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IZA DP No. 17321

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ABSTRACT

Business Disruptions Due to Social Vulnerability and Criminal Activities in Urban Areas

This study investigates the relationship between social vulnerability, illegal activities, and location-based business disruptions in Athens, the capital of Greece. The research utilises repeated cross-sectional data from 2008, 2014, and 2023, gathered from areas with high levels of criminal activity, reflecting the experiences of business owners and managers in these locations. The findings reveal that heightened levels of social vulnerability—including the presence of illicit drug users and homeless individuals—alongside illegal activities such as gang-related protection rackets and black-market operations, are associated with increased location-based business disruptions. These disruptions manifest in assaults on employees and customers, business burglaries, reputational damage, supply chain problems, and decreased turnover. The study also examines the impact of economic conditions in 2014 and 2023, when Greece's Gross Domestic Product was lower than in 2008, indicating an economic recession. The findings suggest that the economic downturn during these years further exacerbated location-based business disruptions. Conversely, enhanced public safety measures, such as increased police presence, law enforcement, and improved public infrastructure, were associated with a reduction in these disruptions. Furthermore, an interesting insight was that businesses with longer operating histories tend to experience fewer location-based disruptions, indicating that operating history might be perceived as a resilience factor. The study suggests that policy actions should focus on increasing police visibility, providing financial support to high-risk businesses, funding urban regeneration projects, maintaining public infrastructure, and delivering social services aimed at helping marginalised communities escape vulnerability.

JEL Classification: K4, K42, L26, I3, E32

Keywords: social vulnerability, illegal activities, crime, criminality, business, entrepreneurship, business disruptions, economic recessions, public safety

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1. Introduction

In Europe, the US, Australia, and Latin America, an emerging body of literature examines the association between local crime in urban areas and location-based business disruptions (Churchill et al., 2023; Acolin et al., 2022; Scheaf and Wood, 2022; Fe and Sanfelice, 2022; Hipp et al., 2019; Lens and Meltzer, 2016). Urban crime can lead to multifaceted disruptions for businesses, including physical assaults on employees and customers, burglary, and damage to reputation (Fe and Sanfelice, 2022; Hipp et al., 2019; Lens and Meltzer, 2016). Contemporary evidence suggests that a higher prevalence of violent and property crimes is associated with business failures (Hipp et al., 2019), resulting in falling product prices, reduced production, and businesses exiting the market (Rozo, 2018). Additionally, crime in public spaces reduces customer visits to businesses (Fe and Sanfelice, 2022) and lowers commercial property values (Lens and Meltzer, 2016).

In Greece, there is a significant gap in empirical studies addressing the impact of social vulnerability and illegal activities[1] on business realities. Since 2010, the country has been enduring a severe economic crisis, and despite the increase in social vulnerability and illegal activities (Hellenic Police, 2022; Drydakis, 2015; Tsouvelas et al., 2016; Zarafonitou, 2012), no comprehensive assessment of this issue has been conducted. This lack of research limits both the understanding of the phenomenon and the development of effective policy responses. Given the importance of fostering local communities characterised by low levels of violence and sustainable business operations, it is crucial to investigate the factors that contribute to location-based business disruptions. Such research will be critical for policymakers, city planners, and businesses.

The present study seeks to fill a gap in the literature by evaluating whether social vulnerability and illegal activities are associated with location-based business disruptions in Athens, the capital of Greece. This study utilises three waves of repeated cross-sectional data collected from the same areas—known for prevalent criminal activity—in 2008, 2014, and 2023. Through interviews, the study captures the experiences of business owners and managers in these locations. The study aims to answer the following questions: (1) Are social vulnerability and illegal activities in an area associated with increased location-based business disruptions? (2) During economic recessions, do areas characterised by social vulnerability and illegal activities experience more location-based business disruptions? (3) Is the presence of public safety policies and infrastructure quality associated with reduced location-based business disruptions in areas affected by social vulnerability and illegal activities?

[1] Illegal activities are broadly defined as actions that violate laws or regulations. These activities become crimes when they are recognised as punishable offences under criminal law (Andresen et al., 2010). The present study investigates behaviours such as gang presence related to protection rackets, robbery, burglary, black-market dealings, and gang clashes, which are considered both illegal activities and crimes (Andresen et al., 2010). These activities pose a threat to public safety, property, and social order, and are often associated with organised crime and urban instability.

The study contributes to the literature in three keyways. First, from a theoretical perspective, it utilises complementary theories, such as Social Disorganisation Theory (Shaw and McKay, 1942), Routine Activities Theory (Cohen and Felson, 1979), Strain Theory (Merton, 1938), and the Crime Prevention Through Environmental Design Framework (Jeffery, 1971), to examine the mechanisms influencing location-based business disruption in areas affected by criminality. Each theory provides a unique lens through which to view the phenomenon. Collectively, these theories identify a broad range of factors that influence business disruptions in crime-affected areas. Crucially, the study extends theoretical discussions by exploring the interplay between these concepts and economic recessions. This exploration not only broadens the scope of existing theories but also offers new insights into how economic recessions can exacerbate location-based business disruptions in areas characterised by criminality.

Secondly, the study introduces three new scales, influenced by the aforementioned theories, designed to measure (a) social vulnerability and illegal activities in areas, (b) public safety and infrastructure quality in areas, and (c) location-based business disruptions. These multi-item scales enhance both the theoretical and empirical landscape of the field by integrating these new constructs into the existing literature. They provide a systematic approach to capturing phenomena related to social vulnerability in urban areas (such as the presence of illicit drug users and homeless individuals), illegal activities (such as gang presence and black markets), public safety and infrastructure quality (such as law enforcement effectiveness and the quality of public infrastructure), and location-based business disruptions (such as damage to reputation and customer traffic). These scales offer a comprehensive understanding of the multifaceted factors that influence experiences of location-based business disruptions. Examining the interplay between social vulnerability, illegal activities, public safety, infrastructure quality, and location-based business disruptions can yield valuable insights into the complex dynamics of the phenomena under examination. Such an approach is notably absent in the current literature, where the majority of studies tend to focus on a single association between two variables (e.g., robbery and customer traffic). From a policy intervention perspective, the development of the three scales introduced in this study could serve as valuable tools for assessing community needs, monitoring changes over time, and evaluating the effectiveness of interventions.

Third, the study adopts a robust approach by utilising repeated cross-sectional data from 2008, 2014, and 2023 within the same areas, capturing reflections, through interviews, from owners and managers running predominantly micro-sized businesses. This design enables a dynamic analysis of changes between 2008 and 2014, and 2008 and 2023 controlling for fixed location effects and capturing variations in the relationships under investigation. Such an approach enhances the reliability and validity of the findings by mitigating potential biases associated with studies conducted at a single time point. By comparing data across multiple time periods, the study is better positioned to attribute observed changes to the variables of interest, rather than to extraneous factors or temporal fluctuations.

