TEMPORARY BORDER CONTROLS AND THE STOCK MARKET: EVIDENCE FROM THE SCHENGEN AREA

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Temporary Border Controls and the Stock Market: Evidence from the Schengen Area

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Abstract

This paper evaluates the impact of temporary border controls on the stock market. We construct a new dataset on the reintroduction of border controls by collecting data from official documents. We use these data in two complementary research designs. First, we conduct a quasi-experimental event study using the first refugee-induced border control, which occurred in Germany in September 2015. Second, we conduct a Schengen area analysis covering all border controls between 2006 and 2016, using both a difference-in-difference and a synthetic control method. In both analyses, we find a small negative and short-lived effect on daily stock returns, as well as an increase in their short-lived volatility. These effects are driven by medium and large firms, which are more likely to be involved in cross-border activities. Overall, we find that these border controls initially mildly worsen market expectations, but the market does not overreact by interpreting them as a sign of a possible collapse of the Schengen Agreement.

Keywords: Borders, Border Controls, Schengen, Stock Market, Refugees.

JEL codes: F20, F55, G14, O52

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"The risk we are facing is the death of Schengen", French President Emmanuel Macron, 27 March 2020

The so-called 2015 refugee crisis threatened a fundamental cornerstone of the European construction: the free movement of goods, capital, services, and people (known as the "four freedoms"). Faced with 1.3 million asylum-seekers entering the Schengen area in a matter of months (Eurostat, 2016), a series of Schengen member states unilaterally introduced temporary border controls.[1] While voicing the need for reforms due to the growing number of border controls within Schengen, the cost of inaction has been argued by fervent political defenders of the European project (e.g., Jean-Claude Junker, Emmanuel Macron, Angela Merkel, Ursula von der Leyen) to threaten European integration and the functioning of the EU's Single Market. The above quote illustrates one such concern. Indeed, the reintroduction of border controls is likely to raise not only cross-border transaction costs, but also European firms' operational risk and expectations. Employing stock market data, our study seeks to capture how firms' expectations (reflected in the stock market price) are changed by the reintroduction of border controls. According to the asset pricing theory and under the assumption of market efficiency (Fama, 1991; Campbell, 2000), we expect the reintroduction of border controls within the Schengen area to negatively affect the market value of stock market shares through two potential channels. On the one hand, rising transaction costs may decrease the firm's prospective cash flows. On the other hand, anecdotal evidence suggests that an increase in uncertainty regarding the whole EU project can negatively affect the firm's expected operational risk.

We study the impact of the temporary reintroduction of border controls on firms' daily stock market returns in two settings. First, a German case study focusing on the first refuge-induced border control in 2015. Second, a difference-in-difference and synthetic control method covering the universe of all border controls from the first Schengen suspension in 2006 to 2016 (before the Brexit referendum). We find systematic evidence that border controls negatively affect daily stock returns. On the first trading day after the introduction of border controls in Germany, daily stock returns decreased by 0.25 percentage points. The magnitude of the effect is small in absolute terms, but in relative terms it is six times larger compared to the daily return mean (the average daily return during the estimation period of July 13^{th}, 2015, and October 13^{th}, 2015,

[1] Forced migrants entering the Schengen area in 2015 are better designated as asylum-seekers, as they are seeking safety from persecution or serious harm in a country of asylum and awaiting a decision on their application for refugee status. Not all asylum-seekers become refugees. However, for exposition purposes, we will use both terms interchangeably.

is -0.04). When applying the difference-in-difference and synthetic control method to the whole Schengen area, we find similar results: a small negative effect in absolute terms and a larger effect when compared to the mean. In particular, the average effect of all refugee-induced Schengen suspensions translates into a decrease of about 0.05 percentage points, a sizeable effect compared to the mean daily return over the study period (0.08 percentage points between June 1^{st}, 2006, and June 1^{st}, 2016). In both settings, the effects (decrease in returns and increase in volatility) are short-lived, and stronger for medium and large-sized firms which are more likely to be involved in cross-border activities.

Our first main contribution to the literature is the construction of a new dataset that documents the universe of all temporary border controls and classifies them into refugee, terrorist, and expected border control groups. The dataset is created using only official sources. The new data sheds new light on the literature that attempts to assess the economic consequences of borders (McCallum, 1995; Anderson and Van Wincoop, 2003; Havranek and Irsova, 2017). In doing so, we build on an extensive literature in economics and finance that exploits variation in stock market returns within an event study framework (MacKinlay, 1997; Guidolin and La Ferrara, 2007, 2010; Dube et al., 2011; Acemoglu et al., 2018; Draca et al., 2023).

Second, to the best of our knowledge, this is the first paper to evaluate the border effect on a new outcome - stock market returns. The existing literature on borders has mainly focused on trade-related outcomes (Nitsch and Wolf, 2013). In a seminal study of US-Canada interregional trade, McCallum (1995) shows that conditional on economic size and distance, goods are exchanged 22 times more within national borders than between borders. Since then, methodological advances have reduced this estimate to single digits, in the range of 3 to 5 (Anderson and Van Wincoop, 2003; Havranek and Irsova, 2017). In the European context, intranational trade is about ten times higher than international trade with an EU partner country (Nitsch, 2000). Using German reunification as a quasi-natural experiment, Nitsch and Wolf (2013) find that such a border effect is also highly persistent. However, borders are not only correlated with trade patterns due to higher transaction costs, they also capture political, cultural or linguistic differences. Other studies have explored historical discontinuities in borders to investigate other outcomes, such as population and urbanization (Redding and Sturm, 2008) or political outcomes (Alesina and Spolare, 2003; Schultz, 2015; Michalopoulos and Papaioannou, 2016). As far as we know, no attention has been paid to the expectations of firms as reflected in stock market prices.

Third, there are no systematic studies evaluating the short-run stock market impact of asylum-seekers. While the uncoordinated nature of policy responses to asylum-seekers inflows has been highlighted (Hatton, 2016b,a; Fernández-Huertas Moraga and Rapoport, 2015), the economic costs of such an uncoordinated reaction have not been quantified. Only a few reports have attempted to estimate the associated costs based on global forecasting and simulation models used to assess the consequences of large macroeconomic shocks (Aussilloux and Le Hir, 2016; Bohmer et al., 2016). While attractive from a policy perspective, such models are based on strong assumptions about how additional controls push up import prices and lead to subsequent inflationary spirals.

The rest of the paper is organized as follows. Section I describes the context. Section II analyzes the German case study, and Section III presents the analysis of the Schengen-area. Lastly, Section IV offers some concluding remarks.

I Context

Since the creation of the Schengen area, freedom of movement and the removal of internal borders have been fundamental legal principles in the European Union (Barbero, 2020). The signing of the Schengen Agreement on June 14^{th}, 1984, and its implementation agreement in June 1990 have facilitated the mobility of workers and consumers, as well as the transportation of goods across borders (Davis and Gift, 2014).[2] Over the past decade, however, the EU and its member states have frequently made exceptions to the agreed principles.

According to the Schengen Border Code Regulation, border controls can be temporarily reintroduced under three main circumstances. The first is the case of "foreseeable events" (European Parliament and European Council (2016b), article 24) (e.g., international political summits or international sports competitions); the second is the case of "a serious threat to public policy or internal security" (European Parliament and European Council (2016b), article 23); the third is when member states report "cases requiring urgent action" (European Parliament and European Council 2016a, article 25). In each of these cases, member

[2]The Schengen member states should not be confused with the member states of the European Union (EU). Most EU member states are part of Schengen, along with a few non-EU countries. There are 26 Schengen member states: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, and Switzerland.

states must provide their reasons for border controls to the EU Commission and other EU member states. However, in the first case, member states must inform the EU about "the scope of the proposed reintroduction, specifying where border control is to be reintroduced; the names of the authorized crossing-points" (European Parliament and European Council (2016a), article 24 (1)). In the other two cases, member states are not required to provide such detailed information and can leave neighboring countries with an unclear picture of the extent to which cross-border flows will be affected. For example, if a given member state decides to reintroduce border controls by applying articles 23 and 25 of the Schengen Code, this means that the neighboring country will face disruptions in the free movement of people, goods, and services (e.g., disrupted workforce commuting, traffic congestion). Controls usually appear in an unannounced and occasional manner. They are managed by the police and customs services, usually at the most active border crossing points.

Between June 2006 and June 2016, the reintroduction of border controls was announced 62 times; 56% of these were related to expected events, 35% to refugees, and 8% to terrorism-related events (see Appendix Figure B-5). The expected events include various political summits and conferences (G8 summits, NATO summits, or UN conferences), international sports competitions, or demonstrations. The refugee-related border controls began in September 2015 in Germany, and seven other Schengen countries — Austria, Slovenia, Hungary, Sweden, Norway, Denmark, and Belgium — followed in the following months. The explosion of Schengen suspensions was also related to terrorist attacks. The terrorist attacks in Paris (November 2015) and Brussels (March 2016) led several countries to re-establish border controls within the Schengen Area. Although Schengen member states had historically followed the mechanism foreseen in the Schengen Agreement (Home, 2016), the increased geographical scope and duration of the restrictions led some analysts to describe the situation as the "dislocation," the "dismantling", or even the "death" of the Schengen Area (Sénat, 2016).

II German Case Study

II.A German Case Study: Data and Descriptive Statistics

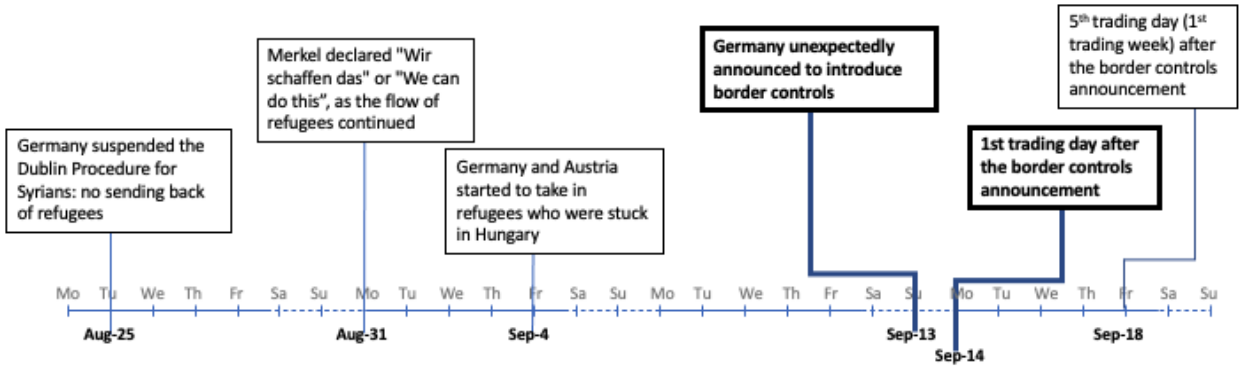
We use the first refugee-induced border control in Germany as a quasi-experiment to study the effect on the stock market. The event we focus on took place on September 13^{th}, 2015, the day Germany became the first Schengen member to announce the reintroduction of border controls due to an alleged "big influx of persons seeking international protection". The announcement made late Sunday afternoon by German Interior Minister, Thomas de Maziere, was considered a "surprise move" (Karnitschnig, 2015). German police patrols were immediately observed at the border crossings with Austria, at 17:30 the same day (Harding, 2015).

