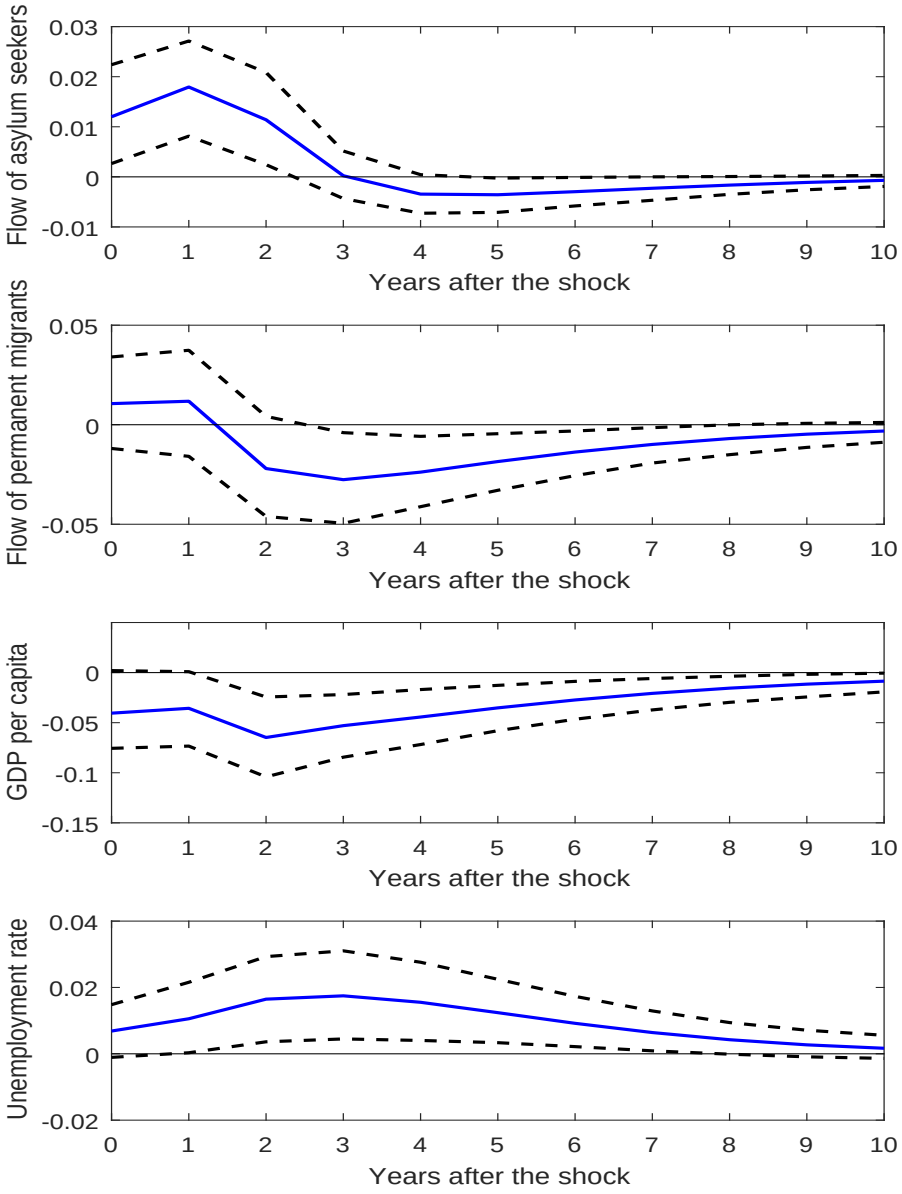
Notes: Year 0 stands for the year of the shock, which corresponds to a one-thousand increase in the number of victims of terrorist attacks worldwide. Annual responses are averages of monthly responses. The responses of migration variables are in per 1,000 points change. For per capita GDP, the responses are expressed in percentage change. The responses of unemployment are percentage points change. * denotes statistical significance at the 10% level.

Our findings are unchanged when global terrorism is measured by the number of victims resulting form terrorist attacks that occurred outside Western Europe. The corresponding results are reported in Figure A-2.

To compute Table 2, we use the sample averages of the flows of asylum seekers and permanent migrants in France (0.05 and 0.15 per 1,000 inhabitants, respectively) and of the unemployment rate (9.9%).