Examining the dynamics of location-based disruptions in Greek micro-sized businesses is crucial, given their significant role in the national economy (OECD, 2022). With 94.6% of Greek businesses classified as micro-sized businesses, these businesses contribute 85.2% of employment. In a country where micro-sized businesses form the backbone of economic activity their stability and growth are vital not only for local communities but also for Greece's overall economic recovery and sustainability (OECD, 2022). However, Greek micro, small, and medium-sized businesses face significant challenges. Over the past decade, the number of these businesses has decreased by 16%, due to a combination of economic instability, the lingering effects of the 2008 financial crisis, and, more recently, the COVID-19 pandemic (OECD, 2022). This decline has had serious implications for employment and economic growth, highlighting the vulnerabilities within the sector. In addition, the Athens metropolitan area, where 8.2% of the country's business activity is concentrated, serves as a critical focus for understanding these challenges. Athens is not only the commercial heart of Greece but also a region where social vulnerability and criminality have increased in recent years (Drydakis, 2024a; Drydakis, 2023a, b, c; Hellenic Police, 2022; Tsouvelas et al., 2016). These factors can severely impact business operations, especially for micro-sized businesses that may lack the financial and operational buffers to withstand such disruptions.

The study's findings suggest that social vulnerability, linked to illicit drug use, sex work, homelessness, and begging, is associated with location-based business disruptions. Furthermore, the study finds that illegal activities, including gang presence and black-market dealings, exacerbate these disruptions. The study also shows that economic recessions are associated with increased location-based business disruptions and that, during economic downturns, the link between social vulnerability, illegal activity, and location-based business disruptions becomes more severe than in non-recession periods. Conversely, higher levels of public safety and infrastructure quality are associated with reduced location-based business disruptions. Furthermore, an interesting insight is that businesses with longer operating histories tend to experience fewer location-based disruptions. Understanding how external threats affect business realities provides crucial insights to guide policy interventions aimed at protecting the sector and ensuring its long-term resilience. Policy measures should include increasing police visibility, offering financial support to high-risk businesses, funding urban regeneration, and maintaining public infrastructure. Additionally, policies should focus on enhancing social services to help marginalised communities escape vulnerability.

The remainder of the paper is structured as follows. The subsequent section outlines the study's theoretical framework. Section three provides a brief presentation of the Greek reality in the subject matter. Section four details the data gathering process, and section five presents the study's variables and scales. Following this, section six presents the validations of the scales, while section seven presents the descriptive statistics, and section eight provides the estimates. Section nine offers an evaluation of the

outcomes, policy implications, and discusses the study's limitations and future research directions. Finally, the last section concludes the study.

2. Conceptual framework

2.1. Securing and boosting business operations

In business environments, securing various aspects of operations is not only a necessity but also a key driver of success. International studies suggest that safeguarding aspects such as physical security and employee well-being, while simultaneously building a reputation of trust, can significantly enhance employee productivity, foster customer loyalty, improve business competencies, drive overall growth, and position businesses to better withstand challenging conditions, with financially stable businesses being better equipped to invest in their strategies and operational resilience (Tan et al., 2023; Drydakis, 2022a, 2022b; Jilcha and Kitaw, 2017; Fennelly, 2016; Raziq and Maulabakhsh, 2015; Kurpjuhn, 2015; Gul, 2014; Baker and Benny, 2012; Robson et al., 2007; Beck and Demirguc-Kunt, 2006; Bunn et al., 2001).

Physical safety within business premises is essential for fostering an environment where both employees and customers feel comfortable (Fennelly, 2016; Ayim Gyekye, 2015; Baker and Benny, 2012; Bunn et al., 2001). Research shows that when employees feel secure, they are more likely to be productive, engaged, and loyal to the organisation (Robson et al., 2007; Bunn et al., 2001). This sense of safety increases job satisfaction, reduces turnover rates and recruitment costs, and boosts overall efficiency (Raziq and Maulabakhsh, 2015; Ayim Gyekye, 2005). A safe workplace also enhances employee morale, leading to sustainable development and a stronger commitment to achieving business goals (Tan et al., 2023; Jilcha and Kitaw, 2017).

Moreover, a business's reputation is one of its most valuable assets, directly influencing customer perception and loyalty (Gul, 2014). When customers perceive a business as secure and strong, they are more likely to develop trust, which not only encourages repeat business but also leads to positive word-of-mouth referrals (Fennelly, 2016). This trust creates a reliable revenue stream, improves customer retention, and contributes to a competitive brand image capable of withstanding market fluctuations (Fennelly, 2016; Gul, 2014).

Additionally, access to financing is critical for business expansion, particularly when investing in technology, infrastructure, or new markets (Vasilescu, 2014; Beck and Demirguc-Kunt, 2006). Reduced security risks and maintaining a positive reputation help businesses minimise perceived risks for investors and financial institutions (Fennelly, 2016; Vasilescu, 2014; Gul, 2014; Beck and Demirguc-Kunt, 2006). This increases their ability to secure funding or attract investment, fueling further growth and enabling long-term resilience. A secure business is seen as a stable, reliable investment, opening doors to more lucrative opportunities and financial partnerships, while also recovering more easily from short-term disruptions (Vasilescu, 2014; Beck and Demirguc-Kunt, 2006).

Furthermore, a robust supply chain is equally important (Rezaei et al., 2015; Hong and Jeong, 2006). By forming partnerships with reliable logistics providers and implementing effective theft prevention measures, businesses can ensure the uninterrupted flow of goods, which is crucial for meeting customer demand and maintaining efficiency. This helps lower costs and enhances customer satisfaction, all of which contribute to a business's competitive advantage (Fennelly, 2016; Rezaei et al., 2015; Hong and Jeong, 2006). Similarly, reducing instances of fraud not only protects financial assets but also helps build a culture of trust and accountability (Drydakis, 2022b; Kurpjuhn, 2015).

2.2 Social vulnerability, illegal activities, and location-based business disruptions

Securing and boosting business operations, as outlined in Section 2.1, can be undermined by factors such as social vulnerability and illegal activities in the surrounding area. This is particularly true for businesses with weak resilience, crime assessments, and crime prevention strategies (Churchill et al., 2023; Acolin et al., 2022; Scheaf and Wood, 2022; Fe and Sanfelice, 2022; Hipp et al., 2019; Fennelly, 2016; Lens and Meltzer, 2016; Baker and Benny, 2012). According to the Social Disorganisation Theory (Shaw and McKay, 1942), areas characterised by disorganisation exhibit social vulnerability and illegal activities. In such locales, the breakdown of social cohesion could exacerbate risks to individual safety and cause disruptions to businesses (Shaw and McKay, 1942; Sampson and Groves, 1989). The Routine Activities Theory (Cohen and Felson, 1979) delves deeper, indicating that in areas rife with social vulnerability and illegal activities, conditions for adversities—motivated offenders (e.g., gangs), suitable targets (e.g., individuals and businesses), and inadequate guardianship (e.g., limited police presence)—are more likely to align. This alignment heightens the peril for individuals and disturbances for businesses due to the increased availability of targets and diminished guardianship (Cohen and Felson, 1979; Felson, 1994).

Empirical literature indicates that illegal activities such as drug trading and black-market operations can offer income, attracting individuals and groups willing to engage in such activities. This contributes to disorganisation by increasing criminality, such as violence and theft (Purser, Mowbray, and O'Shields, 2017; Richardson et al., 2015; Robinson et al., 2009). In areas with a prevalence of such adversities, competition among different groups for control over lucrative markets and territories is common, leading to conflicts, disputes, and acts of violence as groups vie for dominance. Moreover, in disorganised areas, the level of social vulnerability related to substance abuse, sex work, begging, and homelessness can impair judgement, further contributing to illegal activities for survival (Purser, Mowbray, and O'Shields, 2017; Richardson et al., 2015; Robinson et al., 2009). At the same time, given the interplay between social vulnerability and illegal activities, marginalised groups can be more susceptible to coercion and exploitation, forcing them into illegal activities, thereby increasing disorganisation (Purser, Mowbray, and O'Shields, 2017; Richardson et al., 2015; Robinson et al., 2009).