Panel A of Figure 1 illustrates the timeline of the event. One month prior, Germany had an open-door policy for newcomers. They suspended the Dublin procedure for Syrian asylum-seekers, due to the wars in the Middle East, which meant that these migrants no longer had to be sent back to the first EU country they entered. On August 31^{st}, 2015, German Chancellor Angela Merkel declared "We can do this" as Europe faced the refugee crisis. The German government offered protection to hundreds of thousands of refugees, and Merkel declared it a "national duty" to do so. On September 4^{th}, Germany and Austria began taking asylum-seekers stuck at the Hungarian border. Germany had a welcoming culture, and it became the most desirable destination for asylum seekers in Europe. Only 9 days later, on September 13^{th}, the situation completely reversed politically and Germany began to tighten controls at its border with Austria, potentially sending a very different signal to the market. Panel B of Figure 1 shows that the monthly flow of asylum applicants in Germany was on an increasing trend for two years before the event (it was happening rather progressively over time). Thus, it was not a phenomenon that started 9 days before the event that could explain the reversal of the political narrative and the sudden introduction of border controls.

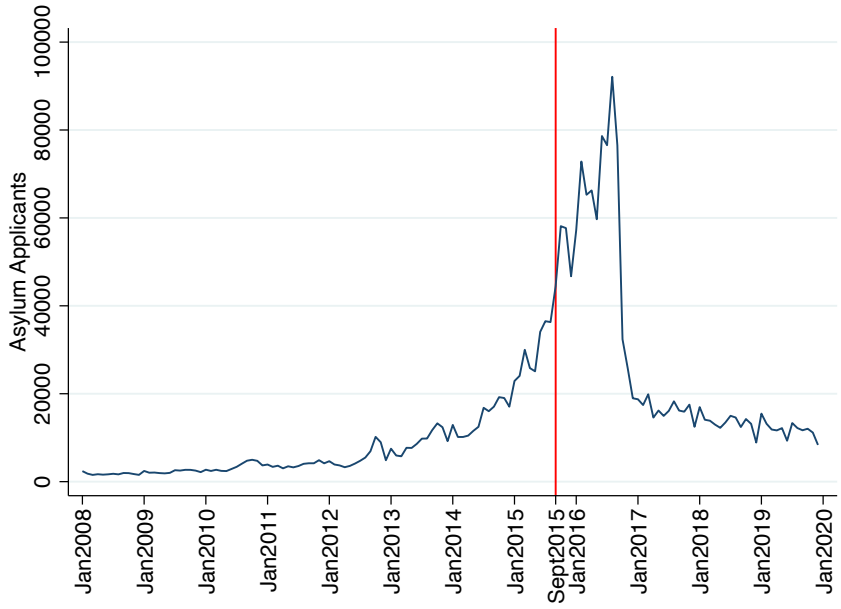
For our outcome, we use historical stock returns for all publicly listed German stocks from Eurofidai (Eurofidai, 2021). The returns are multiplied by 100 in order to be expressed as percentages. We remove the top and bottom 1% of all observed returns from our sample so that our results are not driven by possible measurement error in the outliers.[3]

[3] In Appendix Figure A-1, we plot the distribution of returns for Germany. Our main results are similar when we use different trimming or winsorizing cutoff points.

Figure 1: Timeline and Context of the First Refugee Induced Border Controls



(a) Timeline of The First Refugee Induced Border Controls



(b) Monthly Number of Asylum Applicants in Germany

Note: Panel A figure shows the timeline from August to September 2015 of the refugee crisis related events in Germany and the reintroduction of border controls. Additionally, the plot shows the day of the week to track the opening of the stock exchange around the event date. Panel B figure shows the number of asylum applicants in Germany using Eurostat data (Eurostat, 2021)

II.B German Case Study: Results

To clarify our identification strategy and the interpretation of our results, we first study the effect of a single major event: the German border controls implemented on September 13^{th}, 2015, due to the alleged "big influx of persons seeking international protection". Among all documented border controls, we argue that Germany provides an ideal case study to quantify the causal impact of border controls on stock market

returns for several reasons. Germany was the first country to introduce border controls due to the refugee crisis. In addition, this was an unexpected reintroduction of border controls, implemented immediately on a Sunday before European stock markets reopened. Moreover, the presence of asylum-seekers is likely to have a negligible direct effect on stock markets, as opposed to other events such as terrorist attacks. After Germany, on September 16^{th} Austria became the next country to notify the European Commission of the reintroduction of border controls, due to the same alleged "big influx of persons seeking international protection". Therefore, the first two trading days of the week, Monday 14^{th} and Tuesday 15^{th}, are of particular interest as they are not contaminated by spillover effects from neighboring countries.

We assess the impact of the reintroduction of border controls on daily stock returns within a constant mean return model (MacKinlay, 1997). Our baseline model is structured as follows:

$$R_{it} = \beta EventDay1_t + \alpha_i + X_t'\gamma + \epsilon_{it}, \tag{1}$$

where the outcome R_{it} denotes the average daily stock market return for a given security i at day t. $EventDay1_t$ is a dummy equal to one for the first trading day when the event occurred (Monday, September 14^{th}). α_i stands for security fixed effects. X_t' captures day-of-the-week fixed effects. Standard errors are clustered at the security level. We restrict our estimation window to two months before the announcement of the reintroduction of German border controls and one month after the announcement.[4] We use information on 7,119 securities traded by German companies.

The use of fixed effects makes our estimation model equivalent to the constant mean return model in the event study literature, as we effectively demean returns at the security level, similar to abnormal returns.[5] However, an event study in a two-way fixed effects setup does not necessarily capture the average treatment effect (De Chaisemartin and d'Haultfoeuille, 2020; Gardner, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2020). The fixed effects estimates in Eq. 1 can be biased if the effects are heterogeneous but assumed to be homogeneous. For example, if the effects of border control are stronger in the early periods, but the estimated impact of border control is assumed to be constant, then the day-of-the-week fixed effects in the first periods will be biased since we assume a smaller treatment effect than the reality. To address the above

[4]Results are shown to be similar when we define an estimation window over alternative two- and three-month periods.

[5]We cannot apply the so-called market model, which removes the variation in market returns from the security return because our treatment is defined at the country level, not the security level.

concerns, we follow Gardner (2021) and apply the proposed two-step approach. In the first stage, we estimate all coefficients except the event study coefficients for all non-treated data. Specifically, we estimate the following first stage:

$$R_{it} = \alpha_i + X_t'\gamma + \nu_{it}, \tag{2}$$

where the sample is restricted to all securities that have not yet been exposed to border controls. Therefore, the estimates in the first stage are not contaminated by the effects of border controls, as discussed above. In the second stage, we estimate the following equation:

$$R_{it} = \beta EventDay1_t + \widehat{\alpha_i} + X_t'\widehat{\gamma} + \epsilon_{it}, \tag{3}$$

where all the parameters, $\widehat{\alpha_i}$, $X_{i,t}'\widehat{\gamma}$, are estimates from Eq.2. We cluster the standard errors at the security level.

The results for the German case study are presented in Table 1. Panel A focuses on daily stock returns, while Panel B focuses on stock return volatility. Column (1) shows that the reintroduction of border controls in Germany decreases daily returns by 0.25 percentage points. Compared to major events such as a civil war (Guidolin and La Ferrara, 2007, 2010), the Brexit referendum (Oehler et al., 2017), or US-backed military coups (Dube et al., 2011), the magnitude seems rather small. However, it is about six times larger than the average daily return (–0.04) over the study period.[6] However, columns (2) to (4) demonstrate that the impact is short-lived. While the reintroduction of border controls on Sunday still had some negative effects on the second trading day (Tuesday), financial markets corrected the initial dip on the third (Wednesday) and fourth (Thursday) trading days. Consistent with the daily returns, the market also increased in volatility for the first two days only, as shown in Panel B. The initial short-lived stock market reaction can be interpreted as markets internalizing border controls as a path towards the so-called "death" of the Schengen Area.

Given the use of fixed effects, our identification strategy captures the fact that daily stock returns are lower (or volatility is higher) than the average for the concerned security on Monday September 14^{th} com-

[6]Descriptive statistics are provided in Appendix Table A-1. Although lower in magnitude, similar results are found using a classical two-way fixed-effects estimator (see Appendix Table A-4). Our results are qualitatively unaltered when we modify the estimation window to 2 or 3 months before or after the event (Appendix Tables A-5 and A-6) or when we use alternative outcomes or winsorizing cut-off points (Appendix Table A-7).

Table 1: The Effect of Border Controls in Germany on Daily Returns and Volatility

	(1)	(2)	(3)	(4)
Dependent Var:	Panel A: Daily Returns			
$EventDay1Mon$	-0.250***	-0.241***	-0.234***	-0.238***
	(0.027)	(0.025)	(0.025)	(0.025)
$EventDay2Tue$		-0.104***	-0.098***	-0.101***
		(0.027)	(0.027)	(0.027)
$EventDay3Wed$			0.275***	0.273***
			(0.027)	(0.026)
$EventDay4Thu$				0.187***
				(0.027)
Securities	7,119	7,119	7,119	7,119
Observations	356,841	356,841	356,841	356,841
Tbeg	13jul2015	13jul2015	13jul2015	13jul2015
Tend	13oct2015	13oct2015	13oct2015	13oct2015
SecurityFE	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes
Dependent Var:	Panel B: Volatility			
$EventDay1Mon$	0.082***	0.082***	0.082***	0.082***
	(0.015)	(0.015)	(0.015)	(0.015)
$EventDay2Tue$		0.032***	0.032***	0.032***
		(0.005)	(0.005)	(0.005)
$EventDay3Wed$			-0.043***	-0.043***
			(0.007)	(0.007)
$EventDay4Thu$				-0.011
				(0.008)
Securities	5,808	5,808	5,808	5,808
Observations	27,816	27,816	27,816	27,816
Tbeg	14sep2015	14sep2015	14sep2015	14sep2015
Tend	18sep2015	18sep2015	18sep2015	18sep2015
SecurityFE	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes

Note: The table reports the effect of the reintroduction of border controls in Germany in the first 4 trading days on daily stock returns (Panel A), and its 5-day volatility (Panel B). It estimates Eq. 1 using a two-stage event study approach. The unit of observation is security-day. Standard errors in parentheses are clustered at the security level. * p<0.1, ** p<0.05, *** p<0.01.

pared to what is expected on that particular day of the week. A priori, we cannot exclude the possibility that a particular day was a bad trading day for reasons unrelated to the refugee-induced border control. Therefore, we implement a series of additional analyses. First, we control for the Geopolitical Risk Index (GPR), which is a news-based measure of adverse geopolitical events and associated risks: measuring both the threat and the realization of adverse geopolitical events (Caldara and Iacoviello, 2022). Table A-2 shows that the results for daily returns remain qualitatively unchanged, but the results for volatility change. The volatility for the 1^{st} trading day is significantly higher after controlling for GPR, and there is no longer significant volatility in the subsequent trading days. Second, in Table A-3 we implement 8 placebo exercises where we make as

if neighboring countries were those who reintroduced border controls on September 13^{th}. We find that not a single neighboring country experienced a significant decrease in daily stock returns on the 1^{st} trading day.

