The Economic Costs of Conflict: A Case Study of the Basque Country

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This article investigates the economic effects of conflict, using the terrorist conflict in the Basque Country as a case study. We find that, after the outbreak of terrorism in the late 1960's, per capita GDP in the Basque Country declined about 10 percentage points relative to a synthetic control region without terrorism. In addition, we use the 1998–1999 truce as a natural experiment. We find that stocks of firms with a significant part of their business in the Basque Country showed a positive relative performance when truce became credible, and a negative relative performance at the end of the cease-fire. (*JEL* D74, G14, P16)

Political instability is believed to have strong adverse effects on economic prosperity. However, to date, the evidence on this matter is scarce, probably because it is difficult to know how economies would have evolved in absence of political conflicts.

This article investigates the economic impact of conflict, using the terrorist conflict in the Basque Country as a case study. The Basque conflict is especially interesting from an economic perspective. At the outset of terrorist activity in the early 1970's, the Basque Country was one of the richest regions in Spain, occupying the third position in per capita GDP (out of 17 regions). In the late 1990's, after 30 years of terrorist and political conflict, the Basque Country had dropped to the sixth position in per capita GDP.[1] During that period, terrorist activity by the Basque terrorist organization ETA resulted in almost 800 deaths. Basque entrepreneurs and corporations had been specific targets of violence and extortion (including assassinations, robberies, and kidnappings-for-ransom). Not surprisingly, the economic downturn suffered by the Basque economy during those years has been attributed, at least partially, to the effect of terrorism. However, little research has been carried out to assess the economic effects of the conflict.[2]

This type of study is difficult. On the one hand, a pure time-series analysis of the severity of terrorism and the evolution of the Basque economy will be contaminated by the economic downturn which Spain suffered during the second half of the 1970's and the first half of the 1980's, at the peak of terrorist activity. On the other hand, at the outset of terrorism, the Basque Country differed from other Spanish regions in characteristics that are thought to be related to potential for economic growth. Therefore, a simple comparison of the evolution of the Basque economy and the economy of the rest of Spain would not only reflect the effect of terrorism but also the effect of pre-terrorism differences in economic growth determinants.

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[1] See Fundación BBV (1999).

[2] Notable exceptions are Walter Enders and Todd Sandler (1991, 1996), who study the effects of terrorism on tourism and foreign direct investment in Spain.

Our analysis rests on two different strategies. First, we use a combination of other Spanish regions to construct a "synthetic" control region which resembles relevant economic characteristics of the Basque Country before the outset of Basque political terrorism in the late 1960's. The subsequent economic evolution of this "counterfactual" Basque Country without terrorism is compared to the actual experience of the Basque Country. We find that, after the outbreak of terrorism, per capita GDP in the Basque Country declined about 10 percentage points relative to the synthetic control region. Moreover, this gap seemed to widen in response to spikes in terrorist activity. The second part of this study uses the unilateral truce declared by ETA in September 1998 as a natural experiment to estimate the effects of the conflict. If the terrorist conflict was perceived to have a negative impact on the Basque economy, stocks of firms with a significant part of their business in the Basque Country should have shown a positive relative performance as the truce became credible, and a negative relative performance at the end of the cease-fire. We find evidence that is consistent with this conjecture using event study methods.

Most of the empirical literature on the effects of political conflict on economic variables have used cross sections of country-level data. Using a cross section of countries, Yiannis P. Venieris and Dipak K. Gupta (1986) and Alberto Alesina and Roberto Perotti (1996) concluded that political instability has a negative effect on investment and savings. Also using a cross section of countries, Robert J. Barro (1991), Paolo Mauro (1995), and Alesina et al. (1996) have argued that political instability has a negative effect on economic growth.[3] A potential caveat of this literature is that part of the observed association between political conflict and economic variables across countries is thought to be created by reverse causation, since political instability is not only a cause but also an effect of fluctuations in economic variables.[4] Instrumental variables techniques can be used to correct for reverse causation. However, the validity of instruments in cross-country regressions has often been questioned (see, e.g., N. Gregory Mankiw, 1995). Another potential shortcoming of studies based on country-level data is that political conflicts in different countries may be radically different in nature. Such heterogeneity may create problems when comparing the experiences of different countries and interpreting the results (Jonathan Temple, 1999, discusses heterogeneity issues in cross-country regressions).

Case studies, like the one presented in this article, look like the natural avenue to validate or refute the results given by cross-country studies. Heterogeneity issues are circumvented here by focusing on a particular conflict: the terrorist conflict in the Basque Country. In addition, as explained below, the Basque conflict has no direct economic motivation and, in contrast to most other violent conflicts, it does not take place in a region under particularly harsh economic conditions. Consequently, temporal variation in economic prosperity in the Basque Country during the period considered in this study is unlikely to have had a substantial effect on the intensity of terrorist activity, mitigating endogeneity issues.

I. A Brief History of ETA's Terrorist Activity

ETA was founded in 1959 to promote the establishment of an independent Basque state.[5] However, it was not until 1968 that ETA claimed its first victim. In fact, ETA did not implement large-scale terrorist activity until the

[3] See also Douglas A. Hibbs (1973), Gupta (1990), John B. Londregan and Keith T. Poole (1990), Jess Benhabib and Aldo Rustichini (1996), and Daron Acemoglu and James A. Robinson (2001) on the relationship between political instability and economic variables.

[4] Conventionally, it has been argued that economic growth promotes political stability. Mancur Olson (1963) has argued, however, that rapid economic growth produces social dislocation and may cause political unrest. While cross-country studies have shown a positive association between poverty and political conflict (see, e.g., Paul Collier and Anke Hoeffler, 2002), Alan B. Krueger and Jitka Maleckova (2002) provide evidence that, within country, disparities in individual socioeconomic characteristics seem to be unrelated to participation in politically motivated violence.

[5] Basques are spread over the Basque Autonomous Region and Navarra in Spain, and part of the French Atlantic Pyrenees Department. The Basque Autonomous Region in Spain has been, however, the main scenario of the conflict; for the rest of the article, we use the term "the Basque Country" to refer to this region. The Basque Autonomous region is a small region with an area of 7,234 square kilometers (around 1.5 percent of the total area of Spain) and 2.1 million inhabitants in 2000 (around 5.2 percent of the total population of Spain).

TABLE 1—CHRONOLOGY OF ETA'S TERRORIST ACTIVITY

Year	Killings	Kidnappings	Event
1968	2	0	First victim of ETA
1969	1	0	
1970	0	1	
1971	0	0	
1972	1	1	
1973	6	1	ETA kills Franco's Prime Minister Admiral Carrero-Blanco
1974	19	0	
1975	16	0	Dictator Franco dies
1976	17	4	
1977	11	1	First democratic elections in Spain after Franco's death
1978	67	6	Spanish Constitution approved in referendum
1979	76	13	Regional Autonomy Statute for the Basque Country approved
1980	92	13	
1981	30	10	Attempted military coup. Spain joins NATO
1982	37	8	
1983	32	5	
1984	32	0	
1985	37	3	
1986	41	3	Spain joins European Community
1987	52	1	
1988	19	1	
1989	19	1	
1990	25	0	
1991	46	0	
1992	26	0	Barcelona hosts the Summer Olympic Games
1993	14	1	
1994	13	0	
1995	15	1	
1996	5	2	
1997	13	1	
1998	6	0	ETA declares indefinite cease-fire starting on September 18
1999	0	0	ETA announces the end of cease-fire on November 28
2000	23	0	

Source: Spanish Ministry of Interior (2002).

mid-1970's. Table 1 shows the number of killings and kidnappings from 1968 to 2000. ETA's terrorist activity was low before 1973 with no more than two victims in any given year. The death toll increased sharply during the mid-1970's, with an average of almost 16 victims per year in the period of 1974–1977. The bloodiest three years of ETA, 1978–1980, witnessed a total of 235 victims. In subsequent years, the number of killings decreased gradually. On average, during the 1980's, ETA's activity resulted in 39 deaths per year; this figure was reduced to 16 per year during the 1990's. The number of kidnappings during the sample period was smaller than the number of killings but evolved similarly. In September 1998, ETA declared a total and indefinite cease-fire. The cease-fire lasted approximately 14 months; in November 1999, ETA announced the end of cease-fire. In the year 2000, ETA killed 23 people.

TABLE 2—ETA'S TERRORIST ACTIVITY, 1968–1997

Deaths:	
Basque Country	523
Rest of Spain	236
Percentage in the Basque Country	68.91
Deaths per million inhabitants per year:	
Basque Country	8.17
Rest of Spain	0.22
Ratio Basque Country/Rest of Spain	37.43

Notes: Authors' computations from Fundación BBV (1999) and Spanish Ministry of Interior (2002). Five additional deaths in the Basque portion of the French Atlantic Pyrenees Department are not reflected in the table.