The present study suggests that, while business strategies can build a reputation of trust, enhance employee productivity, foster customer loyalty, improve business competencies, secure investors' funds, and better cope with crises (Drydakis, 2022b; Fennelly, 2016; Raziq and Maulabakhsh, 2015; Kurpjuhn, 2015; Vasilescu, 2014; Gul, 2014; Robson et al., 2007; Hong and Jeong, 2006), they may become less effective when businesses are disrupted by location-based factors related to social vulnerability and illegal activities, and cannot effectively adapt to those challenges due to resource and expertise constraints (Fennelly, 2016; Baker and Benny, 2012).

In Europe, the US, Australia, and Latin America, social vulnerability and illegal activities in an area have been found to pose direct threats to businesses operating there (Churchill et al., 2023; Fe and Sanfelice, 2022; Ganson and Hoelscher, 2021; Hipp et al., 2019; Rosenthal and Ross, 2010; Bates and Robb, 2008; Abadie and Dermisi, 2008). These adversities can create an environment where physical danger for individuals (e.g., business staff and customers) becomes prevalent, and businesses can become targets for burglary by gangs, as well as vandalism in retaliation for refusing to engage in protection rackets. Businesses take time to recover from burglary losses, as owners must replenish stock, repair property, increase input relative to output costs, deter investment, and constrict demand while filing for losses (Churchill et al., 2023; Fe and Sanfelice, 2022; Ganson and Hoelscher, 2021). Moreover, businesses may reduce opening hours and incur higher costs for security guards and surveillance equipment to protect their premises, leading prospective employees to seek employment in other communities, thereby increasing the challenges of retaining and attracting qualified staff (Acolin et al., 2022; Brown and Velásquez, 2017). These costs can be detrimental to micro- and small-sized businesses in their operations, which are characterized by limited budgets (Fennelly, 2016; Baker and Benny, 2012).

Operating in areas characterised by criminality can damage a business's reputation, leading to decreased customer trust and prompting them to take their business elsewhere (Churchill et al., 2023; Fe and Sanfelice, 2022). Concerns about safety and stability may reduce customer traffic, resulting in lower sales. Businesses in such areas may also face a higher risk of fraud, including identity theft or financial scams (Scheaf and Wood, 2022; Anderson, Durbin, and Salinger, 2008). Furthermore, criminal activity can disrupt supply chains, causing delays in product deliveries, increased transportation costs, and challenges in inventory management (Ganson and Hoelscher, 2021; Hipp et al., 2019; Abadie and Dermisi, 2008). These location-based disruptions affect overall efficiency and competitiveness, making businesses less profitable and encouraging them to relocate (Hipp et al., 2019).

Moreover, financial institutions may view businesses in areas characterised by criminality and gang clashes as less creditworthy due to the increased likelihood of disruptions and financial losses (Ganson and Hoelscher, 2021; Cole and Sokolyk, 2016; Han, Fraser, and Storey, 2009; Abadie and Dermisi, 2008). This perception can make it challenging for businesses to secure loans or obtain

favourable financing terms, hindering their growth and investment opportunities. These interconnected factors can translate into lower sales, turnover, and revenue for businesses, impacting their profitability and growth potential (Fe and Sanfelice, 2022; Ganson and Hoelscher, 2021; Hipp et al., 2019).

Considering the arguments presented, factors such as social vulnerability and illegal activities can create a complex set of location-based challenges for businesses, particularly when their preparedness and resilience are weak. These challenges can lead to increased costs, reduced employee productivity, loss of customer trust, and limited financial opportunities, ultimately threatening the business's overall growth and long-term survival.

With these considerations in mind, the first hypothesis of the study is presented below:

Hypothesis 1: The presence of social vulnerability and illegal activities in areas is associated with increased location-based business disruptions.

Strain theory (Merton, 1938) proposes that individuals engage in deviant behaviour when they are unable to achieve socially accepted goals through legitimate means. It is suggested that increased economic challenges, such as rising unemployment and debt during periods of economic recession, exacerbate strain by limiting opportunities for legitimate employment, pushing individuals towards illegal activities to secure income (Merton, 1938; Agnew, 1992). Similarly, according to Social Disorganisation Theory (Shaw and McKay, 1942) and Routine Activities Theory (Cohen and Felson, 1979), increased economic challenges can further weaken social cohesion within already vulnerable communities, making them more susceptible to illegal behaviour for survival. At the same time, the Crime Prevention Through Environmental Design framework (Jeffery, 1971) suggests that increasing visible signs of disorder can signal to potential offenders that an area has reduced social controls, consequently leading to an increase in crime. During periods of economic recession, reduced investments in security mechanisms and public infrastructure could be linked to an increase in illegal activities, which might have adverse implications for individuals and business operations located in those areas (Jeffery, 1971; Cozens, Saville, and Hillier, 2005).

Empirical studies from Europe and the US have found that areas with pre-existing high levels of social vulnerability and criminality face compounded challenges during economic recessions (Hipp and Luo, 2022; Boessen and Chamberlain, 2017; Bushway, Phillips, and Cook, 2012). Economic recessions intensify financial pressures on marginalised individuals, particularly in areas with high unemployment, occasionally leading them to engage in illegal activities to generate income. The combination of increased economic desperation, social vulnerability, and illegal activities during these periods can create a cycle of heightened location-based business disruptions, further perpetuating existing adversities within the community.

Moreover, studies have found that during economic recessions, reductions in social services and support programmes can exacerbate vulnerability by limiting access to benefits and other essential services, pushing marginalised communities into illegal activities for survival (Hipp and Luo, 2022; Bell, Bindler, and Machin, 2018; Bushway, Phillips, and Cook, 2012). This, in turn, can adversely affect individuals and businesses operating in these areas, with the effect being more severe in those businesses that cannot invest in security systems or adapt their operations accordingly (Fennelly, 2016; Baker and Benny, 2012).

Similarly, budget cuts during recessions can lead to a reduction in police presence and law enforcement, further straining social cohesion and weakening community bonds. In areas with high levels of criminality, reduced policing can embolden criminals, leading to an increase in illegal activities and a heightened sense of insecurity. Additionally, economic recessions can result in reduced investments in public lighting, hygiene measures, and the maintenance of buildings and public spaces (Hipp and Luo, 2022; Bell, Bindler, and Machin, 2018; Bushway, Phillips, and Cook, 2012). This deterioration in infrastructure quality impacts the overall liveability and functionality of these areas, fosters illegal activities, damages the area's reputation, and discourages business activities.

The second hypothesis of the study is:

Hypothesis 2: In areas characterised by social vulnerability and illegal activities, periods of economic recession are associated with increased location-based business disruptions.

As the study has evaluated, and according to the Routine Activities Theory (Cohen and Felson, 1979), increased police presence acts as a capable guardian, thereby reducing the likelihood of crime by making it riskier for offenders to engage in illegal behaviour (Cohen and Felson, 1979; Felson, 1994). Similarly, the Crime Prevention Through Environmental Design framework (Jeffery, 1971) suggests that investments in public infrastructure and the regeneration of areas can serve as a deterrent for illegal activities (Jeffery, 1971; Cozens, Saville, and Hillier, 2005).