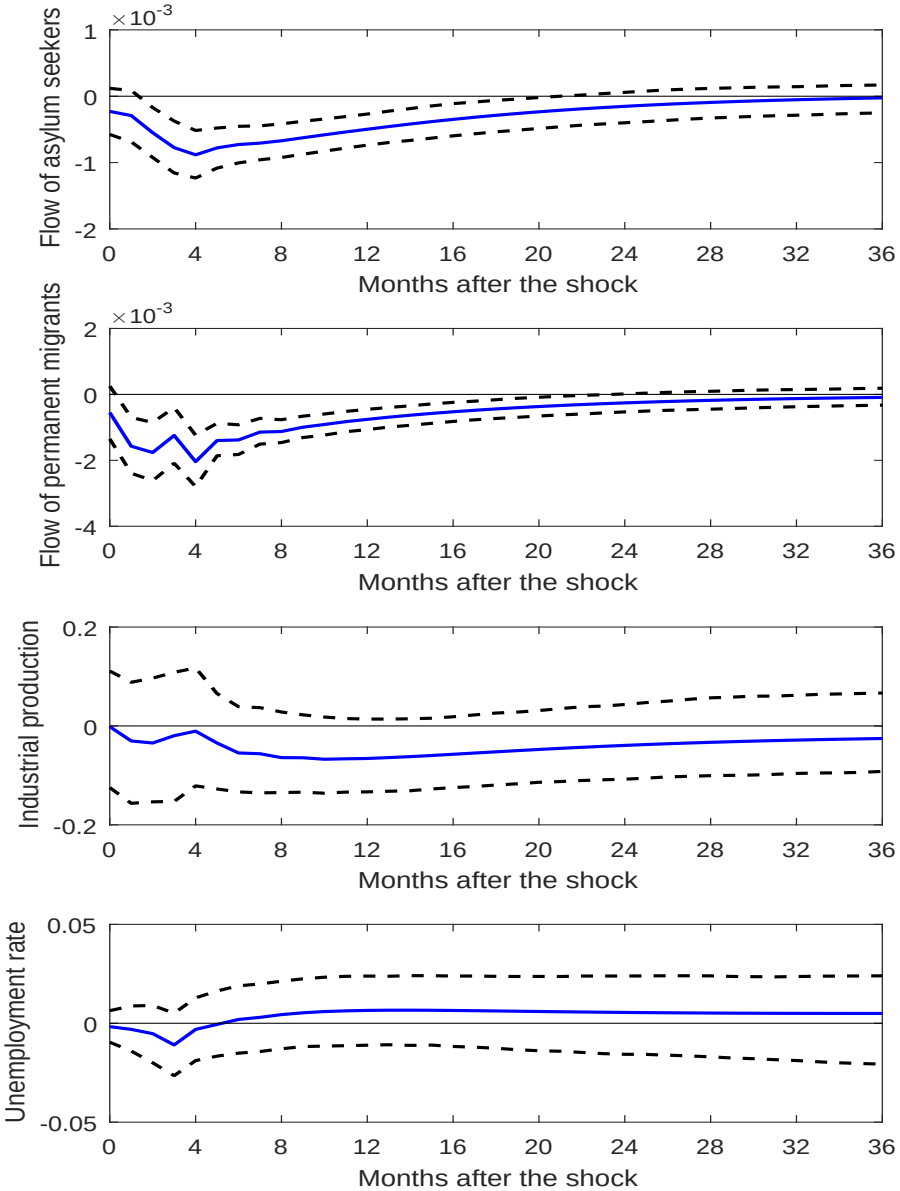
Finally, our findings do not alter when we compute the IRF using local projection techniques. Figure A-3 displays the corresponding dynamic responses.

Figure A-1: Migration and Economy Responses in Europe to an Exogenous Increase of the Global Terrorism Indicator Computed with Terrorist Attacks that Occurred Outside Western Europe