In order to finance its operations, ETA has used kidnappings-for-ransom, extortion, and (less frequently) robberies. The main targets of such money-raising activities have been Basque entrepreneurs, who have since begun to abandon the Basque Country in large numbers in order to escape extortion or abduction by the terrorist group. In addition, the terrorist conflict has been frequently cited as a deterrence for domestic and foreign direct investment in the Basque Country (see, e.g., *The Economist,* November 25, 2000).

Finally, although terrorist attacks have occurred in almost all Spanish regions, most of ETA's violent activity has been concentrated in the Basque Country. Table 2 reports deaths and deaths per million inhabitants per year caused by ETA for the period 1968–1997. Almost 70 percent of the deaths caused by ETA in Spain during 1968–1997 occurred in the Basque Country.[6] This comparison becomes even more

[6] In addition, five killings have been attributed to ETA during the same period in the Basque portion of the French Atlantic Pyrenees Department.

TABLE 3—PRE-TERRORISM CHARACTERISTICS, 1960'S

	Basque Country (1)	Spain (2)	"Synthetic" Basque Country (3)
Real per capita GDP[a]	5,285.46	3,633.25	5,270.80
Investment ratio (percentage)[b]	24.65	21.79	21.58
Population density[c]	246.89	66.34	196.28
Sectoral shares (percentage)[d]			
Agriculture, forestry, and fishing	6.84	16.34	6.18
Energy and water	4.11	4.32	2.76
Industry	45.08	26.60	37.64
Construction and engineering	6.15	7.25	6.96
Marketable services	33.75	38.53	41.10
Nonmarketable services	4.07	6.97	5.37
Human capital (percentage)[e]			
Illiterates	3.32	11.66	7.65
Primary or without studies	85.97	80.15	82.33
High school	7.46	5.49	6.92
More than high school	3.26	2.70	3.10

Sources: Authors' computations from Matilde Mas et al. (1998) and Fundación BBV (1999).
[a] 1986 USD, average for 1960–1969.
[b] Gross Total Investment/GDP, average for 1964–1969.
[c] Persons per square kilometer, 1969.
[d] Percentages over total production, 1961–1969.
[e] Percentages over working-age population, 1964–1969.

striking once the figures are expressed in per capita terms to reflect relative exposure to terrorism. During the period 1968–1997, ETA's activity in the Basque Country, measured as the number of deaths per inhabitant per year, was 37 times as large as in the rest of Spain.[7]

II. Using Other Spanish Regions to Construct a "Synthetic" Basque Country Without Terrorism

A. *Analytical Methods and Main Results*

The goal of this section is to assess the impact that terrorism has had on economic growth for the Basque Country. Table 3, in columns (1) and (2), reports values of some variables typically associated with growth potential[8] for the Basque Country and Spain for the immediate pre-terrorism years. During the 1960's, relative to the whole country, the Basque Country had higher per capita income, higher investment ratio (investment/production), was more densely populated, had a higher percentage of industrial production, and a better educated labor force. As a result, a simple comparison of the economic performance of the Basque Country and the rest of Spain during the terrorism years may not only reflect the impact of terrorism, but also other pre-terrorism differences which affected subsequent economic growth.

We approach this problem by comparing the economic evolution of the Basque Country during the terrorist era with that of a weighted combination of other Spanish regions chosen to resemble the characteristics of the Basque Country before terrorism. We conceptualize such a weighted average of other Spanish regions as a "synthetic" Basque Country without terrorism, against which we can compare the actual Basque Country with terrorism. Let J be the number of available control regions (the 16 Spanish regions other than the Basque Country), and $\mathbf{W} = (w_1, \ldots, w_J)'$ a $(J \times 1)$ vector of nonnegative weights which sum to one. The scalar w_j $(j = 1, \ldots, J)$ represents the weight of region j in the synthetic Basque Country. Each different value for $\mathbf{W}$ produces a different synthetic Basque Country, and therefore the choice of a valid subset of control regions is embedded in the choice of the weights $\mathbf{W}$.

As said above, the weights are chosen so that the synthetic Basque country most closely re-

[7] See also Mark Kurlansky (1999) and CNN (2001) for additional background information on the Basque conflict.
[8] See, e.g., Barro and Xavier Sala-i-Martin (1995).

sembles the actual one before terrorism. Let $\mathbf{X_1}$ be a $(K \times 1)$ vector of pre-terrorism values of K economic growth predictors for the Basque Country [i.e., those values in Table 3, column (1)]. Let $\mathbf{X_0}$ be a $(K \times J)$ matrix which contains the values of the same variables for the J possible control regions. Let $\mathbf{V}$ be a diagonal matrix with nonnegative components. The values of the diagonal elements of $\mathbf{V}$ reflect the relative importance of the different growth predictors. The vector of weights $\mathbf{W}^*$ is chosen to minimize $(\mathbf{X_1} - \mathbf{X_0W})'\mathbf{V}(\mathbf{X_1} - \mathbf{X_0W})$ subject to $w_j \geq 0$ $(j = 1, 2, \ldots, J)$ and $w_1 + \cdots + w_J = 1$. The vector $\mathbf{W}^*$ defines the combination of nonterrorism control regions which best resembled the Basque Country in economic growth determinants at the outset of terrorism.[9]

Since $\mathbf{W}^*$ depends on $\mathbf{V}$ there is something to be said about the choice of $\mathbf{V}$. Arguably, the choice of $\mathbf{V}$ could be subjective, reflecting our previous knowledge about the relative importance of each particular growth predictor. Here, we adopt a more eclectic method, choosing $\mathbf{V}$ such that the real per capita GDP path for the Basque Country during the 1960's is best reproduced by the resulting synthetic Basque Country (see Appendix B for details).

The optimal weights, $\mathbf{W}^*$, are positive for two regions, Catalonia and Madrid, with values 0.8508 and 0.1492 respectively, and take value zero for the other potential controls. The selection of Catalonia and Madrid by our procedure as controls for the Basque Country is not unexpected, since a visual inspection of the data reveals that the values of the pre-terrorism characteristics for these two regions are comparable to the values of the pre-terrorism characteristics for the Basque Country.[10] Column (3) of Table 3 reports growth predictors for the synthetic Basque Country before terrorism: $\mathbf{X_1^*} = \mathbf{X_0W^*}$. These figures give an indication of how well the weighted combination of control regions reproduces the values of growth predictors for Basque Country before terrorism. As expected, the synthetic Basque Country looks comparable to the actual one, although some growth determinants cannot be perfectly fitted. In particular, during the 1960's, the Basque Country was the Spanish region with the highest industrial share as a percentage of total production. Therefore, a convex combination of other Spanish regions cannot perfectly reproduce the Basque sectoral shares before terrorism.

Let $\mathbf{Y_1}$ be a $(T \times 1)$ vector whose elements are the values of real per capita GDP for the Basque Country during T time periods. Let $\mathbf{Y_0}$ be a $(T \times J)$ matrix which contains the values of the same variables for the control regions. Our goal is to approximate the per capita GDP path that the Basque Country would have experienced in the absence of terrorism. This counterfactual per capita GDP path is calculated as the per capita GDP of the synthetic Basque Country, $\mathbf{Y_1^*} = \mathbf{Y_0W^*}$.

Figure 1 plots $\mathbf{Y_1}$ and $\mathbf{Y_1^*}$ for the period 1955–1997. The Basque Country and the synthetic control behave similarly until 1975. From 1975, when ETA's terrorist activity becomes a large-scale phenomenon, $\mathbf{Y_1}$ and $\mathbf{Y_1^*}$ diverge; the Basque Country per capita GDP takes values up to around 12 percent below those of the synthetic control. The gap in per capita GDP seems to decrease at the end of the period, taking values around 8 or 9 percent in 1995–1997. Overall, Figure 1 suggests a 10-percent loss in per capita GDP due to terrorism for the 1980's and 1990's.

Statistical inference on the effect of terrorism on the economy can now be carried out by looking at the relationship between the per capita GDP gap (synthetic vs. actual Basque Country) and the intensity of terrorism in the Basque Country during the sample period. Since production factors are fixed in the short run, we

[9] This approach is closely related to statistical matching methods for observational studies (see, e.g., Paul R. Rosenbaum, 1995). The reason to restrict the weights in $\mathbf{W}$ to be nonnegative and sum to one is to prevent extrapolation outside the support of the growth predictors for the control regions. Without this restriction (and if all the diagonal elements of $\mathbf{V}$ are positive), $\mathbf{X_1}$ would be perfectly fitted as long as the rank of $\mathbf{X_0}$ is equal to K, irrespectively of how distant is $\mathbf{X_1}$ from the elements of $\mathbf{X_0}$. When the weights in $\mathbf{W}$ are restricted to be nonnegative and sum to one, $\mathbf{X_1}$ cannot be perfectly fitted in general even if the rank of $\mathbf{X_0}$ is equal to K. In this case, $\mathbf{X_1}$ will be perfectly fitted only if it lies in the "support" (convex hull) of the growth predictors for the control regions.