Empirical studies in Europe, the US, and Latin America have found that increased police presence can reduce criminal activities, providing a sense of safety and security for both individuals and businesses (Weisburd, 2021; Ganson and Hoelscher, 2021; Piza, 2018; Welsh and Farrington, 2009). Crime prevention programmes have been shown to address factors contributing to vulnerability and criminality (Weisburd, 2021; Ganson and Hoelscher, 2021; Piza, 2018; Rozo, 2018; Welsh and Farrington, 2009). Criminals are less likely to engage in illegal behaviour if they know that such behaviour is less tolerated.

Investing in public infrastructure has also been found to contribute to the overall safety, security, and reduction of social vulnerability in an area (South et al., 2023; Chalfin et al., 2022; Timilsina et al., 2020; Welsh and Farrington, 2009). In regeneration projects, designing spaces to be inclusive for diverse

groups—such as by creating safe walkways, good lighting, and accessible public services—can reduce areas where illegal activities could flourish. Well-designed spaces leave fewer opportunities for criminals to hide or operate unnoticed. Regenerating areas and maintaining public spaces discourages illegal activities, thereby reducing the likelihood of location-based business disruptions (Rozo, 2018). Regeneration efforts not only improve the aesthetic and functional aspects of public areas, but they also have a direct impact on reducing criminal activity, creating a safer, more attractive environment for businesses to thrive (South et al., 2023; Chalfin et al., 2022; Timilsina et al., 2020; Rozo, 2018; Welsh and Farrington, 2009).

The third hypothesis of the study is presented below:

Hypothesis 3: In areas characterised by social vulnerability and illegal activities, higher levels of public safety and better infrastructure quality are associated with reduced location-based business disruptions.

In Figure 1, the Model of Location-Based Business Disruptions illustrates the factors that contribute to, and protect against, location-based business disruptions in areas affected by criminality. The model identifies these factors as either enabling or preventive forces, highlighting their influence on location-based business disruptions. Social vulnerability and illegal activities, such as the presence of illicit drug users, sex workers, homeless people, black markets and gangs, are contributing factors. These conditions heighten the likelihood of location-based business disruptions, such as physical assault, theft, vandalism, and fraud, making it more difficult for businesses to function effectively in such areas. In addition, enabling factors include economic recessions, which exacerbate location-based business disruptions by creating economic conditions that lead to increased crime, vulnerability, and instability. On the other hand, preventive factors play a protective role. Public safety and infrastructure quality are crucial preventive factors, including the presence of police, effective law enforcement, high-quality public infrastructure, and regeneration policies, which enhance the overall safety and stability of the area. In all cases, business resilience, such as financial stability, operational flexibility, and crisis management, enables businesses to withstand location-based disruptions related to social vulnerability and illegal activities.

[Figure 1]

3. A review of the literature: The Greek case

In Greece, limited studies have examined social vulnerability and illegal activities. Based on the scarce available research, the general pattern indicates that since the onset of the economic recession in 2010, there has been an increase in both social vulnerability and illegal activities (Hellenic Police, 2022). During the economic recession, the country experienced a 39% rise in crime rates related to homicide, fraud, rape, extortion, narcotics, weapons, sexual exploitation, burglaries, robberies, and thefts (Hellenic Police, 2022; Tsouvelas et al., 2016). Furthermore, since the start of the economic downturn, the capital

city, Athens, has witnessed a worsening in economic vulnerability, along with a decline in the physical and mental health of marginalised communities, including illicit drug users, sex workers, homeless individuals, beggars, and those living in or at risk of poverty (Drydakis, 2022c; Drydakis, 2024a; 2023a). Additionally, during this period, Athens saw a drop in educational standards, students' academic achievements (Drydakis, 2023b), and the physical and mental health of students (Drydakis, 2023c). There was also a broader deterioration in the physical and mental health of the general population (Drydakis, 2015). These declines have been attributed to increased unemployment, reduced incomes, rising poverty, and budget cuts to social support services and public infrastructure investments (Drydakis, 2015).

In Greece, studies examining the associations between social vulnerability, illegal activities, and location-based business realities are scarce. One study, utilising data from before the onset of the economic recession, found that in 2008, entrepreneurs in Athens identified several problems affecting their businesses, including unsafe locations and poor public infrastructure, among other factors (Katsioloudes and Jabeen, 2013). Additionally, the study indicated that one of the reasons entrepreneurs disliked being self-employed was the fear of crime (Katsioloudes and Jabeen, 2013).

In 2011, a study conducted in the city centre of Athens (Zarafonitou, 2012) revealed that approximately 30% of business owners had experienced burglaries. The study highlighted a widespread perception of an increase in crime between 2007 and 2011, with an overwhelming 97% of respondents reporting this view, alongside a belief in police inefficiency, with 75% expressing dissatisfaction (Zarafonitou, 2012). A follow-up survey conducted in 2016 in Athens' city centre found that 54% of residents, entrepreneurs, and employees felt somewhat or very unsafe walking alone in the area after dark, citing drug users, inadequate policing, poor public infrastructure, and the presence of many immigrants as key reasons (Zarafonitou, 2020). Regarding victimisation, the reported rate was 49%, with thefts being the most common form, accounting for 54.3% of incidents. Furthermore, 68% of respondents reported a decline in the quality of life in their area between 2014 and 2016.

4. Data gathering

The aim of the study was to gather reflections from businesses operating in areas affected by criminality in Athens, the capital of Greece (King and Wincup, 2007). Focusing on Athens as the capital city provided insight into urban dynamics within a central hub of Greece. In 2008, the research team hosted focus groups with the Hellenic Police to identify locations in Athens where social vulnerability and criminality were prevalent (King and Wincup, 2007).

There was a consensus in 2008, based on official crime data related to assaults, thefts, burglaries, vandalism, and homicides (Hellenic Police, 2008a), as well as monthly Hellenic Police reviews (Hellenic Police, 2008b; c; d), that criminality rates were high in the city centre of Athens. For example, in the city centre, 1,721 thefts and burglaries were recorded in January 2008 (half of all incidents in the entire

Athens metropolitan area), compared to 1,236 in the same month of 2007, representing a 39% increase. Officers from the Hellenic Police described this as an unprecedented situation, as in previous years, crime rate fluctuations had ranged between 5% and 20%. An exercise was undertaken to mark these geographical locations on a map of Athens' city centre (King and Wincup, 2007). The identified areas were within the boundaries of a geographical parallelogram, as depicted in the city centre map presented in Figure 2.

[Figure 2]

In Figure 2, the parallelogram is defined by the following avenues: A) 28th Octovriou, B) Agiou Konstantinou, C) Konstantinoupoleos, and D) Agiou Meletiou. These areas are characterised by commercial and administrative activities. Moreover, within the identified areas, there are residential houses where property rents are among the lowest in Athens (Drydakis, 2010; 2011). The area is segregated by immigrant populations and characterised as working-class (Drydakis, 2010; 2011; Hellenic Statistical Authority, 2015). Since 2008, these areas have continued to be evaluated in criminology literature as locations marked by increased social vulnerability and illegal activities (Hellenic Police, 2013; 2017; 2022; Zarafonitou, 2012; 2020).