Table 2: Heterogeneity of the Border-Control Effect by Industry and Firm Size

	Industry					Firm Size		
Sub-sample	Transport	Materials	Industrials	Discretionary	Staples	Small Cap	Medium Cap	Large Cap
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Var:	Panel A: Daily Returns							
$EventDay1Mon$	-0.455***	-0.264***	-0.377***	-0.261***	-0.338***	0.046	-0.492***	-0.315***
	(0.118)	(0.070)	(0.056)	(0.089)	(0.079)	(0.058)	(0.050)	(0.029)
Securities	234	686	1,602	692	390	1,983	2,039	2,091
Observations	11,254	33,145	78,601	34,154	20,177	106,592	106,575	106,583
Tbeg	13jul2015	13jul2015	13jul2015	13jul2015	13jul2015	13jul2015	13jul2015	13jul2015
Tend	13oct2015	13oct2015	13oct2015	13oct2015	13oct2015	13oct2015	13oct2015	13oct2015
SecurityFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dependent Var:	Panel B: Volatility							
$EventDay1Mon$	0.001	0.116***	0.049	0.049	-0.090**	0.181***	0.110***	-0.012
	(0.067)	(0.032)	(0.030)	(0.045)	(0.046)	(0.032)	(0.024)	(0.025)
Securities	180	522	1,273	561	328	1,719	1,698	1,716
Observations	861	2,515	6,080	2,651	1,590	8,098	8,098	8,097
Tbeg	14sep2015	14sep2015	14sep2015	14sep2015	14sep2015	14sep2015	14sep2015	14sep2015
Tend	18sep2015	18sep2015	18sep2015	18sep2015	18sep2015	18sep2015	18sep2015	18sep2015
SecurityFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table reports heterogeneous effects of border controls on daily stock returns by industry and firm size (Panel A) and its 5-day volatility (Panel B). We follow the Eurofidai (2021) classification, where for each company the information on its industry sector is provided. The transportation industry consists of companies engaged in activities related to traffic and transportation (column 1). The materials industry refers to commodity chemicals, agricultural chemicals, construction materials, paper, and forest products (column 2). The industrials industry consists of capital goods, commercial and professional services, and transportation (column 3). The discretionary industry is composed of automobiles and components, consumer durables, apparel, consumer services, and media (column 4). The staples industry includes food, beverages, tobacco, food and staples retailing, and household and personal products (column 5). Firm size is calculated by classifying all companies into 3 quantiles based on their market capitalization. The results are estimated using Eq. 1, with a two-stage event study approach. The unit of observation is security-day. Standard errors in parentheses are clustered at the security level. * p<0.1, ** p<0.05, *** p<0.01.

In Table 2, we then examine the heterogeneity of the effect across securities by looking at the industries in which they operate and their size. Panel A focuses on daily stock returns, while Panel B focuses on stock return volatility. Overall, we find that the transportation, materials, industrials, discretionary, and staples sectors experienced a significant decline on the first trading day after the event.[7] In terms of firm size, the impact of the reintroduction of border controls is mostly concentrated among securities with medium or

[7]In Appendix Table A-8 we test all remaining sectors and additionally find a significant decrease in the energy, financials, and IT sectors, whereas, we find no effect for the telecommunications sector. We follow the standard sector classification in the Eurofidai dataset, which was done by Six Telekurs.

large valuations (this is consistent with the consensus that large firms are more likely to be involved in cross-border activities (Bernard et al., 2007, 2018)). In contrast to the previous findings on aggregate effects, the heterogeneous effects are less pronounced when looking at volatility across industries and firm size (Panel B).

III Schengen Area Analysis

III.A Schengen Area: Data and Descriptive Statistics

Since all reintroductions of border controls have to be reported to the Commission (or potentially by the Commission to the member states), we document the universe of all temporary reintroductions of border controls at internal borders from official Commission documents (Commission, 2019). We first encode the duration of each temporary border control event reported by a member state. We then classify each event according to the reasons given by each member state for why the borders were reintroduced: refugee crisis, a terrorist attack, or foreseeable events (G7 or NATO meetings, Pope's visit, demonstrations, etc.).

In Appendix Figure B-4 we plot the frequency and duration of all 117 temporary border controls for each Schengen member state, from the first occurrence in October 2006 until June 2016. Overall, 19 out of 26 Schengen member states instated border controls at least once during our study period. In terms of frequency, Hungary, Latvia, the Netherlands, Portugal, and Slovenia reintroduced border controls only once. At the other extreme, France did so 11 times between June 2006 and June 2016.[8] In terms of duration, the reintroduction of border controls can last from one day to six months. For example, the reintroduction of border controls due to demonstrations by young Basques in Bayonne, France on October 21st, 2006, lasted 1 day. The longest controls were related to the refugee crisis and lasted around 6 months in Germany and Austria and 5 months in Norway and Sweden. The longest border control related to a terrorist attack occurred in France in December 2015 and lasted more than 5 months (165 days).

Similar to the German case study, we use historical stock returns from Eurofidai for all European stocks in the Schengen area (Eurofidai, 2021). The returns are multiplied by 100 to be expressed as percentages. We remove the top and bottom 1% of all observed returns from our sample so that our results are not driven

[8] For a more visual representation, see Appendix Figure B-5.

by possible measurement error in the outliers.[9] To avoid possible confounding variables due to Brexit, we restrict our data collection from June 1^{st}, 2006, to June 1^{st}, 2016, since the Brexit referendum took place on June 23^{rd}, 2016. Finally, we also use additional data to deal with identification threats, namely, data on asylum seekers from Eurostat (Eurostat, 2021) and on terrorist attacks from the Global Terrorism Database (GTD, 2021).

III.B Schengen Area: Difference-in-Difference Results

To assess the external validity of the results obtained for the German case study, we use a difference-in-difference strategy for all reintroductions of border controls in the Schengen area from 2006 to 2016. Our previous model in Eq. 1 is further enriched by the country dimension, as follows:

$$R_{ct} = \beta Events_{ct} + \alpha_c + \delta_t + X'_{ct}\gamma + \epsilon_{ct} \tag{4}$$

where the outcome R_{ct} denotes the capitalization-weighted stock market return in country c at day t. $Events_{c,t}$ is our variable of interest, and equals one if a country reintroduced border controls. α_c and δ_t designate country and day fixed effects, respectively. $X'_{c,t}$ is a vector of controls variables, such as the log number of asylum applications and the occurrence of terrorist attacks. Standard errors are clustered at the country level.

In order for our difference-in-difference results to be interpreted as causal, we need to address several challenges. The first challenge relates to the parallel trends assumption. Second, we should investigate whether some border controls are plausibly exogenous and whether there are confounding factors that simultaneously affect the reintroduction of border controls and daily returns. Third, our estimates may be affected by spillover effects experienced by firms whose operations take place in a "bordering" country, for which the circulation of goods and people is indirectly impacted. Finally, possible anticipation effects, particularly for expected events, can lead to an attenuation bias of the estimated coefficient.

The core identification assumption of our difference-in-difference design requires conditional parallel

[9] In Appendix Figure B-2, we plot the distribution of returns for the entire Schengen area. Our main results are similar when we use different trimming or winsorizing cut-off points. In Appendix Figure B-3, we plot the stock market returns distinguishing between treated and control units. Treated units show more variation, while it is difficult to observe if there is a difference in the average stock returns.

trends (conditional on country fixed effects, day fixed effects, and the additional controls). The average stock return among countries with border controls (treated) should have followed parallel trends compared to countries without border controls (control), absent of border controls. A potential violation of our identification assumption would occur if the treatment group experienced an additional stock return decrease contemporaneous with the border controls (such as the direct effect of the terrorist attacks). In the case of the refugee-induced border controls, this is not a threat to identification as the flow of asylum-seekers did not appear suddenly, but rather, as illustrated in the German case study, it happened progressively over time (Panel B of Figure 1). Additionally, in Figure B-6 we show that there are no significant pre-trends.

Next, we turn to the questions of treatment exogeneity and omitted-variable bias. We have classified three main causes of border controls: refugees, terrorists attacks, and expected events. Refugee-induced border controls can be argued to not be fully exogenous, as countries could predict or observe large flows of asylum-seekers in neighboring countries. In other words, the higher the number of refugees entering a country, the higher the probability of reintroducing border controls. To address this potential source of bias, we control for the number of asylum applications in a given country. We compile country level data with monthly frequency from Eurostat (Eurostat, 2021).

For border controls trigerred by terrorist attacks, we use the Global Terrorism Database. We construct an indicator that captures the exact date of a terrorist attack. The actual incidence of a terrorist attack clearly confounds both Schengen suspension and stock market returns. It is well established in the literature that terrorist attacks affect financial markets expectations (Papakyriakou et al., 2019).

Beyond the use of controls, we track the three main types of reasons given for the temporary suspension of the Schengen Agreement. The first two, terrorist attacks and refugee-induced border controls are the most unexpected. The third type, expected events, are the least exogenous as they are usually planned well in advance. Examples of expected events are high-level government meetings of the G7 or NATO, or other large events (European Football Championship, Tour de France). We should not expect much of a market reaction to expected events, as they are already priced into stock prices long before the reintroduction of border controls. Similarly, since the stock market is a forward pricing mechanism, the duration of border controls or the reopening of borders is not relevant, as this is announced and expected – and therefore already priced in. Finally, the role of spillover effects is investigated by considering the impact of the reintroduction

of border controls by a neighboring country.

Given the variation in treatment timing, we are concerned about the shortcomings of estimating Eq. 4 with a standard difference-in-difference estimation. We cannot exclude that the treatment effect is heterogeneous across groups and time, in which case the standard difference-in-difference estimator will not necessarily capture the average treatment effect (De Chaisemartin and d'Haultfoeuille, 2020; Gardner, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2020). Therefore, similar to the German case study, we follow Gardner (2021) and adopt a two-stage difference-in-difference method.

Table 3 presents the results of the Schengen-wide analysis. Panel A focuses on daily stock returns, while Panel B focuses on stock return volatility. Exploiting within-country variation, column (1) shows a significant and negative average impact of the reintroduction of border controls between June 2006 and June 2016. Border controls related to refugee inflows (column 2) and terrorist attacks (column 3) have the strongest impact, in this order. As expected, foreseeable events have no significant effect on daily returns since they are already priced in before they occur (column 4). Economically, we find that the reintroduction of refugee-induced border controls reduces daily returns by 0.06 percentage points, on average. This magnitude is slightly below the mean daily return (0.08).[10]

The fact that the magnitude is much smaller than in the German case study suggests that financial markets do not interpret the various border controls as a slow path towards the "death" of the Schengen Agreement. Similar to the German case study, financial markets seem to correct themselves after the initial drop in daily returns. As shown in Table B-2, the effect is significantly negative only for the first time refugee-induced border controls are introduced. For subsequent events, financial markets correct themselves after the initial decline. In terms of volatility, similar to the German case study, stock return volatility increases significantly after the reintroduction of border controls in the Schengen area (Panel B of Table 3).

Another interpretation of our results is that all firms within the Schengen area interpret any reintroduction of border controls in the same way in terms of future expectations. If this were the case, securities from other Schengen countries would not offer a good counterfactual. To assess such a possibility, we extend the sample to twelve European countries bordering the Schengen area and augment Eq. 4 with an indicator equal to 1 when there is a reintroduction of border controls anywhere in the Schengen area and interact it with whether

[10]Descriptive statistics are provided in Appendix Table B-1.

Table 3: The Effect of Border Controls in the Schengen Area on Daily Returns and Volatility

	(1)	(2)	(3)	(4)	(5)
Dependent Var:	Panel A: Daily Returns				
All Events	-0.069**				
	(0.029)				
Refugees		-0.055***			-0.053***
		(0.011)			(0.012)
Terrorist Attacks			-0.124***		-0.126***
			(0.028)		(0.028)
Expected Events				-0.073	-0.073
				(0.114)	(0.113)
Countries	26	26	26	26	26
Observations	65,396	65,396	65,396	65,396	65,396
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016
CountryFE	Yes	Yes	Yes	Yes	Yes
DayFE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	No	Yes
Dependent Var:	Panel B: Volatility				
All Events	0.237***				
	(0.058)				
Refugees		0.250***			0.247***
		(0.076)			(0.073)
Terrorist Attacks			0.431***		0.427***
			(0.120)		(0.124)
Expected Events				0.090	0.078
				(0.068)	(0.071)
Countries	26	26	26	26	26
Observations	93,633	93,633	93,633	93,633	93,633
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	31may2016	31may2016	31may2016	31may2016	31may2016
CountryFE	Yes	Yes	Yes	Yes	Yes
DayFE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	No	Yes

Note: The table reports the effects of different types of border controls: all types (column 1), refugee-related (column 2), terrorism-related (column 3), and expected-events-related (column 4). The dependent variable is the capitalization-weighted daily stock return (Panel A), and its 5-day volatility (Panel B). The estimates are obtained using Eq. 4 with a two-stage difference-in-difference approach. Controls include the log number of asylum applications for the refugee-related variables, and the occurrence of a terrorist attack for the terrorism-related variables. The unit of observation is country-day. Standard errors in parentheses are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

the country is a Schengen member state. If there were general equilibrium or contagion effects, we would find that markets react to an event wherever it occurs. We find no evidence of such effects in the Appendix Table B-3.