[10] Like the Basque Country, relative to the rest of Spain during the 1960's, Catalonia and Madrid had higher levels of per capita income, population density, and human capital. In addition, Catalonia and the Basque Country were the two Spanish regions with highest shares of industrial production. As a robustness exercise, we checked that small perturbations to $\mathbf{V}$ do not alter the results substantively, even when they occasionally produce small positive weights for regions other than Catalonia and Madrid.

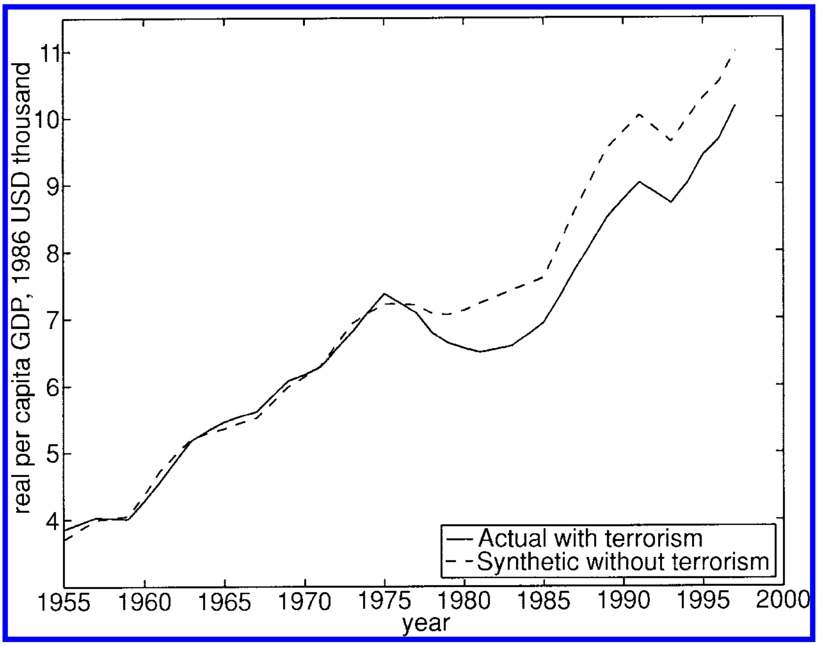

FIGURE 1. PER CAPITA GDP FOR THE BASQUE COUNTRY

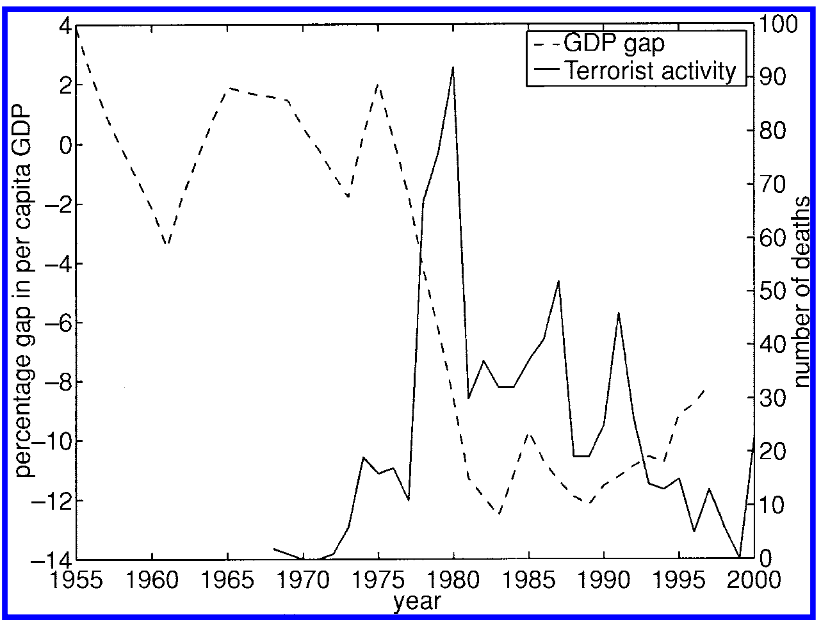

FIGURE 2. TERRORIST ACTIVITY AND ESTIMATED GAP

expect terrorism to have a lagged negative effect on per capita GDP. In Figure 2, we plotted the per capita GDP gap, $\mathbf{Y_1} - \mathbf{Y_1^*}$, as a percentage of Basque per capita GDP, and the number of deaths caused by terrorist actions (used as a proxy for overall terrorist activity). As expected, spikes in terrorist activity seem to be followed by increases in the amplitude of the

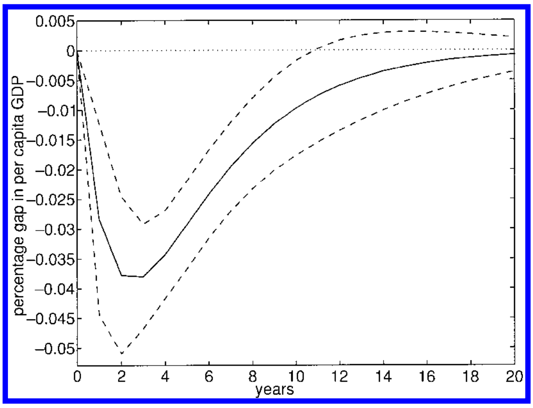

FIGURE 3. IMPULSE-RESPONSE FUNCTION FOR TERRORISM ON PER CAPITA GDP GAP AND 95-PERCENT CONFIDENCE INTERVALS

percentage GDP gap. This pattern is confirmed by Figure 3 which shows the estimated impulse-response function of terrorism on the GDP gap, along with 95-percent confidence intervals. The impulse-response function shows the estimated contemporaneous and lagged response of the gap to an increase of terrorist activity, proxied by an increase of one unit in the number of victims.[11] The estimated effect of terrorism on the GDP gap is negative for every time lag, it is maximal after two to three years, and it decreases monotonically (in absolute value) after that. The confidence intervals for the lagged responses do not contain zero until the eleventh lag. Terrorist activity explains the GDP gap almost perfectly (see last row of Table B1 in Appendix B), and it does so in a way that is consistent with our previous beliefs about the lagged impact of terrorism on output.

B. *A "Placebo Study"*

Of course, a question remains about whether the gap shown in Figure 1 truly responds to the effect of terrorism or is merely an artifact of the inability of our analysis to reproduce the growth path for the Basque Country in the absence of terrorism. To address this question we performed a "placebo study," applying the method that we used to compute the gap for the Basque Country to a "nonterrorism region" (a region other than the Basque Country). The idea is to compare the economic evolution of a region similar to the Basque Country, but without high levels of terrorist activity, to the economic evolution of its synthetic version, also without high levels of terrorism. The purpose is to assess whether the gap observed for the Basque Country may have been created by factors other than terrorism.

To conduct this "placebo" study we chose Catalonia which was the region with the largest weight in the synthetic control for the Basque Country. In addition to being the region most similar to the Basque Country before terrorism in economic growth determinants (as measured using our methods), Catalonia resembles the Basque Country in many characteristics, some of which are not directly measured in our data. In particular, at the end of Franco's dictatorship, both the Basque Country and Catalonia were highly industrialized regions, and both had historical demands for self-governance, which led to the first two regional autonomy statutes of the post-Franco era in 1979. Since then, autonomy statutes have been granted to the rest of Spanish regions; however, Catalonia and the Basque Country have always been among the regions with the highest degree of political autonomy. While in both regions large fractions of the population have traditionally demanded higher levels of self-governance, Catalonia never experienced a large-scale outbreak of political terrorism.

Figure 4 shows the actual real per capita GDP path for Catalonia and the one implied by a "synthetic Catalonia" constructed as a weighted combination of other Spanish regions (excluding the Basque Country) as explained above. The weighted combination of Spanish regions reproduces per capita GDP for Catalonia with high accuracy up to the late 1980's. During 1990–1997 Catalonia outperformed the synthetic control by around 4 percent in per capita GDP. This gap does not come as a surprise if we consider the heavy investments and economic expansion that Catalonia experienced during that period as a result of the 1992 Summer Olympic Games hosted in Barcelona. Since

[11] In other words, the impulse-response function in Figure 3 plots the dynamic multipliers of terrorism on the gap. This function was estimated using an autoregressive distributed lag model assuming no feedback effects between the gap and terrorism (see, e.g., Andrew C. Harvey, 1990). Polynomial distributed lag models were used as an alternative specification, to check the robustness of our results. Estimates based on polynomial distributed lag models produced virtually identical results. See Appendix B for details on the estimation of the impulse-response function and confidence intervals.