Within the identified areas, more than 60 avenues or streets are located. Due to resource constraints, the study employed random sampling and selected 20 avenues or streets for field data collection (Kelley et al., 2003). Between October and November 2008, data gathering took place. Once per week, the research team sought to visit as many businesses as possible. The research team requested to interview either the business owner or a manager if the owner was unavailable (King and Wincup, 2007). The study followed the usual procedures for securing ethics approval and ensuring participant anonymity. Informed consent was obtained verbally from all participants.

Given the nature of the phenomenon under study, securing meaningful comparisons and analysing trends required a sufficient time gap between data collections (Steel, 2008; King and Wincup, 2007). Subsequent field research took place in 2014 and 2023, using the same 20 avenues or streets for data gathering. Hence, this study involved repeated cross-sectional surveys from the same areas in 2008, 2014, and 2023 (King and Wincup, 2007). Notably, Greece was not experiencing an economic recession in 2008, whereas it was in the midst of economic turmoil in both 2014 and 2023. This temporal variation allowed for the examination of patterns before and during the economic recession in Greece, providing valuable insights into how economic downturns may impact the study’s objectives.

5. Variables and scales

The survey captured participants’ gender, ethnicity, and status within the business (i.e., owner or manager). Additionally, the study collected information on business characteristics, such as size classification (i.e., micro, small, medium, or large-sized businesses) and years of operation. These

business characteristics may indirectly capture business resilience against urban criminality if they reflect businesses' financial stability, adaptability, and crisis management strategies in place (Saad et al., 2021). Furthermore, the study gathered information regarding the sector in which the businesses operated.

The study develops three scales to capture business owners' or managers' self-reflections on the level of location-based business disruptions, as well as the level of social vulnerability and illegal activities in the area where the business is located, and lastly, the level of public safety and infrastructure quality in the same area. The business owners or managers were asked to reflect on the aforementioned themes from the last year. These scales are offered in Table 1.

[Table 1]

The first scale, entitled the Location-Based Business Disruptions (LBBD) scale, incorporates 11 factors based on theoretical considerations and empirical evidence from existing literature on business disruptions due to urban criminality (Churchill et al., 2023; Scheaf and Wood, 2022; Fe and Sanfelice, 2022; Hipp et al., 2019; Lens and Meltzer, 2016; King and Wincup, 2007). The factors capture personal reflections of business owners' or managers' realities on various dimensions of disruptions that businesses face in areas with high levels of criminality, such as physical assault faced by customers, as well as, burglary, fraud, reputation damage, difficulty in accessing financing, and turnover reduction faced by businesses due to their location. This approach ensures that the scale captures a comprehensive picture of the challenges faced by different actors operating in such areas, as well as a reflection on the diverse ways in which location-based challenges can affect businesses beyond just physical safety concerns. A five-point Likert-type reporting system is utilised to capture the reflections of business owners or managers. For example, a question asks participants to indicate 'The level of burglary faced by businesses due to their location in this area', with the alternative answers ranging from 'non-existent', 'low', 'moderate', 'high' to 'very high'. The Location-Based Business Disruptions (LBBD) scale aggregates the answers to the 11 factors, resulting in a range from 0 to 44. Higher Location-Based Business Disruptions (LBBD) scale levels indicate a higher level of location-based business disruptions as expressed by the participants in the survey.

The second scale, entitled the Social Vulnerability and Illegal Activities (SVIA) scale, incorporates 9 factors based on theoretical and empirical literature, reflecting the presence of vulnerability and criminality (Churchill et al., 2023; Scheaf and Wood, 2022; Purser, Mowbray, and O'Shields, 2017; Richardson et al., 2015; Robinson et al., 2009; King and Wincup, 2007). The scale adopts a multifaceted approach by considering the level of various factors of social vulnerability such as the presence of drug users, sex workers, and homeless people in the area, as well as factors of illegal activities such as gang presence related to protection rackets, and burglary, and black-market presence related to illegal drugs, weapons, counterfeit goods, and stolen items. This approach allows for a more informative understanding of the interplay between vulnerable people and illegal activities associated with operating in such

environments. A five-point Likert-type reporting system is utilized to capture business owners' or managers' reflections, e.g., a question asks participants to indicate 'The level of illicit drug users' presence in this area' with the answer ranging from 'non-existent' to 'very high.' The Social Vulnerability and Illegal Activities (SVIA) scale aggregates the answers to the 9 factors, resulting in a range from 0 to 36. Higher Social Vulnerability and Illegal Activities (SVIA) scale levels indicate a higher level of social vulnerability and illegal activities as expressed by the participants in the survey.

The third scale, entitled the Public Safety and Infrastructure Quality (PSIQ) scale, incorporates 5 factors. Each factor in the scale relates to key aspects of public safety, as documented in scholarly literature, including the presence of police and law enforcement, as well as policy actions taken by policymakers to protect businesses from criminality (such as financial assistance or tax incentives for investing in security measures and crime prevention programmes), the quality of public infrastructure (such as streets, lighting, hygiene, building quality, and the provision of social services to support marginalised communities), and policy actions by stakeholders in the regeneration of areas characterised by criminality (for example, street and building renovations, and the creation of green spaces) (South et al., 2023; Chalfin et al., 2022; Weisburd, 2021; Piza, 2018; Rozo, 2018; Welsh and Farrington, 2009; King and Wincup, 2007). A five-point Likert-type reporting system is utilized to capture business owners' or managers' reflections, e.g., a question asks participants to indicate 'The level of police presence in this area' with the answer ranging from 'non-existent' to 'very high.' The Public Safety and Infrastructure Quality (PSIQ) scale aggregates the answers to the 5 factors, resulting in a range from 0 to 20. Higher Public Safety and Infrastructure Quality (PSIQ) scale levels indicate a higher level of public safety and infrastructure quality as expressed by the participants in the survey.

6. Scales validation

The study's scales underwent validation procedures to ensure consistency and validity. Table 1 presents the rotated factor loadings for the three scales. Panel I displays the rotated factor loadings for the Location-Based Business Disruptions (LBBD) scale. The results indicate that all factors significantly contribute to overall business disruptions and can be grouped together. All factor loadings are well above the commonly accepted threshold of 0.4 (Finch, 2020). For instance, the factor capturing 'the level of reputation damage faced by the business in this area' has a factor loading of 0.84, suggesting a strong association between the level of reputation disruption and overall location-based business disruptions. The remaining factors are interpreted similarly.

In Panels II and III, the rotated factor loadings for the Social Vulnerability and Illegal Activities (SVIA) scale and the Public Safety and Infrastructure Quality (PSIQ) scale are presented, respectively. In all cases, the factor loadings exceed the accepted threshold of 0.4 (Finch, 2020).

[Table 1]

Moreover, Table 2 presents the validation of the scales. Panel I displays the outcomes for the Location-Based Business Disruption (LBBD) scale. The coefficient of homogeneity, with H = 0.67, suggests internal consistency among factors (Finch, 2020). The Cronbach's alpha value of 0.94 indicates high internal consistency reliability for the Location-Based Business Disruption (LBBD) scale. The ratio of the chi-square value to the degrees of freedom, $\chi^2/df = 4.7$, indicates a reasonably good fit for the data. Similarly, a good fit is indicated by the values of the Root Mean Square Error of Approximation (RMSEA = 0.10), Standardized Root Mean Square Residual (SRMR = 0.04), and Comparative Fit Index (CFI = 0.93).