We conduct a battery of robustness checks. The results are broadly robust to the use of the standard difference-in-difference with two-way fixed effects setup (Appendix Table B-4) or to the gradual dropping of the initial years of our sample from June 1^{st}, 2006, up to June 1^{st}, 2014 (Appendix Figure B-7). Our

results are also similar when we remove additional controls from the baseline specification: the number of asylum applications or the occurrence of a terrorist attack (Appendix Table B-5), redefining volatility periods from 2 to 6 days (Appendix Table B-6), using alternative measures of daily returns (Appendix Table B-7), or using a different cut-off point for winsorizing (Appendix Table B-8). Although we lose precision, when stratifying the sample by industry the only negative effect is observed in the financial sector, with increased volatility observed across the majority of sectors (Appendix Table B-9). In terms of firm size, we find that medium and large firms are the ones that drive the results which are more likely to be involved in cross-border activities (see Appendix Table B-10 for refugee and terrorist attack related events, and Appendix Table B-11 for expected and all events).

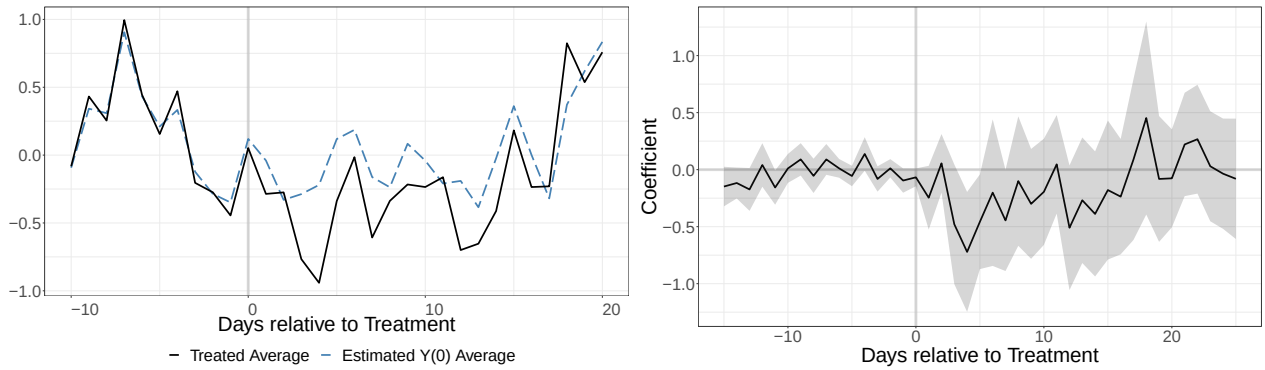
III.C Schengen Area: Synthetic Control Method Results

As an alternative methodological approach to the DID method, we employ a variant of the synthetic control method (SCM) approach to causal inference called the generalized synthetic control (GSC) (Xu, 2017). The GSC combines SCM with the interactive fixed effect (IFE) model (Bai and Li, 2014). Additionally, we incorporate the matrix completion (MC) counterfactual estimator that was introduced by Athey et al. (2021). As stated by Liu et al. (2022), these enhanced estimators have the capacity to offer more reliable causal estimates in contrast to traditional approaches, particularly when potential time-varying confounding factors can be formulated as the interplay between time-varying common shocks and unit-specific intercepts.

The Generalized Synthetic Control generalizes causal inference based on time-series cross-sectional observations to cases where the common trends assumption may be violated. It mitigates potential selection bias and relaxes the parallel trends assumption by semi-parametrically modeling the unobservable time-varying coefficients using interactive fixed effects (IFE). The basic idea is that the "synthetic control" can better reproduce the outcomes observed for units in a treatment group compared to any individual control unit on its own (Abadie et al., 2015; Xu, 2017). Lastly, the use of synthetic counterfactuals mitigates the bias because the unobservable confounders that may cause endogeneity will typically also influence the counterfactual (Billmeier and Nannicini, 2013).

Figure 2 shows generalised synthetic control estimates trends in daily returns for the treated and counterfactual groups and the estimated ATT on the treated. The treatment is the refugee induced border controls.

Figure 2: Refugee Induced Border Controls - Trends in Daily Returns for the Treated and Counterfactual Groups and the Estimated ATT on the Treated



(a) Treated and Counterfactual Averages

(b) Estimated ATT

Note: This plot was produced by the GSCM analysis. Time periods on the horizontal axis are shown relative to the intervention which is marked by the thick gray line. Daily returns on the vertical axis are shown relative to the control group. The treatment is the refugee induced border controls. The dark gray band represents the 90% confidence interval.

Panel (a) shows that 10 days before the treatment period, the counterfactual group is well-matched to the treated group. After the treatment period, the treated group is always below the counterfactual group, indicating a negative effect of the treatment on daily returns. In Panel (b) we plot the ATT estimates of refugee induced border controls on daily returns. The estimates are significantly different from zero in the initial period for a few trading days, and afterward they revert zero.

IV Conclusions

The economic impact of reintroducing border controls is hotly debated among policymakers, but there is virtually no causal evidence on this issue. In this paper, we provide quasi-experimental evidence of such effects using the first refugee-induced border control event in Germany. For external validity, we then examine the universe of all border controls in the Schengen area using a difference-in-difference and synthetic control method. In both settings, we find a small negative and short-lived effect of temporary borders on daily stock returns, as well as an increase in their short-lived volatility. Therefore, firms do not seem to interpret the reintroduction of border controls as a sign of the dislocation of the Schengen Agreement.

Our study faces two main limitations in further interpreting our results from a policy perspective. First, the results do not imply that financial markets do not value *per se* the free circulation of people or goods

offered by the Schengen Agreement. We study the impact of temporary suspensions of the Schengen Agreement, and not its permanent disintegration. Second, we cannot exclude the possibility that financial markets are not good at pricing the reintroduction of border controls as a signal regarding the viability of a political agreement (i.e., underreaction of the market). Future research should aim at further disentangling the immediate effect of border controls on transaction and operating costs, from changes in firms' expected operational risk.

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Online Appendix: The Cost of Suspending Schengen? Evidence From European Stock Markets

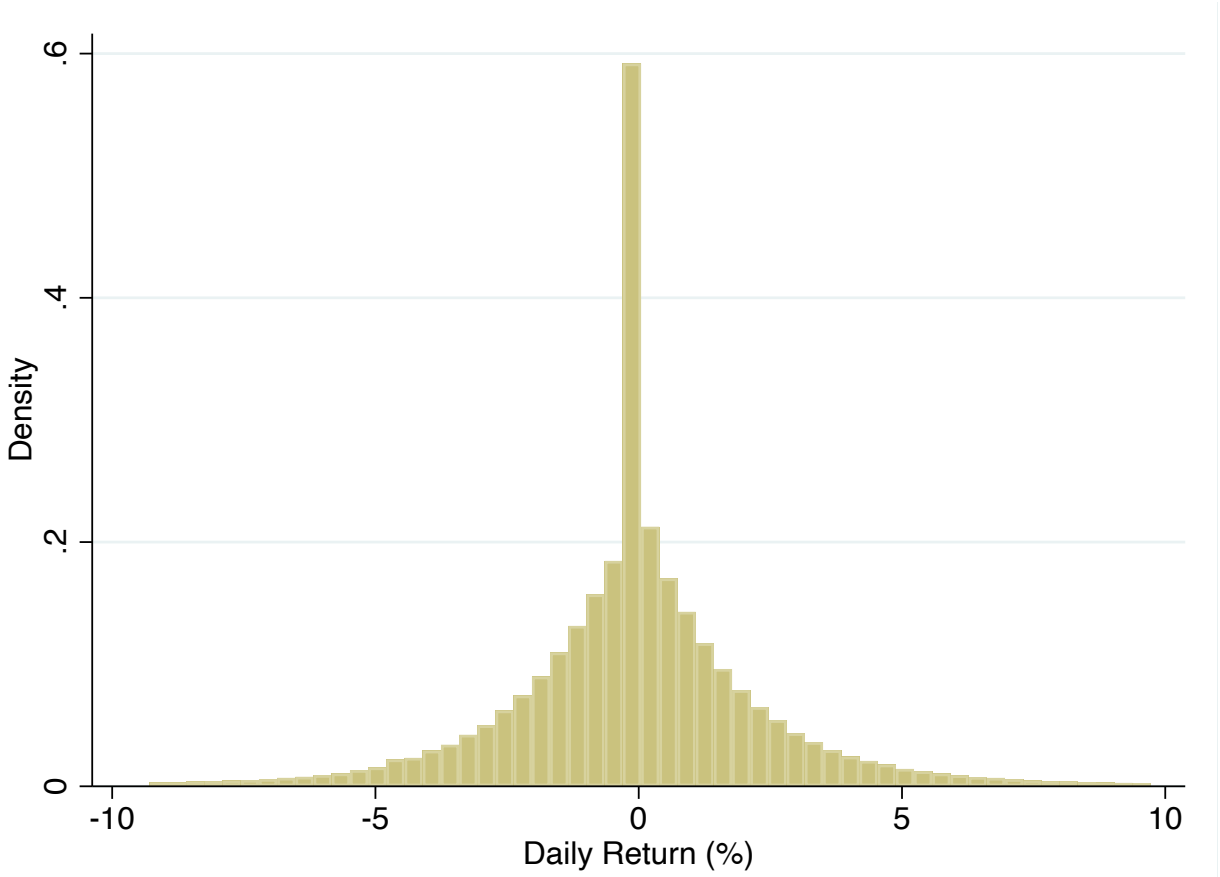
By Adam Levai, and Jean-François Maystadt

Contents

A German Case Study

A.1 Descriptive Statistics

Figure A-1: Distribution of the Daily Stock Market Returns



Note: the plot shows the distribution for all daily stock market returns in Germany between July13th2015 and October13th2015, after trimming top and bottom 1% from the raw data.

Table A-1: Summary Statistics

Variable	Mean	S.D.	Min.	Max.	Obs.
Daily Returns	-0.042	2.370	-9.29	9.72	356841
Average 5-day Volatility	1.674	1.400	0.00	12.86	26777
Small Cap Returns	-0.069	2.487	-9.28	9.72	106592
Medium Cap Returns	-0.008	2.353	-9.29	9.72	106575
Large Cap Returns	-0.048	2.193	-9.27	9.72	106583
Transport Sector Returns	0.031	2.183	-9.25	9.71	11254
Materials Sector Returns	-0.105	2.204	-9.29	9.66	33145
Industrials Sector Returns	-0.066	2.426	-9.28	9.72	78601
Discretionary Sector Returns	-0.018	2.382	-9.28	9.71	34154
Staples Sector Returns	-0.037	2.106	-9.23	9.71	20177

Note: the table shows summary statistics for the baseline sample.