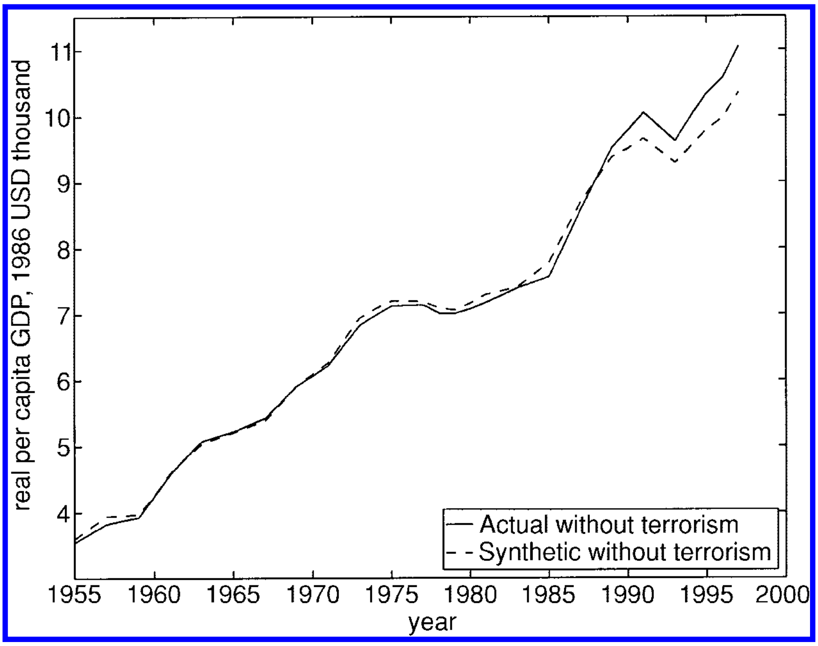

FIGURE 4. A "PLACEBO STUDY," PER CAPITA GDP FOR CATALONIA

Catalonia is the main contributor to the synthetic control for the Basque Country, an abnormally high level of per capita GDP for Catalonia during the 1990's may artificially widen the GDP gap for the Basque Country in Figure 1. Therefore, our placebo study suggests that, while per capita GDP for Catalonia can be reasonably well reproduced by our techniques, the catch-up in per capita GDP for the Basque Country during the 1990's (relative to the synthetic control region) may have been more pronounced than what Figure 1 indicates.

C. *Discussion*

As noted earlier, the Basque Country has been the main scenario of the terrorist conflict. However, ETA has also operated in other Spanish regions. Even though there is no indication that entrepreneurs have abandoned Spain as a result of the terrorist threat, Basque terrorism might have imposed a negative reputational externality on other Spanish regions, and foreign investment might have chosen alternative destinations with no terrorist conflicts. If it is in fact the case that the Basque terrorist conflict has had a negative economic effect on other Spanish regions, this effect is arguably weaker than the economic effect of terrorism on the Basque Country. To the extent that the regions which form the synthetic control might have been economically hurt by the conflict, our estimated GDP gap would provide a lower bound on the economic effect of terrorism on the Basque Country economy. On the other hand, the conflict may have diverted investment from the Basque Country to other Spanish regions, artificially increasing the magnitude of the gap. However, since the size of the synthetic Basque Country is much larger than the actual Basque Country, this type of bias is arguably small.[12] In the next section we show evidence that support the view that the effect of the conflict was small outside the Basque Country.

A more important criticism of the analysis in this section is that, as long as the synthetic control cannot reproduce exactly the characteristics of the Basque Country before terrorism, the GDP gap may have been created by differ-

[12] For the 1964–1975 period, GDP for the synthetic region was 2.5 times larger than GDP for the Basque Country; this figure increased to more than 3 during the terrorism era. Furthermore, investment diverted to regions other than those in the synthetic Basque Country does not affect the validity of our analysis.

ences in growth predictors between the Basque Country and the synthetic control before terrorism [columns (1) and (3) in Table 3], or by other differences not reflected in our data. In particular, it might be argued that the GDP gap was caused by the higher industrial concentration in the Basque Country in the pre-terrorism years, since terrorism developed during a period of industrial decline, when many industrial plants closed. In fact, the industrial share of GDP declined 17 percentage points (from 45 percent to 28 percent) for the Basque Country during the 1964–1993 period. The industrial share of the GDP decreased 15 percentage points (from 38 percent to 23 percent) for the synthetic control during the same period. Notwithstanding the potential importance of this criticism, we believe that differences in industrial decline between the Basque Country and the synthetic control cannot fully explain the GDP gap between the two regions during the 1980's and 1990's. As discussed earlier, the GDP gap seems to respond to the intensity of the terrorist activity in the Basque Country. Such association is consistent with the interpretation that the gap was caused by terrorism, and would be left unexplained under the alternative explanation that the gap was generated by a more pronounced industrial decline in the Basque Country.[13]

Figure 5 graphs population series for the Basque Country, the synthetic control and Spain (the series are normalized to 100 in 1964). The population of the Basque Country and the synthetic control grew at similar rates during the late 1960's and the early and the mid-1970's, well above the rate for the whole country. In the late 1970's and early 1980's the patterns of the series changed dramatically; population growth decelerated for the synthetic Basque Country and Spain, and became negative for the Basque Country. The results on the per capita GDP gap

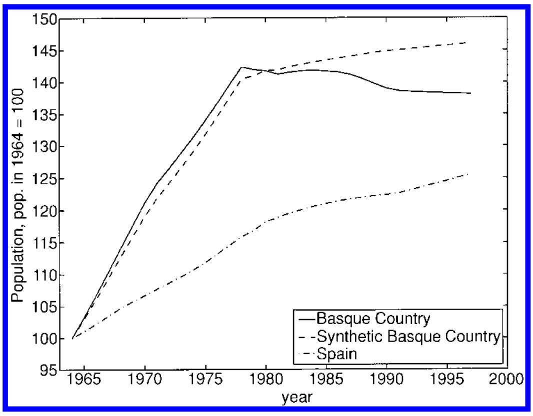

FIGURE 5. POPULATION

presented in this section do not reflect this relative population loss in the Basque Country. Once the population dynamics are considered, the gap in per capita GDP documented in this section becomes even more striking.

Finally, it is worth noticing that the results in this section are consistent with the findings in Barro and Sala-i-Martin (1995, page 399, Figure 11.8), who document an atypically low growth rate for the Basque Country during the period 1950–1999 relative to other European regions.

III. Using ETA's 1998–1999 Truce as a Natural Experiment

A. *Analytical Methods and Main Results*

On September 16, 1998, ETA announced a cease-fire (starting on September 18, 1998). Fourteen months later, on November 28, 1999, ETA announced the end of the truce. Table 4 presents a chronology of some of the most important events related to the truce. Anecdotal evidence suggests that the truce was not perceived as credible from the beginning (note, for example, the Spanish government's reaction to the announcement of the cease-fire in Table 4, event number 4). In fact, ETA had declared other cease-fires in the past, but none of them lasted more than three months; the previous one, in 1996, had only lasted one week.[14] Peace

[13] The connections between the oil crisis and the decline of industrial centers in Europe during the 1970's and the 1980's has been noted by Derek H. Aldcroft (1993) and others. To check that the association between the intensity of terrorism and the gap does not arise artificially from a differential effect of the oil crisis in the Basque Country, we repeated the impulse-response analysis including contemporaneous and lagged values of oil prices as additional exogenous variables. The coefficients on the oil prices variables were not statistically significant and their inclusion left the estimated impulse-response function for terrorist activity on the gap virtually unchanged.

[14] The announcement of the cease-fire was preceded by a joint declaration subscribed by the main Basque nationalist parties calling for the end of violence and the start of

TABLE 4—CHRONOLOGY OF THE TRUCE

Number	Date	Event
1	September 12, 1998	Basque nationalist parties (including ETA's political wing) sign joint declaration calling for the end of violence and the start of political negotiations with the Spanish government on issues regarding sovereignty
2	September 15, 1998	Spanish Minister of Interior says the government expects "fake truce" by ETA intended to regroup and gain popular support
3	September 16, 1998	ETA calls cease-fire starting on September 18
4	September 17, 1998	Spanish government expresses "profound skepticism" about the truce and advises caution
5	October 2, 1998	Spanish Prime Minister says ETA has yet to prove its commitment to peace, but promises changes in policy towards incarcerated ETA activists if peace consolidates
6	October 24, 1998	ETA leaders say cease-fire is "firm and serious" in BBC TV broadcast
7	November 3, 1998	Spanish government says it has authorized exploratory contacts with ETA in order to assess ETA's commitment to maintain cease-fire
8	February 24, 1999	ETA's communique pledges to maintain cease-fire and alludes to a new "hopeful climate"
9	May 16, 1999	ETA says it has maintained contacts with Spanish government
10	June 2, 1999	Spanish government confirms conversations with ETA
11	August 25, 1999	Spanish Prime Minister says that contacts with ETA have been interrupted
12	August 26, 1999	ETA confirms that the peace process is paralyzed
13	August 28, 1999	ETA's communique states that the peace process has reached a "critical stage" in which it is either concluded "or else it will rot"
14	November 28, 1999	ETA announces the end of cease-fire

prospects became more realistic as time passed without terrorist actions and the Spanish government confirmed contacts with ETA. Three months before the end of the truce the situation deteriorated as the Spanish government announced that the process was paralyzed.