Panels II and III, which validate the Social Vulnerability and Illegal Activities (SVIA) scale and the Public Safety and Infrastructure Quality (PSIQ) scale, respectively, also indicate internal consistency and a good fit for the data (Finch, 2020).

[Table 2]

7. Descriptive statistics

Table 3 presents the descriptive statistics for the study. In 2008, 118 individuals participated in the survey, followed by 97 in 2014, and 104 in 2023. Panel I provides data for 2008, Panel II for 2014, and Panel III for 2023. Panel IV combines the data from these panels.

In Panel IV, it is shown that 32.2% of the participants were women, 34.1% were non-natives, and 75.8% were business owners. The data indicates that in 86.8% of cases, the businesses were classified as micro-sized, and in 42% of cases, they had operated for more than ten years. Most businesses were in the retail sector (23.1%), followed by the service sector (18.4%) and the hospitality and tourism sector (14.4%).

The economic indicators highlight fluctuations in GDP and risks of poverty or social exclusion across the years. In 2008, GDP stood at €355.8 billion, dropping to €235.5 billion in 2014, before rising to €242.3 billion in 2023. This pattern suggests the country experienced a significant recession, which is also reflected in the changes in the risk of poverty or social exclusion: 24.7% in 2008, 31.3% in 2014, and 26.1% in 2023. The statistics suggest that the country has not returned to the pre-recession levels of economic performance seen in 2008.

[Table 3]

Table 4 presents data across Panels I-IV on the Location-Based Business Disruptions (LBBD) scale for the years 2008, 2014, and 2023, as well as for the overall sample. The findings reveal an increasing trend of location-based business disruptions in the studied areas during the economic recession. This trend is reflected in the growing incidence of physical assaults, harm, robbery, and theft experienced by business owners, managers, employees, and customers. Additionally, there were heightened levels of disruptions affecting business reputation, financing, and turnover. In all cases, the

differences in the scale factors between 2008 and 2023 are statistically significant at the 1% level. Overall, there is a statistically significant increase in the Location-Based Business Disruptions (LBBD) scale between 2008 and 2023 (15.5 vs 28.4, $t=13.3$, $p<0.01$).

Furthermore, Table 4 provides data on the proportion of participants who indicated a 'high level' of response for each of the Location-Based Business Disruptions (LBBD) scale factors. For instance, in the overall sample (Panel IV), 21.9% reported that businesses experienced a 'high level' of 'reputation damage due to their location'. The corresponding percentages were 7.6% in 2008, 27.8% in 2014, and 32.6% in 2023. Across all Location-Based Business Disruptions (LBBD) scale factors, there is a statistically significant increase between 2008 and 2023, significant at the 1% level.

[Table 4]

Similarly, Table 5, Panels I-IV, showcases data on the Social Vulnerability and Illegal Activities (SVIA) scale for 2008, 2014, and 2023, as well as for the total sample. The data shows an increase in social vulnerability and illegal activities in the areas under consideration during the economic recession period. Indicators of social vulnerability, such as the presence of illicit drug users, sex workers, and homeless individuals, have increased significantly ($p<0.01$). Additionally, indicators of illegal activities, including gang presence related to protection rackets, and robbery, burglary, or theft, have also significantly increased ($p<0.01$). Overall, there is a statistically significant increase in the Social Vulnerability and Illegal Activities (SVIA) scale between 2008 and 2023 (15.2 vs 21.6, $t=5.8$, $p<0.01$).

Table 5 also presents data on the proportion of participants reporting a 'high level' of response for each of the Social Vulnerability and Illegal Activities (SVIA) scale factors. For instance, a 'high level' of 'homeless people’s presence' was observed, with figures rising from 18.6% in 2008 to 22.6% in 2014, and further increasing to 35.5% in 2023. The increase from 2008 to 2023 is statistically significant at the 1% level ($z = 2.8$). Similarly, there is a statistically significant rise, also at the 1% level, in the 'presence of gang activity related to robbery, burglary, or theft' between 2008 and 2023 ($z = 2.9$).

[Table 5]

Table 6 presents data across Panels I-IV on the Public Safety and Infrastructure Quality (PSIQ) scale for 2008, 2014, and 2023, as well as for the total sample. The data suggests that during the economic recession, there was a decline in various aspects related to public safety and infrastructure. This decline is evident in reduced levels of police presence, law enforcement, actions by policymakers to protect businesses, the quality of public infrastructure, and policy actions aimed at regenerating the examined areas ($p<0.01$). Overall, there is a statistically significant decline in the Public Safety and Infrastructure Quality (PSIQ) scale between 2008 and 2023 (10.6 vs 6.1, $t=8.0$, $p<0.01$).

Furthermore, Table 6 provides details regarding the proportion of participants who indicated a 'high level' of response for each of the Public Safety and Infrastructure Quality (PSIQ) scale factors. For example, in 2008, 21.1% of respondents rated 'the quality of public infrastructure' as 'high', compared to

15.4% in 2014 and 6.7% in 2023. The decrease between 2008 and 2023 is statistically significant at the 1% level (z=3.0). The analysis reveals a statistically significant decline, at the 1% level, across each Public Safety and Infrastructure Quality (PSIQ) factor scale between 2008 and 2023.

[Table 6]

Table 7 presents a correlation analysis. There is a positive correlation between the Social Vulnerability and Illegal Activities (SVIA) and Location-Based Business Disruptions (LBBD) scales ($r=0.77$, $p<0.01$), indicating that an increase in social vulnerability and illegal activities correlates with heightened location-based business disruptions. Additionally, the Public Safety and Infrastructure Quality (PSIQ) shows a negative correlation with both the Social Vulnerability and Illegal Activities (SVIA) scale ($r=-0.87$, $p<0.01$) and the Location-Based Business Disruptions (LBBD) scale ($r=-0.77$, $p<0.01$). These results suggest that improvements in public safety and infrastructure quality are associated with a reduction in social vulnerability, illegal activities, and location-based business disruptions.

Moreover, GDP demonstrates a negative correlation with the Location-Based Business Disruptions (LBBD) ($r=-0.52$, $p<0.01$) and the Social Vulnerability and Illegal Activities (SVIA) ($r=-0.29$, $p<0.01$), while showing a positive association with the Public Safety and Infrastructure Quality (PSIQ) ($r=0.33$, $p<0.01$). These findings suggest that stronger macroeconomic performance is associated with reduced social vulnerability, illegal activities, and location-based business disruptions, as well as improved public safety and infrastructure quality in the studied areas.

[Table 7]

8. Regression outcomes

8.1 Estimating the determinants of the Location-Based Business Disruptions (LBBD) scale

Table 8 presents the determinants of the Location-Based Business Disruptions (LBBD) scale. Given the continuous nature of the Location-Based Business Disruptions (LBBD) scale, OLS estimates are provided with robust standard errors to account for potential heteroscedasticity and intra-cluster correlation in the error terms within locations across different time periods (Wooldridge, 2010).