A.2 Robustness

Table A-2: Baseline Results - Controlling for Geopolitical Risk Index

Dependant Var:	Daily Returns			
	(1)	(2)	(3)	(4)
$EventDay1Mon$	-0.231***	-0.225***	-0.217***	-0.218***
	(0.027)	(0.025)	(0.025)	(0.025)
$EventDay2Tue$		-0.123***	-0.119***	-0.117***
		(0.027)	(0.027)	(0.027)
$EventDay3Wed$			0.283***	0.286***
			(0.027)	(0.027)
$EventDay4Thu$				0.197***
				(0.027)
$ln(GPR)$	0.000	0.001***	0.001***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Securities	7119	7119	7119	7119
Observations	356,841	356,841	356,841	356,841
Tbeg	13jul2015	13jul2015	13jul2015	13jul2015
Tend	13oct2015	13oct2015	13oct2015	13oct2015
SecurityFE	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes
Dependent Var:	Panel B: Volatility			
$EventDay1Mon$	0.200***	0.200***	0.200***	0.200***
	(0.031)	(0.031)	(0.032)	(0.031)
$EventDay2Tue$		0.000	-0.000	0.000
		(0.000)	(0.002)	(0.004)
$EventDay3Wed$			-0.001	-0.000
			(0.006)	(0.000)
$EventDay4Thu$				0.001
				(0.012)
$ln(GPR)$	-0.000	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.001)
Securities	5808	5808	5808	5808
Observations	27816	27816	27816	27816
Tbeg	14sep2015	14sep2015	14sep2015	14sep2015
Tend	18sep2015	18sep2015	18sep2015	18sep2015
SecurityFE	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes

Note: The table reports the effect of the reintroduction of border controls in Germany in the first 4 trading days on daily stock returns (Panel A), and its 5-day volatility (Panel B). It estimates Eq. 1 using a two-stage event study approach. The unit of observation is security-day. Standard errors in parentheses are clustered at the security level. * p<0.1, ** p<0.05, *** p<0.01.

Table A-3: Baseline Results - Placebo for Neighbouring Countries

Dependant Var:	Daily Returns							
	(1) Denmark	(2) Poland	(3) Czech Republic	(4) Austria	(5) Switzerland	(6) France	(7) Luxembourg	(8) Belgium
$EventDay1Mon$	0.149**	0.346**	-0.100	0.497***	0.536***	0.624***	0.445***	0.901***
	(0.071)	(0.137)	(0.211)	(0.060)	(0.035)	(0.037)	(0.125)	(0.073)
$EventDay2Tue$	0.204***	0.057	0.180	0.109	0.341***	0.579***	0.469***	0.296***
	(0.077)	(0.136)	(0.118)	(0.071)	(0.033)	(0.035)	(0.110)	(0.064)
$EventDay3Wed$	-0.236***	-0.082	-0.388**	-0.658***	-0.534***	-0.670***	-0.922***	-0.395***
	(0.069)	(0.135)	(0.155)	(0.072)	(0.036)	(0.036)	(0.105)	(0.067)
$EventDay4Thu$	0.313***	0.346**	-0.748***	-0.224***	-0.021	-0.015	-0.300***	0.245***
	(0.076)	(0.154)	(0.197)	(0.073)	(0.040)	(0.037)	(0.104)	(0.074)
Securities	912	1103	92	785	2258	3884	433	910
Obs	36212	49786	3715	36295	105989	184067	21245	42992
Tbeg	13jul2015	13jul2015	13jul2015	13jul2015	13jul2015	13jul2015	13jul2015	13jul2015
Tend	13oct2015	13oct2015	13oct2015	13oct2015	13oct2015	13oct2015	13oct2015	13oct2015
SecurityFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table reports placebo effects for all the neighboring countries of Germany as if they reintroduced border controls during the same 4 trading days on daily stock returns. It estimates Eq. 1 using a two-stage event study approach. The unit of observation is security-day. Standard errors in parentheses are clustered at the security level. * p<0.1, ** p<0.05, *** p<0.01.

Table A-4: Baseline Results Using a Standard Two-Way Fixed Effects Estimator

Dependant Var:	Daily Returns			
	(1)	(2)	(3)	(4)
$EventDay1Mon$	-0.148***	-0.148***	-0.148***	-0.148***
	(0.027)	(0.027)	(0.027)	(0.027)
$EventDay2Tue$		-0.117***	-0.117***	-0.117***
		(0.028)	(0.028)	(0.028)
$EventDay3Wed$			0.180***	0.180***
			(0.028)	(0.028)
$EventDay4Thu$				0.043
				(0.028)
Securities	6,860	6,860	6,860	6,860
Observations	356,582	356,582	356,582	356,582
Tbeg	13jul2015	13jul2015	13jul2015	13jul2015
Tend	13oct2015	13oct2015	13oct2015	13oct2015
SecurityFE	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes

Note: The table reports the effect of the reintroduction of border controls in Germany in the first 4 trading days on daily stock returns. It estimates Eq. 1 using a standard two-way fixed effects estimator. The unit of observation is security-day. Standard errors in parentheses are clustered at the security level. * p<0.1, ** p<0.05, *** p<0.01.

Table A-5: Alternative Estimation Window - 2 Months Before and 2 Months After the Event

Dependant Var:	Daily Returns			
	(1)	(2)	(3)	(4)
$EventDay1Mon$	-0.269***	-0.263***	-0.257***	-0.260***
	(0.026)	(0.025)	(0.025)	(0.025)
$EventDay2Tue$		-0.136***	-0.131***	-0.133***
		(0.027)	(0.027)	(0.027)
$EventDay3Wed$			0.232***	0.230***
			(0.027)	(0.026)
$EventDay4Thu$				0.133***
				(0.027)
Securities	7,397	7,397	7,397	7,397
Observations	486,110	486,110	486,110	486,110
Tbeg	13jul2015	13jul2015	13jul2015	13jul2015
Tend	13nov2015	13nov2015	13nov2015	13nov2015
SecurityFE	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes

Note: The table reports the effect of the reintroduction of border controls in Germany in the first 4 trading days on daily stock returns with a different estimation window. The estimation window used is 2 months before and 2 months after the event. It estimates Eq. 1 using a two-stage event study approach. The unit of observation is security-day. Standard errors are clustered at the security level. * p<0.1, ** p<0.05, *** p<0.01.

Table A-6: Alternative Estimation Window - 3 Months Before and 2 Months After the Event

Dependant Var:	Daily Returns			
	(1)	(2)	(3)	(4)
$EventDay1Mon$	-0.190***	-0.186***	-0.182***	-0.185***
	(0.026)	(0.025)	(0.025)	(0.025)
$EventDay2Tue$		-0.096***	-0.092***	-0.094***
		(0.027)	(0.027)	(0.027)
$EventDay3Wed$			0.235***	0.233***
			(0.027)	(0.026)
$EventDay4Thu$				0.100***
				(0.027)
Securities	7,649	7,649	7,649	7,649
Observations	594,946	594,946	594,946	594,946
Tbeg	15jun2015	15jun2015	15jun2015	15jun2015
Tend	13nov2015	13nov2015	13nov2015	13nov2015
SecurityFE	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes

Note: The table reports the effect of the reintroduction of border controls in Germany in the first 4 trading days on daily stock returns with a different estimation window. The estimation window used is 3 months before and 2 months after the event. It estimates Eq. 1 using a two-stage event study approach. The unit of observation is security-day. Standard errors are clustered at the security level. * p<0.1, ** p<0.05, *** p<0.01.

Table A-7: Alternative Outcomes and Winsorizing

Dependant Var:	3-day Volatility	Cap Daily	Cap Yearly	Winsorizing 1%	Winsorizing 5%
	(1)	(2)	(3)	(4)	(5)
$EventDay1Mon$	0.168***	-0.315***	-0.319***	-0.206***	-0.217***
	(0.022)	(0.000)	(0.000)	(0.029)	(0.023)
Securities	5,653	9,882	9,882	7,150	7,150
Observations	16,444	606,835	606,835	364,010	364,010
Tbeg	14sep2015	13jul2015	13jul2015	13jul2015	13jul2015
Tend	16sep2015	13oct2015	13oct2015	13oct2015	13oct2015
SecurityFE	Yes	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes	Yes

Note: The table reports the effect of the reintroduction of border controls in Germany on alternative outcomes and winsorized daily stock returns. Column 1 reports the 3-day average volatility of daily returns. Column 2 reports daily returns weighted with the contemporaneous capitalization rate. Column 3 reports daily returns weighted with the capitalization rate from the last trading day in the previous year. Columns 4 and 5 winsorize top and bottom 1% and 5% of daily returns accordingly. The results estimate Eq. 1 using a two-stage event study approach. The unit of observation is security-day. Standard errors are clustered at the security level. * p<0.1, ** p<0.05, *** p<0.01.

A.3 Heterogeneity

Table A-8: Border Control Effect Heterogeneity by Industries

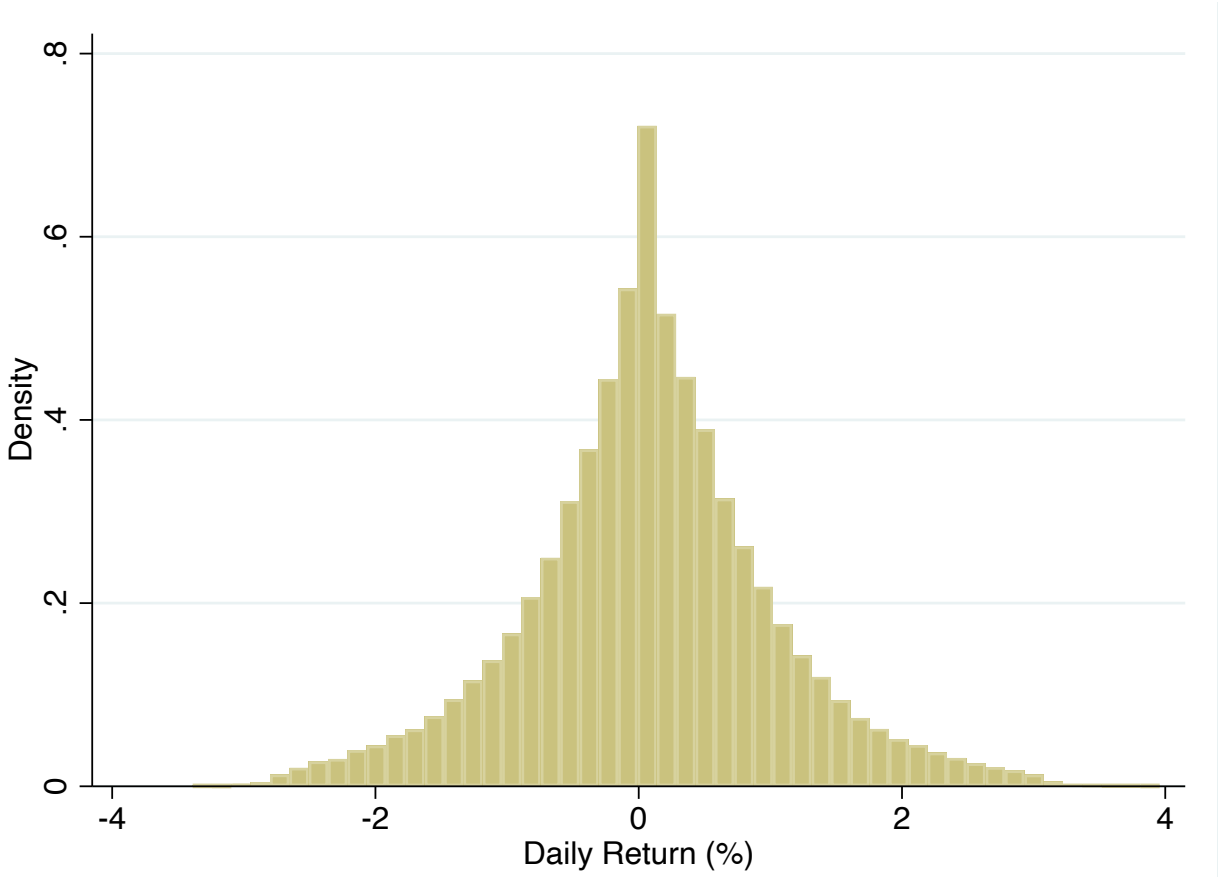
Sub-sample:	Energy	Financials	IT	Telecommunication
	(1)	(2)	(3)	(4)
Dependant Var:	Panel A: Daily Returns			
$EventDay1Mon$	-0.506***	-0.262***	-0.209***	0.128
	(0.184)	(0.055)	(0.073)	(0.213)
Securities	40	1,311	1,058	222
Observations	2,109	69,332	53,618	11,094
Tbeg	13jul2015	13jul2015	13jul2015	13jul2015
Tend	13oct2015	13oct2015	13oct2015	13oct2015
SecurityFE	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes
Dependant Var:	Panel B: Volatility			
$EventDay1Mon$	0.211***	0.286***	0.008	0.316***
	(0.068)	(0.030)	(0.043)	(0.094)
Securities	33	1,129	889	182
Observations	164	5,452	4,225	876
Tbeg	14sep2015	14sep2015	14sep2015	14sep2015
Tend	18sep2015	18sep2015	18sep2015	18sep2015
SecurityFE	Yes	Yes	Yes	Yes
DayOfWeekFE	Yes	Yes	Yes	Yes