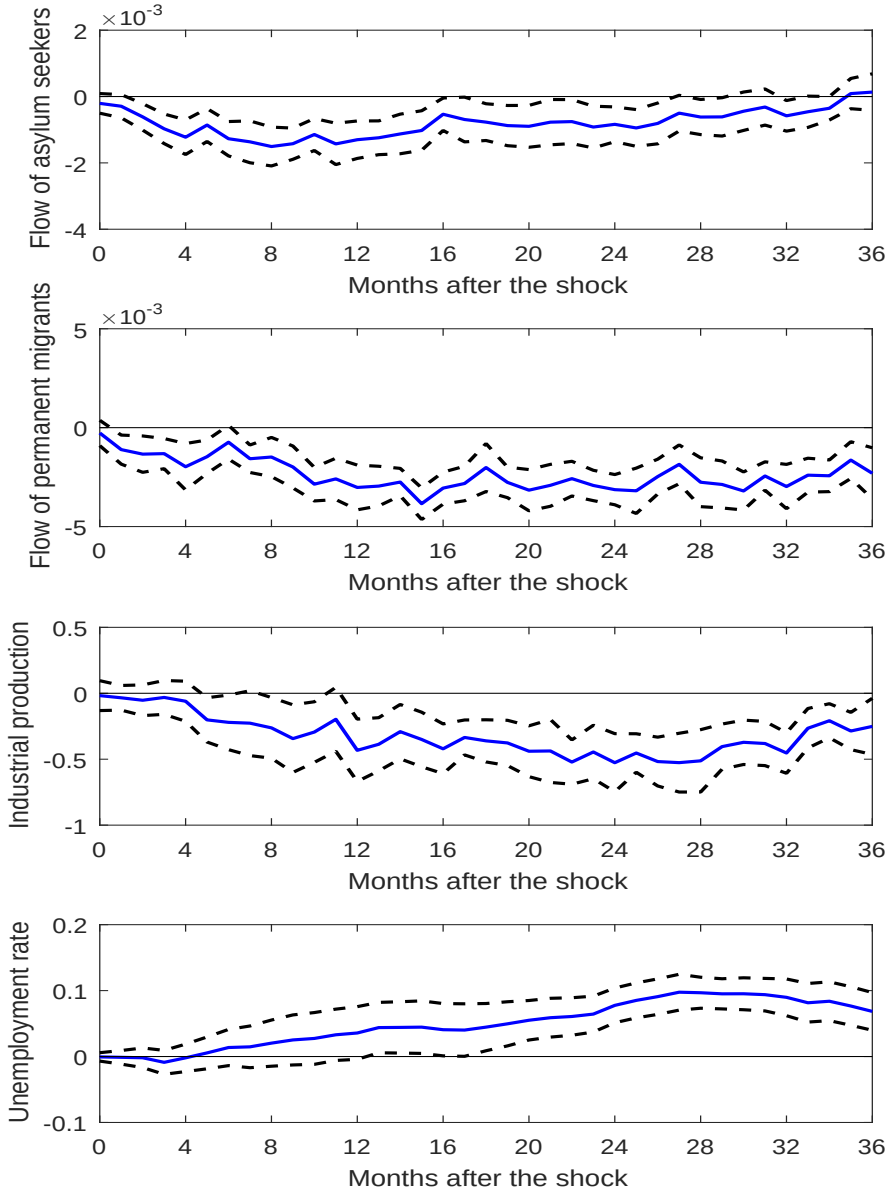

Notes: The solid line gives the estimated impulse response. Dashed lines give the 90% confidence intervals generated by Monte Carlo simulations with 5,000 repetitions. The size of shock corresponds to 1,000 victims of terrorist attacks (outside Western Europe). The responses of migration variables are in per 1,000 points change. The responses of per capita GDP and unemployment rate are in percentage change and percentage points change, respectively.

Figure A-2: Migration and Economy Responses in France to an Exogenous Increase of the Global Terrorism Uncertainty Indicator Computed with Terrorist Attacks that Occurred Outside Western Europe




Notes: The solid line gives the estimated impulse response. Dashed lines give the 90% confidence intervals generated by Monte Carlo simulations with 5,000 repetitions. The size of shock corresponds to 1,000 victims of terrorist attacks (outside Western Europe). The responses of migration variables are in per 1,000 points change. The responses of industrial production and unemployment are in percentage change and percentage points change, respectively.

Figure A-3: Migration and Economy Responses in France to an Exogenous Increase of the Global Terrorism, using Local Projections




Notes: The solid line gives the estimated impulse response. Dashed lines give the 90% confidence intervals. The size of shock corresponds to 1,000 victims of terrorist attacks (outside Western Europe). The responses of migration variables are in per 1,000 points change. The responses of industrial production and unemployment are in percentage change and percentage points change, respectively.