If financial markets are efficient, asset prices should reflect all available information and, thus, react only to new information. Therefore, if the terrorist conflict was perceived to have a negative impact on the Basque economy, Basque stocks (stocks of firms with a significant part of their business in the Basque Country) should have shown a positive performance relative to non-Basque stocks (stocks of firms without a significant part of their business in the Basque Country) as the truce became credible. Similarly, Basque stocks should have performed poorly, relative to non-Basque stocks, at the end of the truce. In this section, we use the method of event study to explore these questions.

A challenge with this exercise is that there is no obvious way to classify stocks into the Basque/non-Basque categories. A classification that relies solely on companies' registered addresses seems problematic. Registered addresses are sometimes chosen for historic, convenience, or tax-related reasons and do not necessarily imply that the company has an important presence in the area. Unfortunately, data on geographical location of firms' activities are rarely available. To solve this problem we adopted a simple and direct approach. Since what is relevant for our event study is which companies were perceived by the markets as carrying a significant part of their business in the Basque Country, we asked a group of market analysts at a certain Basque financial institution to produce this classification for us. We used this information to divide stocks into Basque stocks and non-Basque stocks. Again, the idea is to label firms which have a large part of their business in the Basque Country as Basque stocks, even if they are not located in the Basque Country. All other firms with little exposure in the Basque Country were labeled as non-Basque stocks.[15]

We collected series of daily stock returns

political negotiation (event 1 in Table 4). This declaration and the subsequent announcement of the truce were interpreted by many nonsubscribing parties as maneuvers of Basque nationalist parties to create a united front to pursue independence.

[15] The list of Basque and non-Basque stocks used for the analysis is provided in Appendix B, Table B2.

TABLE 5—DESCRIPTIVE STATISTICS

			Basque	Non-Basque	All
Number of observations			14	59	73
Registered in the Basque Country		Fraction	0.57	0.00	0.11
Size	1998	Mean	412.28	1,999.37	1,695.00
		S.D.	362.84	4,501.26	4,091.61
		Min	117.66	17.01	17.01
		Max	1,531.68	26,778.68	26,778.68
	1999	Mean	478.70	2,948.63	2,474.94
		S.D.	348.46	7,105.34	6,453.67
		Min	104.56	15.88	15.88
		Max	1,244.64	45,347.23	45,347.23
	2000	Mean	371.43	3,346.84	2,776.21
		S.D.	406.43	11,305.43	10,216.72
		Min	56.20	9.12	9.12
		Max	1,656.38	81,292.33	81,292.33
Book-to-market	1998	Mean	0.68	0.55	0.58
		S.D.	0.43	0.34	0.36
		Min	0.20	0.09	0.09
		Max	1.65	1.80	1.80
	1999	Mean	0.72	0.50	0.54
		S.D.	0.55	0.29	0.36
		Min	0.14	0.07	0.07
		Max	2.28	1.38	2.28
	2000	Mean	0.86	0.68	0.71
		S.D.	0.46	0.43	0.44
		Min	0.30	0.08	0.08
		Max	1.70	2.26	2.26

Source: Authors' computations from Madrid Stock Exchange online data (http://www.bolsamadrid.es). Size values in millions of United States dollars. Size and book-to-market figures are for the beginning of the indicated year (last trading day of the previous year). S.D. means standard deviation.

for 1998, 1999, and 2000 and constructed two buy-and-hold portfolios: one composed of 14 Basque stocks and the other composed of 59 non-Basque stocks (see Appendix B for details on selection of stocks for our sample and construction of portfolios). Buy-and-hold portfolios represent the portfolio of a passive investor who constructed a value-weighted Basque or non-Basque portfolio at the beginning of our sample period.[16]

Table 5 contains descriptive statistics for our sample. Fifty-seven percent of the firms that compose our Basque portfolio have registered addresses in the Basque Country, while none of the non-Basque firms are registered in the Basque Country. On average, Basque firms are smaller and have a higher book-to-market ratio.[17]

In contrast with more conventional event study settings, where most of the information is revealed during short event windows, the informational content of the truce evolved gradually during a 14-month period. Therefore, to study the effect of the truce it is important to control for long-run risk factors in stock returns. Fama and French (1993) have identified three common risk factors in stock returns, which compose the often-called Fama-French Three-Factor Model:

[16] The strategy of constructing portfolios of firms exposed and not exposed to certain risks is often used in event studies. See, for instance, Bong Chan Kho et al. (2000).

[17] Size is the market value of all outstanding shares of a common stock. The book-to-market ratio is the ratio of the book value of a stock to its market value. Size and the book-to-market ratio have been shown to explain cross-sectional variation in average stock returns (see, e.g., Eugene F. Fama and Kenneth R. French, 1992).

TABLE 6—PORTFOLIO REGRESSIONS, FAMA-FRENCH THREE-FACTOR MODEL

	Basque (1)	Non-Basque (2)	Basque (3)	Non-Basque (4)	Difference (3)–(4)
Constant	−0.0004	0.0001	−0.0004	0.0001	−0.0005
	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0003)
R^m	0.6824	0.8103	0.6739	0.8096	−0.1357
	(0.0361)	(0.0184)	(0.0366)	(0.0186)	(0.0346)
SMB	0.3755	−0.2253	0.3657	−0.2260	0.5917
	(0.0461)	(0.0234)	(0.0464)	(0.0235)	(0.0445)
HML	0.2510	−0.1418	0.2553	−0.1411	0.3964
	(0.0399)	(0.0207)	(0.0400)	(0.0207)	(0.0382)
Good News			0.0049	0.0005	0.0044
			(0.0021)	(0.0009)	(0.0022)
Bad News			−0.0017	0.0001	−0.0018
			(0.0008)	(0.0004)	(0.0009)
R^2	0.4891	0.9107	0.4966	0.9107	0.5499

Notes: Heteroskedasticity-robust standard errors are in parentheses. The sample period consists of 747 trading sessions for 1998–2000.

$$R_t^j = \alpha^j + \beta_1^j R_t^m + \beta_2^j SMB_t + \beta_3^j HML_t + AR_t^j. \tag{1}$$

For the case studied here, R_t^j is the excess return (over the risk-free rate) on a buy-and-hold portfolio of j = Basque, non-Basque stocks on day t, R_t^m is the excess return on the market portfolio at time t, SMB_t ("small minus big") is the difference between the returns of portfolios composed by small and big size stocks at time t, and HML_t ("high minus low") is the difference between the returns of portfolios composed by high and low book-to-market stocks at time t.

R_t^m represents the usual market factor in stock returns, while SMB_t and HML_t are meant to capture risk factors related to size and book-to-market equity, respectively. The residual, AR_t^j, is a zero mean abnormal portfolio return not explained by common risk factors.[18]

Columns (1) and (2) of Table 6 report the results of fitting equation (1) by ordinary least squares (OLS) to the Basque and non-Basque portfolios. The coefficients on R_t^m, SMB_t, and HML_t are all significant. The coefficients on R_t^m are positive in both cases, whereas the coefficients on SMB_t and HML_t have positive signs for the Basque portfolio and negative signs for the non-Basque portfolio.[19] The residuals of the regressions are the estimated abnormal returns on the Basque and non-Basque portfolios. Abnormal returns are now suited for comparison, as they are adjusted for known risk factors. However, abnormal returns are too noisy to be visually instructive. In order to visually inspect the difference in performance of the two portfolios, abnormal returns are customarily aggregated through time. We calculate cumulative abnormal returns as the compounded abnormal return of a portfolio from the day after the announcement of the truce:

$$CAR_t^j = \left(\prod_{s=1}^{t} \{1 + AR_s^j\} \right) - 1. \tag{2}$$

Figure 6 graphs cumulative abnormal returns for the Basque and non-Basque portfolios from the announcement of the truce to the end of 1999 (the dashed vertical line around the end of

[18] See the influential article by Fama and French (1993) and Appendix B for more information about the definition and construction of these variables. Fama and French (1993) and John D. Lyon et al. (1999) discuss the use of the Fama-French Three-Factor Model to calculate long-run abnormal returns in event studies. In particular, Fama and French (1993) have argued that SMB_t and HML_t absorb the size and book-to-market effects in average stock returns.

[19] As in Fama and French (1993), we expect that returns of portfolios constructed from stocks with small market valuations and high book-to-market ratios (as the Basque portfolio) respond positively to SMB_t and HML_t, whereas returns of portfolios constructed from stocks with big market valuations and low book-to-market ratios (as the non-Basque portfolio) respond negatively to SMB_t and HML_t.

