



# Is terrorism eroding agglomeration economies in Central Business Districts? Lessons from the office real estate market in downtown Chicago<sup>☆</sup>

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## ABSTRACT

The attacks of September 11, 2001, and more recently the Madrid and London downtown train bombings, have raised concerns over both the safety of downtowns and the continuous efforts by terrorists to attack areas of such high density and significance. This article employs building-level data on vacancy rates to investigate the impact of an increased perception of terrorist risk after 9/11 on the office real estate market in downtown Chicago. Chicago provides the perfect laboratory to investigate the effects of an increase in the perceived level of terrorist risk in a major financial district. Unlike in New York, the 9/11 attacks did not restrict directly the available office space in downtown Chicago. However, the 9/11 attacks induced a large increase in the perception of terrorist risk in the Chicago Central Business District, which includes the tallest building in the US (the Sears Tower) and other landmark buildings which are potential targets of large-scale terrorist attacks. We show that, following the 9/11 attacks, vacancy rates experienced a much more pronounced increase in the three most distinctive Chicago landmark buildings (the Sears Tower, the Aon Center and the Hancock Center) and their vicinities than in other areas of the city of Chicago. Our results suggest that economic activity in Central Business Districts can be greatly affected by changes in the perceived level of terrorism.

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## 1. Introduction

In the wake of the 9/11 attacks, economists are devoting much effort to evaluating the impact of terrorism on economic outcomes and understanding the channels through which the enhanced risk of large-scale terrorism induced by the 9/11 attacks may affect economic activity. A partial list of scholarly works in this rapidly growing literature is Abadie and Gardeazabal (2003, 2008), Becker and Murphy (2001), Becker and Rubinstein (2004), Berrebi and Klor (2006), Chen and Siems (2004), Enders and Sandler (1991, 1996), Enders et al. (1992), Frey (2004), Frey et al. (2007), Glaeser and Shapiro (2002), Pshisva and Suarez (2004), and Zussman et al. (2008).

The increase in the perceived level of terrorist risk induced by the 9/11 attacks has placed particularly large pressures on major Central Business Districts, such as New York, London, and Chicago, which are considered to be preferred targets of terrorist attacks because of their high population density, economic significance, and

because they contain symbolic targets such as landmark buildings or government facilities. The susceptibility of Central Business Districts to large-scale terrorist attacks (as well as their vulnerability, as demonstrated by recent events) is particularly unsettling given the crucial role that Central Business Districts play in economic activity. Quite surprisingly, however, there is very little work available on the effects of terrorism on Central Business Districts. This article aims to fill that void. For this purpose, we use building-level data from downtown Chicago, one of the most significant Central Business Districts in the US, to investigate the economic impact of an increase in the perception of risk after 9/11.

There are two main channels through which terrorism affects economic outcomes. First, terrorist attacks have a direct effect on the economy because they destroy productive capital (physical and human). Because the destruction caused by terrorist attacks represents only a small fraction of the total stock of productive capital, Becker and Murphy (2001) have argued that the relative importance of this effect is small in practice. Second, terrorism increases the level of fear and uncertainty, which may have large effects on the behavior of economic agents (see Abadie and Gardeazabal, 2008, and especially Becker and Rubinstein, 2004).

The Central Business District (CBD) of Chicago provides the perfect laboratory to investigate the effects of an increase in the perceived risk of terrorism on a major financial center. The city of Chicago was not directly affected by the destruction of the 9/11

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attacks. However, the 9/11 attacks induced a large increase in the perception of terrorist risk in the Chicago Central Business District, which includes the tallest building in the US (Sears Tower) and other landmark buildings. The case of Chicago is, therefore, of particular interest, because it allows us to separate the direct impact of terrorist attacks on available office space (absent in Chicago following the 9/11 events) from the impact caused by an increased perception of terrorism threat in Central Business Districts after 9/11.

A distinctive characteristic of this study is that it uses data disaggregated at the building level on a quarterly basis for a panel of Class A and Class B office buildings (as defined by CoStar Group, see below) in the downtown area of Chicago. To our knowledge, data analysis of the impact of terrorism on real estate markets has never been done at this breadth and scale.

To detect the impact of an increase in the perception of terrorist risk in Chicago as a result of 9/11, we compare the evolution of vacancy rates at the three main landmark buildings of Chicago (the Sears Tower, the Aon Center, and the Hancock Center) and other nearby office buildings within a “shadow” area of 0.3-mile around each landmark building to the evolution of vacancy rates of office buildings located outside the shadow areas of the three landmark buildings. We use panel data fixed-effects estimators to control for the presence of unmeasured characteristics of each individual building in our sample. Our dataset includes quarterly data for Class A and Class B office buildings in downtown Chicago during the period of 1996–2006.<sup>1</sup> We selected the Sears Tower, the Aon Center, and the Hancock Center as “anchor” buildings because of their landmark stature, which makes them preferred targets of terrorist attacks. We based our choice of a 0.3-mile radius for the shadow areas on the spread of the massive debris in New York City after the 9/11 attacks (Dermisi, 2006).