Note: The table reports heterogenous effects by industry of the reintroduction of border controls in Germany on daily stock returns (Panel A), and its 5-day volatility (Panel B). We follow the Eurofidai (2021) classification, where for each company, the information about its industry sector is provided. The energy industry consists of petroleum/oil and natural gas firms (column 1). Financials sectors is composed of, real estate, banks and other credit institutions, mortgage and funding institutions, and insurance companies (column 2). The IT industry is related to electronics and semiconductors, internet, software and IT services, computer hardware and networking (column 3). Telecommunication industry consists of telecommunication related services (column 4). It estimates Eq. 1 using a two-stage event study approach. The unit of observation is security-day. Standard errors in parentheses are clustered at the security level. * p<0.1, ** p<0.05, *** p<0.01.

B Schengen Area Analysis

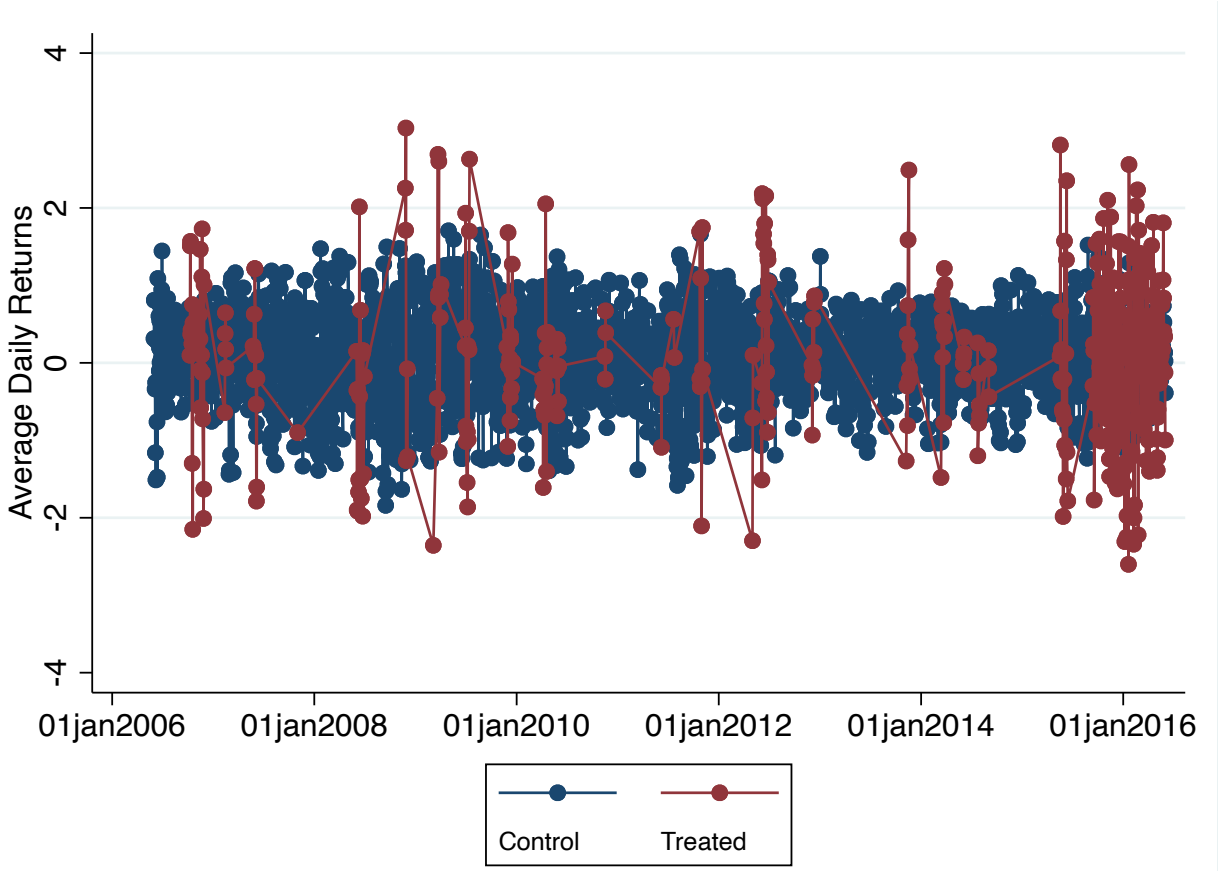
B.1 Descriptive Statistics

Figure B-2: Distribution of the Daily Stock Market Returns



Note: the plot shows the distribution of capitalization-weighted daily stock market returns at the country level, after trimming top and bottom 1% from the raw data.

Figure B-3: Average Daily Returns by Treatment Status



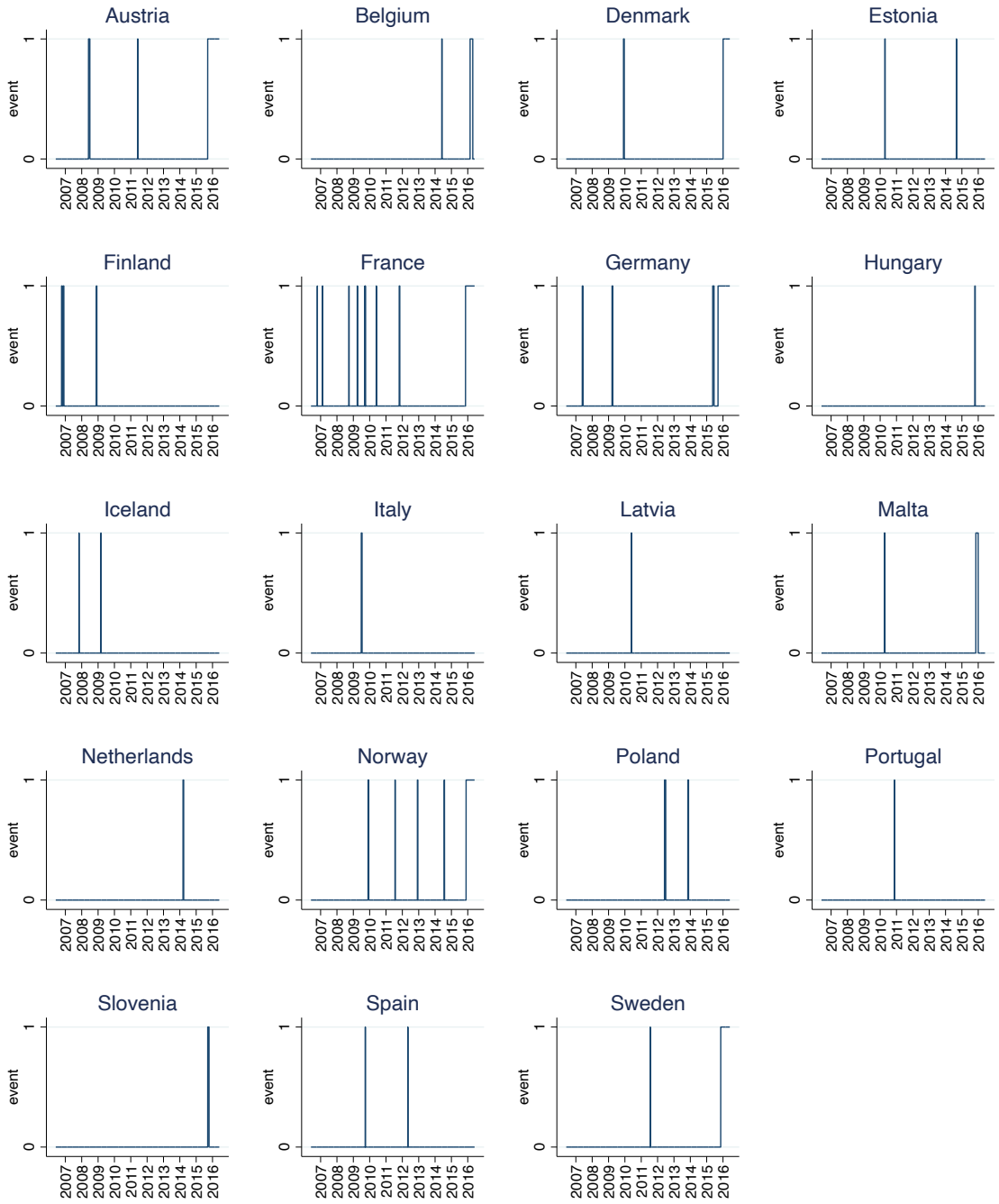
Note: the plot shows stock market daily returns distinguishing between treated (all types of border controls) and control units.

Table B-1: Summary Statistics - 26 Countries, June1st2006 - June1st2016

Variable	Mean	S.D.	Min.	Max.	Obs.
Daily Returns Capitalization-Weighted	0.082	0.978	-3.39	3.96	63107
5-day Volatility	0.761	0.495	0.00	4.54	62381
All Events	0.019	0.136	0.00	1.00	63169
Refugees	0.012	0.111	0.00	1.00	63169
Terrorist Attacks	0.002	0.048	0.00	1.00	63169
Expected Events	0.004	0.064	0.00	1.00	63169
log(AssylNo.Applicants)	3.860	3.238	0.00	11.27	63169
Presence of Terrorist Attack	0.004	0.066	0.00	1.00	63169