FIGURE 6. CUMULATIVE ABNORMAL PORTFOLIO RETURNS

November of 1999 represents the end of the truce). The Basque portfolio outperforms the non-Basque portfolio for most of the truce period except at the beginning (when the cease-fire had not gained credibility) and at the end (when the cease-fire lost credibility).

To perform a statistical test on the effect of the truce we added two dummy variables to equation (1). *Good News*$_t$ takes a value of one for the period between the trading sessions after event 5 and event 7 in Table 4, and a value of zero otherwise. *Bad News*$_t$ takes a value of one for the period between the trading sessions after event 11 and event 14 in Table 4, and a value of zero otherwise. The Good News period comprises 22 trading sessions and the Bad News period 66. During the Good News period, the credibility of the truce gained ground, starting with the offer of a revision in the policy towards ETA activists in jail, if peace consolidated, by the Spanish Prime Minister (event number 5), and culminating with the announcement of the authorization of direct contacts with ETA by the Spanish government (event number 7). In contrast, the Bad News period was characterized by the collapse of the peace process, starting with the acknowledgment that contacts had been interrupted, made by the Spanish Prime Minister (event number 11), and ending with the announcement of the end of the truce by ETA (event number 14). Columns (3) and (4) of Table 6 report the regressions including the dummy variables *Good News*$_t$ and *Bad News*$_t$. The estimated coefficients on the dummy variables represent average daily abnormal returns during the Good News and Bad News periods for the Basque and non-Basque portfolios. As expected, for the Basque portfolio, the coefficient of *Good News*$_t$ is positive and significant while the coefficient of *Bad News*$_t$ is negative and also significant. For the non-Basque portfolio, the effects are small in magnitude and not statistically different from zero, which supports the view that Basque terrorism has a minor impact on the economy outside the Basque Country. The last column of Table 6 shows the result for the difference regression. The dependent variable for the difference regression is the difference in excess return between the Basque and the non-Basque portfolios. The difference regression can be interpreted as the one that corresponds to the portfolio of a passive investor who takes a long position in Basque stocks and a short position in non-Basque stocks. This regression reflects a positive abnormal performance of

Basque stocks relative to non-Basque stocks during the Good News period and a negative relative performance during the Bad News period.

The performances of the Basque and the non-Basque portfolios during the Good News and Bad News periods can be easily visualized in Figure 6. The first shaded area, around October of 1998, represents the Good News period; the second one, around September to November of 1999, represents the Bad News period. The abnormal gains in value for the Basque portfolio during the Good News period and the losses during the Bad News period are apparent. In contrast, the non-Basque portfolio experienced relatively modest abnormal changes in value during the two periods.

B. *Discussion*

Notice that if most of the new information during the Good News and Bad News periods was revealed in certain trading sessions, the analysis in this section would provide conservative inference about the effect of terrorism, because the coefficients on the $Good\ News_t$ and $Bad\ News_t$ dummies reflect average abnormal returns during these periods. Even so, the coefficients on the $Good\ News_t$ and $Bad\ News_t$ dummies are statistically significant at conventional levels.

To better understand the magnitude of the effects described in this section it is useful to compound the daily effects for the Good News and Bad News periods. Compounding the 0.0044 coefficient on the $Good\ News_t$ dummy over the 22 trading sessions of the Good News period, we obtain a compounded abnormal return of 10.14 percent for the Basque portfolio relative to the non-Basque portfolio. Analogous calculations yield a −11.21-percent compounded abnormal return for the Basque portfolio relative to the non-Basque portfolio during the 66 trading sessions of the Bad News period. These are sizable differences which would be difficult to explain unless they are attributed to the differential effect of the truce on Basque and non-Basque stocks.

C. *Alternative Models*

The Fama-French Three-Factor Model provides a popular empirical framework to estimate long-run normal portfolio returns. However, it is worth noting that the results in this section do not depend on the adoption of this particular model. Two other models of normal returns, the Market Model and the Constant-Mean-Return Model are perhaps the most common in the event study literature (see John Y. Campbell et al., 1997). These two models can be expressed as special cases of the Fama-French Three-Factor Model:

$$R_t^j = \gamma^j + \lambda^j R_t^m + AR_t^j \quad \text{(Market Model)},$$

$$R_t^j = \mu^j + AR_t^j \quad \text{(Constant-Mean-Return Model)},$$

where AR_t^j is again a zero mean abnormal return for portfolio j and period t. Columns (1)–(6) in Table 7 report the results of using these two alternative models of abnormal returns in lieu of the Fama-French Three-Factor Model. The Market Model in columns (1)–(3) produces results very similar to those in Table 6. The Constant-Mean-Return Model in columns (4)–(6) is less suitable to study long-run returns because it assumes that expected returns do not vary during the sample period. Using the Constant-Mean-Return Model, the Basque and non-Basque portfolios behave similarly during the Good News period; however, the non-Basque portfolio outperforms the Basque portfolio during the Bad News period.

Although the Fama-French Three-Factor model is perhaps the most widespread multifactor model of portfolio returns, other factors have been proposed in the finance literature to explain stock returns. In particular, factors related to the term premia and the default risk premia of bonds have been proposed for that purpose (see, e.g., Nai Fu Chen et al., 1986; Fama and French, 1993). The results in Fama and French (1993) show that these type of term and risk structure factors may have explanatory power beyond that of R_t^m, SML_t, and HML_t in a time-series regression of stock returns. Columns (7)–(9) in Table 7 show the estimated coefficients for the portfolio regressions when two additional factors, $TERM_t$ and DEF_t, are included to reflect the term and default risk premia of bonds, respectively.[20] The coefficients of the term and

[20] We constructed $TERM_t$ as the difference between the yield on long-term government bonds and the one-month

TABLE 7—PORTFOLIO REGRESSIONS, ALTERNATIVE MODELS

	Market Model			Constant-Mean-Return Model			Fama-French Three-Factor Model plus term and risk structure factors		
	Basque (1)	Non-Basque (2)	Difference (3)	Basque (4)	Non-Basque (5)	Difference (6)	Basque (7)	Non-Basque (8)	Difference (9)
Constant	−0.0004	0.0001	−0.0004	−0.0003	0.0001	−0.0004	−0.0006	0.0000	−0.0006
	(0.0003)	(0.0002)	(0.0004)	(0.0004)	(0.0006)	(0.0005)	(0.0009)	(0.0004)	(0.0009)
R^m	0.4696	0.9312	−0.4617				0.6726	0.8083	−0.1356
	(0.0322)	(0.0150)	(0.0375)				(0.0362)	(0.0187)	(0.0345)
SMB							0.3645	−0.2272	0.5917
							(0.0461)	(0.0237)	(0.0445)
HML							0.2553	−0.1412	0.3964
							(0.0398)	(0.0208)	(0.0382)
TERM							0.0262	0.0247	0.0015
							(0.0478)	(0.0258)	(0.0452)
DEF							−0.0341	−0.0823	0.0482
							(0.1643)	(0.0917)	(0.1577)
Good News	0.0054	0.0002	0.0052	0.0100	0.0094	0.0006	0.0050	0.0006	0.0044
	(0.0023)	(0.0010)	(0.0026)	(0.0033)	(0.0039)	(0.0028)	(0.0022)	(0.0009)	(0.0022)
Bad News	−0.0021	0.0004	−0.0025	−0.0017	0.0013	−0.0030	−0.0020	−0.0002	−0.0018
	(0.0008)	(0.0005)	(0.0009)	(0.0010)	(0.0015)	(0.0012)	(0.0011)	(0.0006)	(0.0011)
R^2	0.3939	0.8887	0.3195	0.0257	0.0127	0.0053	0.4969	0.9109	0.5500

Notes: Heteroskedasticity-robust standard errors are in parentheses. The sample period consists of 747 trading sessions for 1998–2000.

risk structure factors are small and not statistically significant. Moreover, the inclusion of the term and risk structure factors in the regression does not change the coefficients and standard errors of the $Good\ News_t$ and $Bad\ News_t$ in a substantive way relative to columns (3)–(5) in Table 6, although the coefficient of $Bad\ News_t$ in the difference regression becomes marginally nonsignificant at conventional levels. Overall, the results of our event study appear to be remarkably robust to the choice of the model of normal portfolio returns.[21]

Treasury bill rate at t. We constructed DEF_t as the difference between the yields on long-term corporate bonds and long-term government bonds at t.

[21] Nai Fu Chen et al. (1986) and others have suggested to use innovations in macroeconomic variables as factors explaining stock returns. As a further robustness check, we extended the Fama-French model including as additional factors the unexpected components of macroeconomic announcements. Following Louis K. C. Chan et al. (1998), we proxied the unexpected components of macroeconomic announcements using one-step-ahead forecast errors from ARIMA models, which we reestimated for each macroeconomic announcement. Just like the term and risk structure factors, the factors related to macroeconomic announcements were not significant and did not change the coefficients of interest in any meaningful way.