Model I incorporates the Social Vulnerability and Illegal Activities (SVIA) scale, the time periods during economic recessions (specifically, the years 2014 and 2023, with the reference being the year 2008), and the Public Safety and Infrastructure Quality (PSIQ) scale. A positive association was found between the Social Vulnerability and Illegal Activities (SVIA) scale and the Location-Based Business Disruptions (LBBD) scale ($b = 0.450$, $p < 0.01$), indicating that a one-unit increase in the Social Vulnerability and Illegal Activities (SVIA) scale corresponds to a 0.450 unit increase in the Location-Based Business Disruptions (LBBD) scale. Furthermore, the analysis revealed that periods of economic recession are linked to an increase in the Location-Based Business Disruptions (LBBD) scale (b_{2014} =

3.774, $p < 0.01$; $b_{2023} = 7.955$, $p < 0.01$). It is estimated that the year 2023 is more negatively associated with the Location-Based Business Disruptions (LBBD) scale than the year 2014 ($F = 43.4$; $p < 0.01$). Additionally, a negative association was observed between the Public Safety and Infrastructure Quality (PSIQ) scale and the Location-Based Business Disruptions (LBBD) scale ($b = -0.453$, $p < 0.01$). Based on these findings, Hypotheses 1-3 are supported.

Models II-IV provide a sensitivity analysis, with each subsequent model incorporating additional controls. In Model II, controls for businesses' location fixed effects are introduced. Model III includes controls for the sector of operation, while Model IV further incorporates variables capturing participants' gender, ethnicity, business ownership, as well as business size and years of operation. The aim of the sensitivity analysis is to reduce omitted variable bias (Clarke, 2005) by refining the model specifications. To determine the appropriateness of including these variables, multicollinearity tests were conducted (O'Brien, 2007). Furthermore, the combination of fixed effects with robust standard errors is expected to enhance the empirical specification by controlling for unobserved, time-invariant, location-specific factors and adjusting for heteroscedasticity and intra-cluster correlation. This approach is likely to yield more precise and reliable estimates of the relationship between urban crime and location-based business disruptions (Wooldridge, 2010).

The fully specified Model IV continues to support the estimates presented in Model I, thereby reaffirming Hypotheses 1-3.

In Model IV, an important insight from the control variables indicates that businesses operating for more than ten years in the areas under consideration experienced a lower level on the Location-Based Business Disruptions (LBBD) scale ($b = -1.042$, $p < 0.05$).

[Table 8]

8.2 Robustness test: Examining each of the factors of the Location-Based Business Disruptions (LBBD) scale

Table 9 presents a robustness evaluation. In Models I-XI, each factor of the Location-Based Business Disruptions (LBBD) scale is examined. Given the categorical nature of the Location-Based Business Disruptions (LBBD) scale's factors, Ordered Probit estimates are provided (Wooldridge, 2010). Full-informative specifications are offered, as in Table 8, Model IV.

The findings indicate a positive association between the Social Vulnerability and Illegal Activities (SVIA) scale and each factor of the Location-Based Business Disruptions (LBBD) scale. For instance, in Model IV, the Social Vulnerability and Illegal Activities (SVIA) scale is associated with a higher incidence of burglary faced by businesses in the area ($b=0.093$, $p<0.01$). Additionally, in Model VIII, the

Social Vulnerability and Illegal Activities (SVIA) scale is associated with an increase in the declines in customer traffic faced by businesses in the area (b=0.069, p<0.01).

It is also noted that, in all cases except one (in Models X), periods of economic recession are associated with an increase in the factors of the Location-Based Business Disruptions (LBBD) scale. For instance, in Model II, during the economic recession, there is an increase in the levels of physical assault, harm, robbery, or theft faced by business employees in the area ($b_{2014} = 0.601$, $p < 0.01$; $b_{2023} = 1.059$, $p < 0.01$).

Moreover, it is observed that, in all cases except four (in Models IV, VI, VII and IX), there is a negative association between the Public Safety and Infrastructure Quality (PSIQ) scale and the factors of the Location-Based Business Disruptions (LBBD) scale. For example, in Model XI, the Public Safety and Infrastructure Quality (PSIQ) scale is associated with a lower level of turnover reduction due to the location of businesses ($b = -0.078$, $p < 0.01$). The outcomes in Table 9 suggest that Hypotheses 1-3 can be reaffirmed.

In Models II, III, and V, important insights from the control variables indicate that businesses operating for more than ten years in the areas under consideration experience lower levels of physical assault, harm, robbery, or theft among business employees ($b = -0.226$, $p < 0.05$) and business customers ($b = -0.277$, $p < 0.05$). Additionally, these businesses face lower levels of vandalism ($b = -0.486$, $p < 0.01$).

[Table 9]

8.3 Robustness test: Examining each of the factors of the Social Vulnerability and Illegal Activities (SVIA) scale

Table 10 presents further robustness evaluations. In Models I-IX, each factor of the Social Vulnerability and Illegal Activities (SVIA) scale is examined for its association with the Location-Based Business Disruptions (LBBD) scale. Full informative OLS specifications, as provided in Table 8, Model IV, are offered.

The analysis reveals that all factors within the Social Vulnerability and Illegal Activities (SVIA) scale are positively associated with the Location-Based Business Disruptions (LBBD) scale. For instance, in Model I, the presence of illicit drug users in the area is linked to a higher Location-Based Business Disruptions (LBBD) scale ($b = 2.098$, $p < 0.01$). Similarly, Model VI shows that the presence of gangs involved in protection rackets is also associated with an increased Location-Based Business Disruptions (LBBD) scale ($b = 2.069$, $p < 0.01$).

Additionally, the analysis indicates that periods of economic recession are consistently associated with higher Location-Based Business Disruptions (LBBD) scale values across all models. Conversely, the

Public Safety and Infrastructure Quality (PSIQ) scale is associated with reduced Location-Based Business Disruptions (LBBD) scale values in every case.

Overall, the findings presented in Table 10 support the reaffirmation of Hypotheses 1-3.

[Table 10]

8.4 Robustness test: Examining each of the factors of the Public Safety and Infrastructure Quality (PSIQ) scale

Table 11 offers a further robustness evaluation. In Models I-V, each factor of the Public Safety and Infrastructure Quality (PSIQ) scale is examined in relation to its association with the Location-Based Business Disruptions (LBBD) scale. Full informative OLS specifications, as detailed in Table 8, Model IV, are provided.

The analysis reveals that, in all cases except one (Model III), the factors of the Public Safety and Infrastructure Quality (PSIQ) scale are negatively associated with the Location-Based Business Disruptions (LBBD) scale. For instance, in Model I, a higher level of police presence in the area is linked to a reduction in the Location-Based Business Disruptions (LBBD) scale ($b = -1.621$, $p < 0.01$). Likewise, in Model IV, better quality public infrastructure is associated with a decrease in the Location-Based Business Disruptions (LBBD) scale ($b = -0.710$, $p < 0.01$).

Moreover, across all models, the Social Vulnerability and Illegal Activities (SVIA) scale is associated with an increase in Location-Based Business Disruptions (LBBD) scale values, while periods of economic recession are similarly linked to higher Location-Based Business Disruptions (LBBD) scale values.

The estimates presented in Table 11 reinforce Hypotheses 1-3.