The vacancy rate is not the only real estate variable possibly affected by the 9/11 attacks. In fact, in the absence of a mechanism that induces downward rigidity in rents, vacancies created by a demand downturn could be eliminated by adjustments in rents.<sup>2</sup> Our analysis of the effects of the 9/11 attacks on the office real estate market in downtown Chicago focuses on vacancy rates, as opposed to rents, for a variety of reasons. First, office real estate markets are characterized by substantial inertia, which induces long vacancy cycles in response to demand shocks (Wheaton and Torto, 1988; Grenadier, 1995). During periods of slack demand, rents do not adjust all the way to eliminate vacancies in excess of the structural vacancy rate. This creates a situation in which real estate downturns are characterized by prolonged periods of abnormally high vacancy rates (Grenadier, 1995).<sup>3</sup> Second, while vacancy rates in office real estate markets are measured routinely in commercial real estate databases, data on rents are scarce and typically include only information on asking rents.<sup>4</sup> Even if information on contrac-

tual rents was available, office leases often include complicated sets of undisclosed provisions (e.g., owner-paid improvements, free-rents periods), which may substantially affect the effective rents accrued to the property owner (see Wheaton and Torto, 1994, Webb and Fisher, 1996). Moreover, Webb and Fisher (1996) provide evidence that during real estate downturns effective rents are adjusted through concessions to the tenants that often are not reflected on contractual rents. Our final reason for analyzing vacancy rates is that vacancies are directly informative about the degree of spatial agglomeration.

Our results show that office vacancy rates increased in downtown Chicago in the wake of the 9/11 attacks. Most importantly, office properties in the three main Chicago landmark buildings and the surrounding areas experienced more severe increases in vacancy rates than office properties not located in the vicinities of landmark buildings. These results suggest that the higher perceived level of terrorist risk in Chicago after 9/11 induced centrifugal forces powerful enough to counteract the effects of agglomeration economies. This is particularly disturbing given the crucial role of Central Business Districts in exploiting agglomeration economies and knowledge spillovers (Glaeser et al., 1992).<sup>5</sup>

We interpret our results as evidence that the 9/11 attacks influenced the location decisions of office tenants in downtown Chicago. Alternatively, our results could be explained by differences in how the various office real estate market segments in Chicago were affected by the recessionary events of 2001. Using a variety of robustness checks, we show that this alternative explanation is not supported by the data.

The rest of the article is organized as follows. Section 2 reviews the literature on the impact of terrorism in cities. Section 3 describes in detail our dataset and methodology. Section 4 presents and discusses our empirical results. Section 5 concludes.

## 2. Terrorism in cities

Long before the events of 9/11, terrorism had inflicted a large number of human losses and severe physical destruction in major urban centers around the world, including London, Istanbul, and Jerusalem. As Savitch and Ardashev (2001) indicate, not only is terrorism more prevalent in cities than in rural areas, but also the number of incidents and the magnitude of the physical damage created by terrorism in urban areas has increased steadily in recent years. Savitch and Ardashev (2001) provide four main reasons why cities are selected by terrorists for their attacks. First, cities represent what in military terms are called “target-rich environments”. They contain a high density and a heterogeneous mix of valuable assets, including numerous human targets and large infrastructures. Second, global economic interdependence hinges on the role that cities play as communication nodes and command centers. Third, the high population density and heterogeneity that is characteristic of urban areas often implies that antagonistic groups are located in close geographic proximity. As a result, some cities have become nesting grounds for terrorist organizations. Savitch and Ardashev (2001) mention Beirut and Belfast among other examples of this phenomenon. Finally, cities have substantial symbolic value as terrorist targets.

In addition to the four explanations offered by Savitch and Ardashev (2001) for why cities are preferred targets for terrorism, it should be pointed out that cities might be particularly vulnerable to terrorist actions. The large number of individuals and goods traveling into cities often makes security measures too costly

information on rents in the CoStar database is limited to data on asking rents for available office space.

<sup>5</sup> Duranton and Puga (2004) and Rosenthal and Strange (2004) provide recent reviews of the theoretical and empirical literature on agglomeration economies.

<sup>1</sup> Office buildings are classified as Class A because of their amenities, design, location, building efficiency, management quality and other property characteristics that make them unique in the market and highly desirable for tenants who are willing to pay the highest market rents. Buildings are classified as Class B if they have good management and maintenance but do not feature the special or innovative characteristics, or the highly efficient floor plates that are often found in Class A buildings. Other “no-frills” lower-quality buildings are classified as Class C in the CoStar database. Class C buildings are appealing to a tenants’ base with lower quality demands and more severe budgetary constraints than those who lease Class A or Class B properties. The exact CoStar definitions of Class A, B, and C are included in Appendix A.

<sup>2</sup> See Glaeser and Gyourko (2005) on how the durable nature of real estate investment influences real market reactions to negative demand shocks.

<sup>3</sup> In a related context, Genesove (2003) provides evidence of nominal rigidity in the residential real estate market.

<sup>4</sup> In particular, the CoStar database used in this study includes building-level data on vacant space, defined as “space that is not currently occupied by a tenant, regardless of any lease obligations that may be on the space” (CoStar, 2008). However,

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