IV. Summary and Conclusions

Much has been said about the pernicious effects of political conflict on the economy. However, to date little case study research has been produced on this matter. This article presents evidence of a negative economic impact of the terrorist conflict in the Basque Country. The first part of this study shows a 10-percent average gap between Basque per capita GDP and the per capita GDP of a comparable synthetic region without terrorism which emerges over a period of two decades. Moreover, changes in the per capita GDP gap are shown to be associated with the intensity of terrorist activity. The second part of this study uses the 1998–1999 cease-fire as a natural experiment to measure the effect of the conflict on the market value of a sample of Basque and non-Basque firms. We show that Basque stocks outperformed non-Basque stocks as the truce became credible. At the end of the cease-fire, Basque stocks showed a negative performance relative to non-Basque stocks.

Although we focus here on the Basque conflict, the methods applied in this article can be used to investigate the economic effects of conflicts elsewhere. The application of the techniques in this article to the study of other conflicts will also shed light on the robustness of the procedure and serve as cross validation.

Research of this sort could potentially have an undesirable impact if terrorists learn that their actions affect the economy negatively, assuming that is what they want to do. However, we do hope that, as Paul S. Nelson and John L. Scott (1992) found that media attention does not cause terrorism, academic attention does not cause terrorism either.

Appendix A: Data Sources

Data on terrorist activity (deaths and kidnappings) are provided by the Spanish Ministry of Interior (2002). Regional data on GDP, investment, population density, and sectoral production come from Fundación BBV (1999). Data on human capital for different regions have been collected by Mas et al. (1998). In some instances, the series were only available on a biennial basis. In those cases, annual figures were interpolated as simple averages of the years immediately preceding and following the missing years. The regions used for the analysis are the 17 autonomous communities of Spain (leaving out the small autonomous towns of Ceuta and Melilla on the coast of Africa). Oil prices come from the OECD statistical compendium CD-ROM. Data on stock prices, firm size (market value of outstanding shares), book equity, and dividends are routinely collected by the Madrid Stock Exchange (www.bolsamadrid.es). Interest rates on one-day public debt repurchase agreements and bonds come from the Bank of Spain. Data on macroeconomic announcements can be found at the Spanish National Statistical Institute's web page (www.ine.es).

Appendix B: Technical Details

Estimation of Per Capita GDP Gap.—Consider the problem,

$$\underset{\mathbf{W} \in \mathcal{W}}{\text{minimize}}\ (\mathbf{X_1} - \mathbf{X_0 W})'\mathbf{V}(\mathbf{X_1} - \mathbf{X_0 W}),$$

where $\mathcal{W} = \{(w_1, \ldots, w_J)'$ subject to $w_1 + \cdots + w_J = 1, w_j \geq 0\ (j = 1, \ldots, J)\}$, and $\mathbf{X_1}$, $\mathbf{X_0}$, and $\mathbf{V}$ are as described in the text. The solution to this problem, $\mathbf{W}^*(\mathbf{V})$, depends on the diagonal matrix $\mathbf{V}$ whose diagonal elements are weights which reflect the relative importance of the variables in $\mathbf{X_0}$ and $\mathbf{X_1}$. We selected $\mathbf{V}$ such that per capita GDP for the Basque country during the 1960's is best reproduced by the synthetic control defined by $\mathbf{W}^*(\mathbf{V})$. Let $\mathbf{Z_1}$ be a (10×1) vector containing the real per capita GDP values for the Basque Country during the period 1960–1969. Let $\mathbf{Z_0}$ be $(10 \times J)$ matrix containing the values of the same variables for the J potential control regions. Then

$$\mathbf{V}^* = \underset{\mathbf{V} \in \mathcal{V}}{\text{argmin}}\ (\mathbf{Z_1} - \mathbf{Z_0}\mathbf{W}^*(\mathbf{V}))'(\mathbf{Z_1} - \mathbf{Z_0}\mathbf{W}^*(\mathbf{V})),$$

where $\mathcal{V}$ is the set of all nonnegative diagonal $(K \times K)$ matrices. The weights for the synthetic control are given by $\mathbf{W}^* = \mathbf{W}^*(\mathbf{V}^*)$. There are infinitely many equivalent solutions for $\mathbf{V}^*$ [if $\mathbf{V}^*$ is a solution so is $\mathbf{V}^*(c) = c \cdot \mathbf{V}^*$ for any positive scalar c], so we can normalize the Euclidean norm of $\mathbf{V}^*$ (or any positive diagonal element of $\mathbf{V}^*$) to one.

Alternatively, the synthetic Basque Country could be chosen to reproduce only the per capita GDP path for the Basque Country during the 1960's:

$$\mathbf{W}^* = \underset{\mathbf{W} \in \mathcal{W}}{\text{argmin}}\ (\mathbf{Z_1} - \mathbf{Z_0 W})'(\mathbf{Z_1} - \mathbf{Z_0 W}).$$

The synthetic region chosen in this manner produced a larger GDP gap during the terrorism years than the one chosen to reproduce economic growth predictors. However, this procedure could be less appropriate to construct counterfactual per capita GDP paths, since it does not take into account information about known determinants of economic growth (like sectoral composition or human-capital endowments).

Estimation of the Impulse-Response Function.—Since the number of periods is small we adopted a convenient parameterization to estimate the impulse-response function. We started considering a flexible dynamic model with

TABLE B1—ESTIMATION OF THE IMPULSE-RESPONSE FUNCTION

	(1)	(2)	(3)	(4)	(5)
μ	−0.2633	−0.1060	−0.1155	−0.1438	
	(0.2176)	(0.1969)	(0.1982)	(0.2038)	
α_1	1.3663	1.2279	1.2959	1.3141	1.3297
	(0.2483)	(0.2059)	(0.1870)	(0.1839)	(0.1781)
α_2	−0.4624	−0.3647	−0.4076	−0.4232	−0.4301
	(0.2277)	(0.1752)	(0.1639)	(0.1623)	(0.1597)
β_0	−0.0010	−0.0075	−0.0070		
	(0.0078)	(0.0088)	(0.0091)		
β_1	−0.0195	−0.0152	−0.0224	−0.0270	−0.0284
	(0.0091)	(0.0093)	(0.0091)	(0.0080)	(0.0082)
β_2	−0.0009	−0.0144			
	(0.0087)	(0.0112)			
ρ	0.0811				
	(0.2463)				
Number of observations	40	41	41	41	41
R^2	0.9764	0.9751	0.9740	0.9736	0.9732

Notes: Estimates of the parameters in equation (B1). Standard errors are in parentheses.

$AR(1)$ disturbances similar to the one proposed by Harvey (1990, p. 268):

$$G_t = \mu + \alpha_1 G_{t-1} + \alpha_2 G_{t-2} + \beta_0 D_t + \beta_1 D_{t-1} + \beta_2 D_{t-2} + u_t, \quad u_t = \rho u_{t-1} + \varepsilon_t, \tag{B1}$$

where G_t and D_t are respectively the per capita GDP gap and number of death victims in period t, and ε_t are serially independent shocks. The vector of unknown parameters $\boldsymbol{\theta} = (\mu, \alpha_1, \alpha_2, \beta_0, \beta_1, \beta_2, \rho)'$ is to be estimated. Note however, that equation (B1) cannot be directly estimated by least squares, since the error term u_t is correlated with G_{t-1} and G_{t-2} by construction. Expressing u_{t-1} in term of lags of G_t and D_t we get:

$$G_t = \pi_0 + \pi_1 G_{t-1} + \pi_2 G_{t-2} + \pi_3 G_{t-3} + \pi_4 D_t + \pi_5 D_{t-1} + \pi_6 D_{t-2} + \pi_7 D_{t-3} + \varepsilon_t, \tag{B2}$$

where the vector $\boldsymbol{\pi} = (\pi_0, \pi_1, \ldots, \pi_7)'$ is a nonlinear function of $\boldsymbol{\theta}$. We estimated equation (B2) consistently by least squares for the period 1955–1997. The parameters in $\boldsymbol{\theta}$ were recovered from the estimates of $\boldsymbol{\pi}$ by minimum distance [see, e.g., Whitney K. Newey and Daniel McFadden (1994)]. The result is reported in Table B1 column (1). We proceeded by sequentially eliminating nonsignificant parameters in columns (2)–(5), which are estimated by least squares. Our preferred specification, which contains terms in G_{t-1}, G_{t-2}, and D_{t-1} is reported in column (5). Inverting the autoregressive terms, we obtain the impulse-response function:

$$\delta_s = \frac{\partial G_{t+s}}{\partial D_t} = \begin{cases} 0 & \text{if } s = 0 \\ \beta_1 & \text{if } s = 1 \\ \alpha_1 \delta_{s-1} + \alpha_2 \delta_{s-2} & \text{if } s \geq 2, \end{cases}$$

where s runs over nonnegative integers. We report standard errors that are robust to misspecification. Confidence intervals for the impulse-responses in Figure 3 were constructed applying the delta method. Likelihood-based error bands as in Christopher A. Sims and Tao Zha (1999) produced similar results.