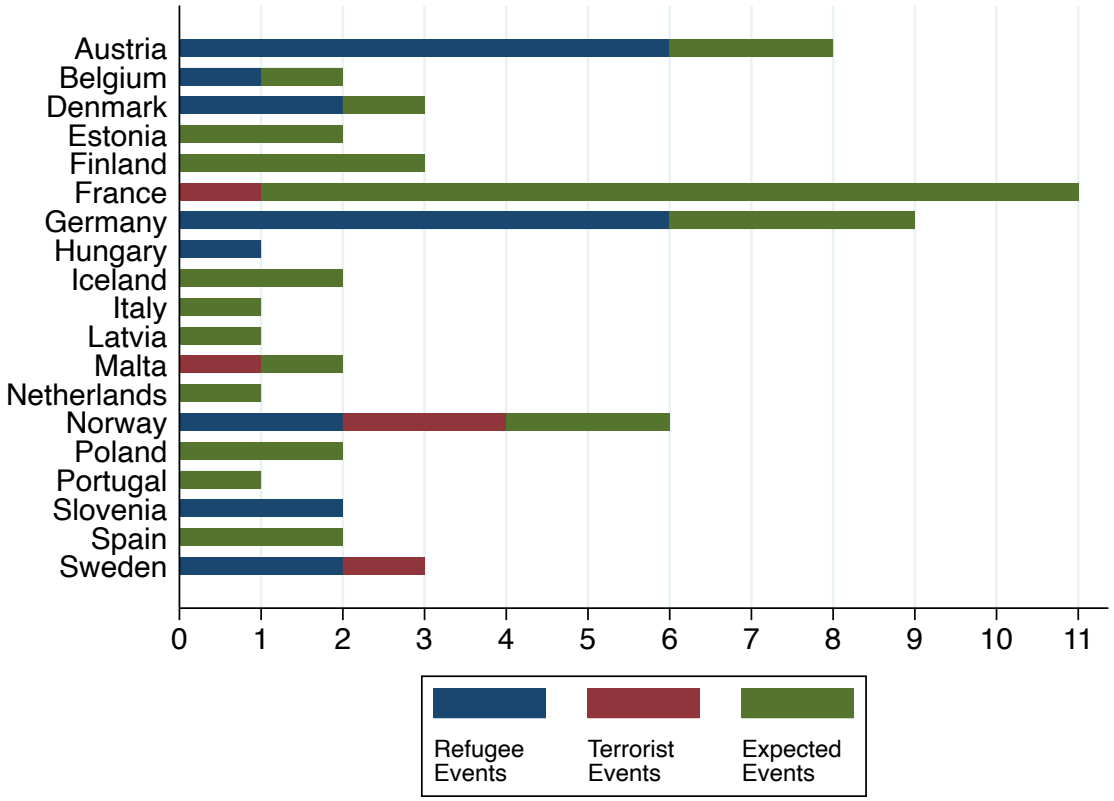
Note: the table shows summary statistics for the baseline sample.

Figure B-4: Frequency and Duration of all Border Controls in Schengen



Note: Authors' calculations based on the official documents from the European Commisssion. The figure plots the frequency and duration of all temporary border closings for each Schengen member state from June 2006 to June 2016.

Figure B-5: Frequency by Type of Border Control in Schengen



Note: Authors' calculations based on the official documents from the European Commisssion. The time sample covered is from June 2006 until June 2016.

B.2 Robustness

Table B-3: Comparing Aggregate Returns of the Entire Schengen Area to its Neighbouring Countries

Dependant Var:	Daily Returns		
	(1)	(2)	(3)
All Events	-0.068**	-0.065**	
	(0.030)	(0.030)	
$Event_t$	-0.001	-0.017	-0.017
	(0.007)	(0.020)	(0.020)
$Event_t * Schengen$		0.018	0.010
		(0.022)	(0.022)
Countries	26	38	38
Observations	65,396	94,174	94,174
Tbeg	01jun2006	01jun2006	01jun2006
Tend	01jun2016	01jun2016	01jun2016
CountryFE	Yes	Yes	Yes
DayFE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Note: The table reports the border control effect on capitalization-weighted daily returns in the Schengen area compared to its neighboring countries. These neighboring countries include Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Ireland, Macedonia, Romania, Russia, Serbia, Turkey, Ukraine, and the United Kingdom. It estimates Eq. 4 using a two-stage difference-in-difference approach. Controls include log number of asylum applications and presence of terrorist attacks. The unit of observation is country-day. Standard errors in parentheses are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

Table B-2: Cumulative Effect of Border Controls in The Schengen Area

Dependent Var:	Daily Returns							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Event 1st Shock	-0.021	-0.021	-0.021					
	(0.147)	(0.147)	(0.147)					
Event 2nd Shock		-0.152***	-0.152***					
		(0.054)	(0.054)					
Event 3rd Shock			0.034					
			(0.029)					
Refugees 1st Shock				-0.276***	-0.276***	-0.276***		
				(0.087)	(0.087)	(0.087)		
Refugees 2nd Shock					0.088**	0.088**		
					(0.039)	(0.039)		
Refugees 3rd Shock						0.243**		
						(0.112)		
Terrorist Attack 1st Shock							-0.105***	-0.103***
							(0.020)	(0.021)
Terrorist Attack 2nd Shock								-0.332***
								(0.007)
Countries	26	26	26	26	26	26	26	26
Observations	65,396	65,396	65,396	65,396	65,396	65,396	65,396	65,396
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016
CountryFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DayFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

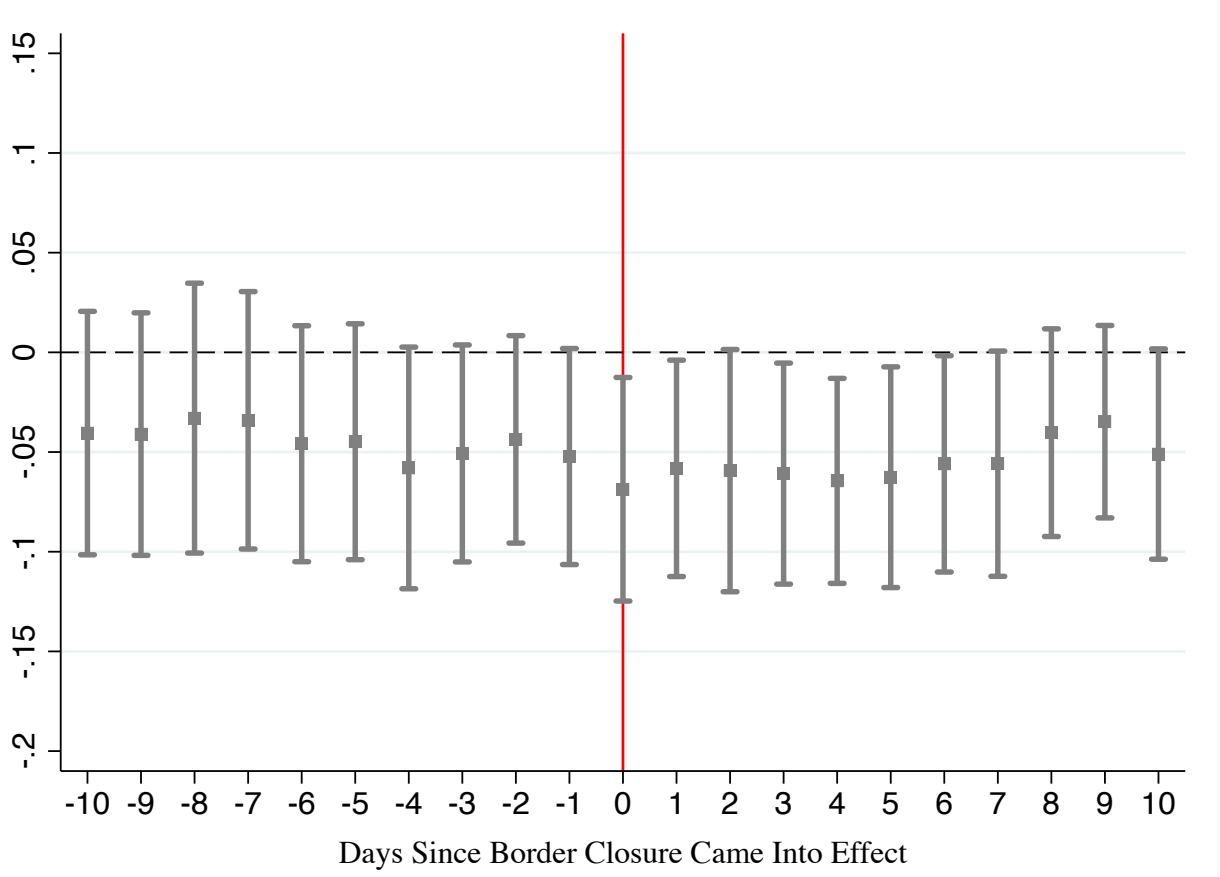
Note: The table reports estimates for countries that experienced a given type of border control for the first time (columns 1, 4, and 7), for the second time a given type of border control (columns 2, 5, and 8), and for the third time a given type of border control (columns 3, and 6). The dependent variable is the capitalization-weighted daily stock return. The estimates are obtained using Eq. 4 with a two-stage difference-in-difference approach. Controls include the log number of asylum applications for the refugee-related variables, and the occurrence of a terrorist attack for the terrorism-related variables. The unit of observation is country-day. Standard errors in parentheses are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

Table B-4: Baseline Results Using a Standard Two-Way Fixed Effects Estimator

Dependant Var:	Daily Returns				
	(1)	(2)	(3)	(4)	(5)
All Events	-0.075**				
	(0.031)				
Refugees		-0.062**			-0.068**
		(0.025)			(0.026)
Terrorist Attacks			-0.118***		-0.131***
			(0.028)		(0.030)
Expected Events				-0.062	-0.065
				(0.075)	(0.076)
Countries	26	26	26	26	26
Observations	65,390	65,390	65,390	65,390	65,390
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016
CountryFE	Yes	Yes	Yes	Yes	Yes
DayFE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	No	Yes

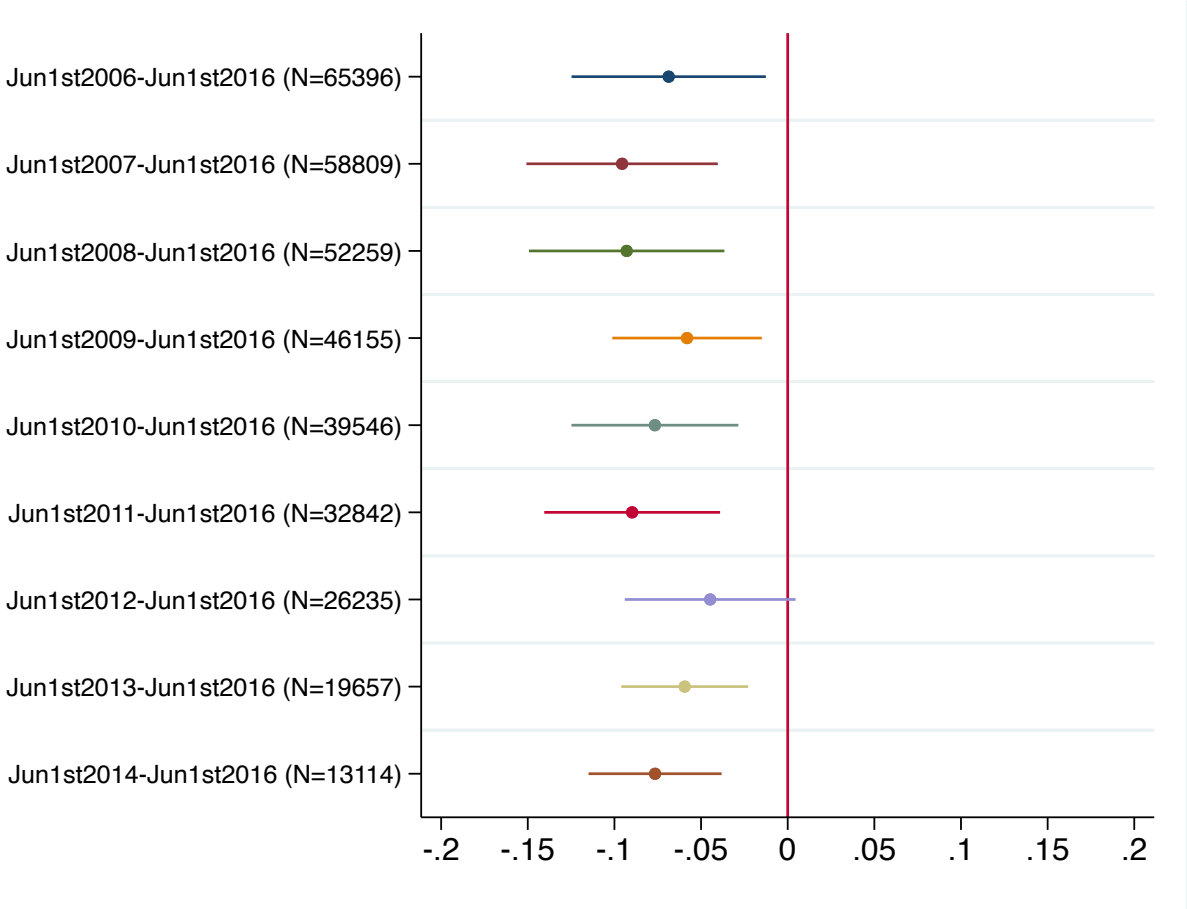
Note: The table reports the effect of the reintroduction of border controls in the Schengen area on capitalization-weighted daily stock returns. It estimates Eq. 4 using a standard two-way fixed effects estimator. Controls include log number of asylum applications for the refugee-related variables, and presence of terrorist attack for the terrorism-related variables. The unit of observation is country-day. Standard errors in parentheses are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

Figure B-6: Event Study Estimates of Border Controls Within The Schengen Area - Lags and Leads



Note: The figure reports lags and leads of Eq. 4 using two-stage difference-in-difference estimates (and their 95% confidence intervals). The dependent variable is the capitalization-weighted daily return. The controls include the log number of asylum applications, the occurrence of a terrorist attack, country, and day fixed effects. The unit of observation is country-day. Standard errors are clustered at the country level. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Figure B-7: Event study plot with different sample lengths



Note: did2s coefficient estimates (and their 95% confidence intervals) are reported. Following the baseline specification, the dependent variable is the daily stock market return. Controls include log number of asylum applications, presence of terrorist attack, country, and day of the week fixed effects.

Table B-5: Baseline Results Without Controls

	(1)	(2)	(3)	(4)	(5)
Dependant Var:	Panel A: Daily Returns				
All Events	-0.069**				
	(0.028)				
Refugees		-0.054***			-0.054***
		(0.010)			(0.010)
Terrorist Attacks			-0.126***		-0.127***
			(0.028)		(0.029)
Expected Events				-0.073	-0.073
				(0.114)	(0.113)
Countries	26	26	26	26	26
Observations	65,396	65,396	65,396	65,396	65,396
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016
CountryFE	Yes	Yes	Yes	Yes	Yes
DayFE	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	No
Dependant Var:	Panel B: Daily Volatility				
All Events	0.255***				
	(0.060)				
Refugees		0.266***			0.266***
		(0.078)			(0.078)
Terrorist Attacks			0.437***		0.445***
			(0.119)		(0.118)
Expected Events				0.090	0.092
				(0.068)	(0.068)
Countries	26	26	26	26	26
Observations	93,633	93,633	93,633	93,633	93,633
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	31may2016	31may2016	31may2016	31may2016	31may2016
CountryFE	Yes	Yes	Yes	Yes	Yes
DayFE	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	No

Note: The table reports the effect of different types of border controls: all types (column 1), refugee-related (column 2), terrorism-related (column 3), and expected events related (column 4). The dependent variable is the capitalization-weighted daily stock returns (Panel A), and its 5-day volatility (Panel B). It estimates Eq. 4 using a two-stage difference-in-difference approach. The unit of observation is country-day. Standard errors are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

Table B-6: Robustness to Different Volatility Time Spans

Dependant Var:	2-day volatility	3-day volatility	4-day volatility	5-day volatility	6-day volatility
	(1)	(2)	(3)	(4)	(5)
All Events	0.233***	0.228***	0.233***	0.237***	0.229***
	(0.054)	(0.055)	(0.057)	(0.058)	(0.059)
Countries	26	26	26	26	26
Observations	51,069	65,316	91,493	93,633	94,581
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	31may2016	31may2016	31may2016	31may2016	31may2016
CountryFE	Yes	Yes	Yes	Yes	Yes
DayFE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Note: The dependent variables are from 2-day (column 1) to 6–day (column 5) average volatilities of equally weighted daily stock market returns. The variable of interest, all events, is the universe of all border closures. It estimates Eq. 4 using a two-stage difference-in-difference approach. The unit of observation is country-day. Standard errors are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

Table B-7: Yearly Capitalization-Weighted Returns

Dependant Var:	Daily Returns Weighted by Yearly Capitalization Rate				
	(1)	(2)	(3)	(4)	(5)
All Events	-0.069**				
	(0.031)				
Refugees		-0.047***			-0.045***
		(0.010)			(0.011)
Terrorist Attacks			-0.156***		-0.157***
			(0.014)		(0.015)
Expected Events				-0.080	-0.079
				(0.119)	(0.118)
Countries	26	26	26	26	26
Observations	65,401	65,401	65,401	65,401	65,401
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016
CountryFE	Yes	Yes	Yes	Yes	Yes
DayFE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	No	Yes

Note: The table reports the effect of different types of border controls: all types (column 1), refugee-related (column 2), terrorism-related (column 3), and expected events related (column 4). The dependent variable is the daily return weighted by the capitalization rate from the last trading day in the previous year. It estimates Eq. 4 using a two-stage difference-in-difference approach. The unit of observation is country-day. Standard errors are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

Table B-8: Benchmark - Winsorizing 1%

Dependant Var:	Daily Returns Winsorized at 1%				
	(1)	(2)	(3)	(4)	(5)
All Events	-0.058**				
	(0.026)				
Refugees		-0.063***			-0.061***
		(0.010)			(0.010)
Terrorist Attacks			-0.070***		-0.072***
			(0.018)		(0.018)
Expected Events				-0.038	-0.037
				(0.109)	(0.108)
Countries	26	26	26	26	26
Observations	66,542	66,542	66,542	66,542	66,542
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016
CountryFE	Yes	Yes	Yes	Yes	Yes
DayFE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	No	Yes

Note: The table reports the effect of different types of border controls: all types (column 1), refugee-related (column 2), terrorism-related (column 3), and expected events related (column 4). The dependent variable is the capitalization-weighted daily return winsorized at 1% (top and bottom of the distribution). It estimates Eq. 4 using a two-stage difference-in-difference approach. The unit of observation is country-day. Standard errors are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

B.3 Heterogeneity

Table B-9: Border Control Effect Heterogeneity by Industries

Sub-sample:	Transport (1)	Energy (2)	Materials (3)	Industrials (4)	Discretionary (5)	Staples (6)	Financials (7)	IT (8)
Dependant Var:	Panel A: Daily Returns							
All Events	-0.044	0.008	0.043	-0.003	-0.046	0.050	-0.081**	0.000
	(0.033)	(0.040)	(0.033)	(0.034)	(0.035)	(0.035)	(0.033)	(0.042)
Countries	23	21	24	25	25	25	26	23
Observations	54,761	47,835	56,964	59,424	56,403	60,348	62,189	51,593
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016
countryIndustryFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DateFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dependant Var:	Panel B: Volatility							
All Events	0.213**	0.261***	0.139***	0.123	0.011	0.094	0.173*	0.274***
	(0.084)	(0.070)	(0.052)	(0.113)	(0.059)	(0.061)	(0.103)	(0.084)
Countries	23	21	24	25	25	25	26	23
Observations	864,260	781,444	907,248	934,534	896,713	945,210	944,391	836,550
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	31may2016	31may2016	31may2016	31may2016	31may2016	31may2016	31may2016	31may2016
countryIndustryFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DateFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The dependent variable is the capitalization-weighted daily stock returns (Panel A), and its 5-day volatility (Panel B), across different industries. We follow the Eurofidai (2021) classification, where for each company, the information about its industry sector is provided. The transport industry consists of companies for which the activity is connected to traffic and transportation (column 1). Energy industry is composed of petroleum/oil and natural gas firms (column 2). Materials industry is related to commodity chemicals, agricultural chemicals, construction materials, paper, and forest products (column 3). Industrials industry is composed of capital goods, commercial and professional services and transportation (column 4). Discretionary industry is composed of automobiles and components, consumer durables, apparel, consumer services, media (column 5). Staples industry includes food, beverages, tobacco, food and staples retailing, household and personal products (column 6). Financials sectors is composed of, real estate, banks and other credit institutions, mortgage and funding institutions, and insurance companies (column 7). The IT industry is related to electronics and semiconductors, internet, software and IT services, computer hardware and networking (column 8). The variable of interest, all events, is the universe of all border closures. It estimates Eq. 4 using a two-stage difference-in-difference approach. The unit of observation is country-day. Standard errors are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

Table B-10: Border Control Effect Heterogeneity by Firm Size

Sub-sample:	Small Cap (1)	Small Cap (2)	Medium Cap (3)	Medium Cap (4)	Large Cap (5)	Large Cap (6)
Dependant Var:	Panel A: Daily Returns					
$Refugees$	0.013		-0.023		-0.025**	
	(0.016)		(0.019)		(0.012)	
$Terrorist\ Attacks$		-0.079		-0.076***		-0.032
		(0.075)		(0.023)		(0.030)
Countries	26	26	26	26	26	26
Observations	63033	63033	63559	63559	65209	65209
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016
countryFirmSizeFE	Yes	Yes	Yes	Yes	Yes	Yes
DateFE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Dependant Var:	Panel B: Volatility					
$Refugees$	-0.046		-0.021		0.094**	
	(0.068)		(0.048)		(0.046)	
$Terrorist\ Attacks$		-0.129**		0.178		0.190*
		(0.056)		(0.152)		(0.099)
Countries	26	26	26	26	26	26
Observations	188502	188502	189374	189374	192090	192090
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	31may2016	31may2016	31may2016	31may2016	31may2016	31may2016
countryFirmSizeFE	Yes	Yes	Yes	Yes	Yes	Yes
DateFE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: The dependent variable is the capitalization-weighted daily stock returns (Panel A), and its 5-day volatility (Panel B), across different firm sizes. Firm size is calculated by classifying all the companies into 3 quantiles based on their market capitalization. It estimates Eq. 4 using a two-stage difference-in-difference approach. The unit of observation is country-day. Standard errors are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

Table B-11: Border Control Effect Heterogeneity by Firm Size

Sub-sample:	Small Cap (1)	Small Cap (2)	Medium Cap (3)	Medium Cap (4)	Large Cap (5)	Large Cap (6)
Dependant Var:	Panel A: Daily Returns					
All Events	0.000		-0.012		-0.018	
	(0.015)		(0.027)		(0.020)	
Expected Events		0.019		0.055		0.010
		(0.055)		(0.080)		(0.084)
Countries	26	26	26	26	26	26
Observations	63033	63033	63559	63559	65209	65209
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016	01jun2016
countryFirmSizeFE	Yes	Yes	Yes	Yes	Yes	Yes
DateFE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Dependant Var:	Panel B: Volatility					
All Events	-0.062		-0.006		0.081**	
	(0.047)		(0.038)		(0.040)	
Expected Events		-0.157***		-0.076		-0.013
		(0.052)		(0.069)		(0.070)
Countries	26	26	26	26	26	26
Observations	188502	188502	189374	189374	192090	192090
Tbeg	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006	01jun2006
Tend	31may2016	31may2016	31may2016	31may2016	31may2016	31may2016
countryFirmSizeFE	Yes	Yes	Yes	Yes	Yes	Yes
DateFE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: The dependent variable is the capitalization-weighted daily stock returns (Panel A), and its 5-day volatility (Panel B), across different firm sizes. Firm size is calculated by classifying all the companies into 3 quantiles based on their market capitalization. It estimates Eq. 4 using a two-stage difference-in-difference approach. The unit of observation is country-day. Standard errors are clustered at the country level. * p<0.1, ** p<0.05, *** p<0.01.

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