Calculation of Portfolio Returns and Risk Factors.—We collected daily end-of-the-day stock prices from Madrid's continuous-trading stock exchange market for the sample period January 2, 1998–December 29, 2000, for a total of 748 daily observations. We restricted the analysis to firms with complete data for the sample period. This restriction eliminates all firms which entered the market during the sample period, had their quotation suspended or merged with another firm in the data file. This resulted in a sample of 81 firms. During 1998, stock prices were quoted in Spanish pesetas. Starting in January 4, 1999, quotations were in euros, thus requiring adjustment by multiplying the euro figures by the 166.386 peseta/euro fixed exchange rate. Stock prices were also adjusted for splits. Then, daily returns were calculated and adjusted for dividends and equity issue (also adjusted for peseta/euro conversion and splits). The return on the market portfolio was proxied by the rate of change of the general index of the Madrid Stock Exchange (IGBM) and the risk-free asset return was taken to be the return on the one-day public debt repurchase agreements. To construct the size and book-to-market portfolios, we proceeded as in Fama and French. Information of size and book-to-market ratio was not available for 7 firms which reduced the sample to 74 firms. We first ranked stocks according to market size and the median was used to split the sample in two groups, small (S) and big (B). Then, we classified stocks into three book-to-market groups: the bottom 30 percent (L), middle 40 percent (M), and top 30 percent (H). The size and book-to-market figures used in 1998, 1999, and 2000 correspond to the end of 1997, 1998, and 1999 figures, respectively. Then, we constructed six portfolios (S/L, S/M, S/H, B/L, B/M, and B/H) and computed daily value-weighted returns on those portfolios. The size portfolio used in the regressions is the daily difference between the average return on the small-size portfolios (S/L, S/M, and S/H) and the average return on the big-size portfolios (B/L, B/M, and B/H). The book-to-market portfolio is the daily difference between the average return on the high book-to-market portfolios (S/H and B/H) and the average return on the low book-to-market portfolios (S/L and B/L). The term premium factor is the difference between the average yield on long-term (ten-year or more) government bonds, and the one-month Treasury bill rate. The default premium factor is the difference between the average yield on long-term (ten-year or more) corporate and the average yield on long-term (ten-year or more) government bonds.

We then computed calendar time returns on buy-and-hold Basque and non-Basque portfolios. We excluded an additional Basque firm since its market valuation accounted for 75 percent of the value of Basque portfolio total market valuation. The Basque portfolio contains 14 stocks and the non-Basque portfolio 59 stocks. Table B2 provides a list of the stocks in the Basque and non-Basque portfolios.

The buy-and-hold portfolios constructed at the beginning of the sample were value weighted. There is no rebalancing (buying or selling stocks) in the buy-and-hold portfolios, reflecting a passive investment strategy. Let $V^j_{i,t}$ be the market valuation of all shares of stock i held in portfolio j in period t. Let V^j_t be the market valuation of portfolio j at time t, that is

$$V^j_t = \sum_{i=1}^{n_j} V^j_{i,t},$$

where n_j is the number of stocks in portfolio j. Let $R^j_{i,t}$ be the market return of stock i in portfolio j between periods $t-1$ and t. The buy-and-hold investment strategy implies that $V^j_{i,t} = (1 + R^j_{i,t})V^j_{i,t-1}$ for all t, hence $V^j_t = \sum_{i=1}^{n_j} (1 + R^j_{i,t})V^j_{i,t-1} = V^j_{t-1} + \sum_{i=1}^{n_j} R^j_{i,t}V^j_{i,t-1}$. Therefore, the return of portfolio j between periods $t-1$ and t is given by

$$R^j_t = \frac{V^j_t - V^j_{t-1}}{V^j_{t-1}} = \sum_{i=1}^{n_j} R^j_{i,t}\left(\frac{V^j_{i,t-1}}{V^j_{t-1}}\right) = \sum_{i=1}^{n_j} R^j_{i,t}\omega^j_{i,t-1},$$

where $\omega^j_{i,t} = V^j_{i,t}/V^j_t$ is the weight of stock i in portfolio j at time t. The evolution of weights over time is described by the following equation:

$$\omega^j_{i,t} = \frac{V^j_{i,t}}{V^j_t} = \frac{(1 + R^j_{i,t})V^j_{i,t-1}}{\left(1 + \sum_{i=1}^{n_j} R^j_{i,t}\left(\frac{V^j_{i,t-1}}{V^j_{t-1}}\right)\right)V^j_{t-1}} = \frac{(1 + R^j_{i,t})\,\omega^j_{i,t-1}}{1 + \sum_{i=1}^{n_j} R^j_{i,t}\omega^j_{i,t-1}}.$$

TABLE B2—LIST OF STOCKS

Basque Stocks			
ACR	Aceralia Corporación Siderúrgica, S.A.	FAE	Faes Fábrica Esp. Prod. Químicos y Farma.
ASA	Tavex Algodonera, S.A.	GUI	Banco Guipuzcoano, S.A.
AZK	Azkoyen S.A.	KOI	Koipe, S.A.
BYB	Bodegas y Bebidas, S.A.	TUB	Tubacex, S.A.
CAF	Construcciones y Auxiliar de Ferrocarril	VAS	Banco de Vasconia, S.A.
CPL	Cementos Portland	VID	Vidrala, S.A.
EUR	Europistas Concesionaria Española, S.A.	VIS	Viscofan, S.A.
Non-Basque Stocks			
ACE	Autopistas Concesionaria Española, S.A.	GCO	Catalana Occidente, S.A.
ACS	Actividades de Const. y Servicios S.A.	GPP	Grupo Picking Pack, S.A.
ACX	Acerinox, S.A.	IBG	Iberpapel Gestión, S.A.
ADZ	Adolfo Domínguez, S.A.	MAP	Corporación Mapfre, Cia. Int. de Reaseguros
AGS	Sdad. General Aguas de Barcelona, S.A.	MDF	Grupo Duro Felguera, S.A.
ALB	Corporación Financiera Alba, S.A.	MPV	Mapfre Vida, S.A.
ALD	Aldeasa, S.A.	MVC	Metrovacesa, S.A.
ANA	Acciona, S.A.	NEA	Nicolas Correa, S.A.
AND	Banco de Andalucía	NMQ	Nueva Montaña de Quijano, S.A.
ARA	Energía e Industrias Aragonesas, S.A.	PAS	Banco Pastor, S.A.
AZC	Asturiana del Zinc, S.A.	PIN	Prima Inmobiliaria, S.A.
BAM	Bami, S.A. Inmobiliaria de Construcciones	POP	Banco Popular Español, S.A.
BKT	Bankinter, S.A.	PSG	Prosegur, S.A., Cia. de Seguridad
BVA	Banco de Valencia, S.A.	PUL	Puleva, S.A.
CAN	Hidroeléctrica del Cantábrico, S.A.	REP	Repsol, S.A.
CAS	Banco de Castilla, S.A.	RIO	Bodegas Riojanas, S.A.
CBL	Banco de Crédito Balear, S.A.	SED	Seda de Barcelona, S.A. (LA)
CEP	Cia. Española de Petroleos, S.A.	SOL	Sol Meliá, S.A.
CPF	Campofrio Alimentación, S.A.	TEF	Telefónica, S.A.
CRI	Cristaleria Española, S.A.	UBS	Urbanizaciones y Transportes, S.A.
CTF	Cortefiel, S.A.	UNF	Unión Eléctrica-Fenosa, S.A.
CTG	Gas Natural SDG, S.A. (Catalana Gas)	UPL	Unipapel, S.A.
DIN	Dinamia Capital Privado, S.A.	URA	Uralita, S.A.
DRC	Grupo Dragados, S.A.	URB	Inmobiliaria Urbis, S.A.
ECR	Ercros S.A.	VAL	Vallehermoso, S.A.
ELE	Endesa, S.A.	VDR	Portland Valderrivas, S.A.
ENC	Grupo Empresarial Ence, S.A.	ZNC	Española del Zinc, S.A.
FCC	Fomento de Construcciones y Contratas, S.A.	ZOT	Zardoya Otis, S.A.
FIL	Filo, S.A.	ZRG	Banco Zaragozano, S.A.
GAL	Banco de Galicia, S.A.		

The starting values of the weights were calculated as $\omega^j_{i,0} = M^j_{i,0}/M^j_0$, where $M^j_{i,0}$ is the total market value of all outstanding shares of stock i in portfolio j in period 0 and M^j_0 is the total market value of all outstanding shares of stocks included in portfolio j. Therefore, at the beginning of the sample, the buy-and-hold portfolios were value-weighted portfolios.

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