[Table 11]

8.5 Robustness Test: An examination of the Location-Based Business Disruptions (LBBD) scale using macroeconomic indicators and alternative time periods

In Table 12, Models I and II present a robustness analysis. Instead of using the periods during the economic recession as controls (i.e., the years 2014 and 2023), the analysis examines the association between GDP, the risk of poverty or social exclusion, and the Location-Based Business Disruptions (LBBD) scale. Social vulnerability over six years (2008–2014) might differ from that over fifteen years (2008–2023) due to unequal exposure to conditions and potential instability between the two periods, which could complicate direct comparisons. Including GDP and the risk of poverty or social exclusion as control variables addresses concerns about unequal time intervals by focusing on the conditions

communities experienced, rather than merely the length of exposure. If economic conditions changed significantly during these years, GDP serves as a control for those shifts. Likewise, the risk of poverty or social exclusion data helps account for varying levels of vulnerability across different periods. Full informative OLS specifications are provided, as shown in Table 8, Model IV.

In Model I, a negative association is observed between GDP and the Location-Based Business Disruptions (LBBD) scale ($b = -0.045$, $p < 0.01$). In Model II, a positive association is found between the risk of poverty or social exclusion and the Location-Based Business Disruptions (LBBD) scale ($b = 0.213$, $p < 0.05$). These results suggest that economic deterioration is linked to higher levels of location-based business disruptions in areas characterised by social vulnerability and illegal activities. The remaining estimates indicate that the Social Vulnerability and Illegal Activities (SVIA) scale is associated with increased Location-Based Business Disruptions (LBBD) scale values, while the Public Safety and Infrastructure Quality (PSIQ) scale is linked to reduced Location-Based Business Disruptions (LBBD) scale values. Consequently, the outcomes in Table 12 reaffirm Hypotheses 1-3.

Finally, Model III incorporates an interaction effect between the Social Vulnerability and Illegal Activities (SVIA) scale and the time period representing the pre-economic recession (i.e., SVIA scale × year 2008). It is found that the association between the Social Vulnerability and Illegal Activities (SVIA) scale and the Location-Based Business Disruptions (LBBD) scale was weaker before the onset of the economic recession (i.e., in 2008) compared to during the recession (i.e., in 2014 and 2023) ($b = -0.126$, $p < 0.10$). Thus, prior to the economic recession, the association between social vulnerability, illegal activity, and location-based business disruptions was less pronounced than during the recession.

[Table 12]

9. Discussion

The study utilised repeated cross-sectional data from 2008, 2014, and 2023, gathered from the same areas with high levels of criminal activity, reflecting the experiences of business owners and managers in these locations. This study sought to answer three questions: (1) Are social vulnerability and illegal activities in an area associated with increased location-based business disruptions? (2) During economic recessions, do areas characterised by social vulnerability and illegal activities face more location-based business disruptions? and (3) Are better public safety policies and infrastructure associated with reduced location-based business disruptions in areas affected by social vulnerability and illegal activities?

The study contributed to the literature in three main areas: theoretical, methodological, and empirical. Theoretically, the study synthesised complementary frameworks such as Social Disorganisation Theory (Shaw and McKay, 1942), Routine Activities Theory (Cohen and Felson, 1979), Strain Theory (Merton, 1938), and the Crime Prevention Through Environmental Design Framework (Jeffery, 1971).

These theories were applied to explore their interplay with economic recessions, providing deep insights into how such downturns exacerbate location-based business disruptions. Methodologically, the study introduced three new scales to measure social vulnerability and illegal activities, public safety and infrastructure quality, and location-based business disruptions. These scales enhance the research landscape by providing systematic tools to capture multifaceted phenomena. Empirically, the study employed three waves of repeated cross-sectional data in 2008, 2014, and 2023 to capture variations and trends in the relationships under investigation, reflecting the experiences of business owners and managers. This comprehensive analysis aimed to provide insights into the dynamics influencing location-based business disruptions and to reduce biases inherent in single-time-point studies.

The study's descriptive statistics indicated that in 2008, before the economic recession, levels of social vulnerability and illegal activities were lower compared to those observed in 2014 and 2023, both of which were periods marked by economic downturns. Similarly, location-based business disruptions were also lower before the economic recession. Conversely, public safety and infrastructure quality were higher prior to the recession.

Regarding the first question of the study, it was found that higher levels of social vulnerability and illegal activities were associated with increased location-based business disruptions. Social vulnerability, linked to the presence of illicit drug users, sex workers, homeless individuals, and beggars, corresponded with a rise in these disruptions. Similarly, illegal activities, including gang-related protection rackets, robbery, burglary, theft, and black-market dealings involving illegal drugs, weapons, and counterfeit goods, were also connected to increased location-based business disruptions. The study observed that social vulnerability and illegal activities were closely associated with incidents of physical assault, harm, robbery, and theft targeting business owners, employees, and customers, as well as cases of burglary, vandalism, and fraud aimed at businesses. Additionally, social vulnerability and illegal activities were linked to reputational damage, reduced customer traffic, difficulties in securing financing, supply chain problems, and decreased turnover for affected businesses.

The study's findings align with the theoretical frameworks of Shaw and McKay (1942), Cohen and Felson (1979), and Felson (1994), as well as with empirical research conducted in Europe, the US, Australia, and Latin America (Churchill et al., 2023; Fe and Sanfelice, 2022; Purser, Mowbray, and O'Shields, 2017; Richardson et al., 2015; Robinson et al., 2009). The presence of vulnerable populations is often correlated with higher crime rates, leading to increased physical assaults, harm, robbery, or theft affecting businesses. The presence of gangs and black markets exacerbates these issues by introducing more severe criminal activities, such as protection rackets, burglary, and the sale of illegal goods. Social vulnerability and illegal activities also contribute to a perception of insecurity, which can deter customers from visiting these areas, directly impacting business revenues and accelerating economic decline. Furthermore, businesses in such areas face heightened risks of burglary, vandalism, and fraud, creating a

challenging environment for sustained operations. These businesses often struggle with reputational damage, difficulties in securing financing, and supply chain disruptions, all of which contribute to reduced turnover, especially for micro-level businesses which cannot dedicate significant resources to security and location-based crisis management.

The evaluation of the second question indicated that periods of economic recession, along with deteriorations in GDP and an increased risk of poverty or social exclusion, were associated with a rise in location-based business disruptions. In both Europe and the US, studies have found that during economic recessions, increased economic strain and challenges related to resource allocation contribute to this phenomenon (Merton, 1938; Shaw and McKay, 1942; Jeffery, 1971; Cohen and Felson, 1979; Agnew, 1992; Hipp and Luo, 2022; Boessen and Chamberlain, 2017; Bushway, Phillips, and Cook, 2012). Higher unemployment rates and reduced income levels can lead to an increase in criminal activities, as individuals may resort to illegal means to sustain themselves. Moreover, during recessions, public resources are often stretched thin, resulting in reduced funding for law enforcement and public safety initiatives. These conditions make it increasingly difficult for businesses to operate securely, especially for those businesses which were already financially weak before economic downturns.

The study found that prolonged economic recessions led to greater location-based business disruptions. It may be that the longer a recession lasts, the higher the rates of crime in areas already characterised by social instability, and the greater the loss of business reputation. Moreover, businesses may cut costs to survive the recession, often reducing expenditure on security measures, making them more vulnerable to crime. Additionally, a decline in law enforcement resources due to budget cuts or reallocation can weaken crime prevention efforts, creating more opportunities for criminal activity. Thus, prolonged economic recessions place significant strain on businesses, creating a cycle in which criminal activity further undermines business stability. In addition, the study found that periods of economic recession appear to amplify the association between social vulnerability, illegal activities, and location-based business disruptions. This suggests that economic downturns act as a catalyst, intensifying the connections between these factors. During economic downturns, communities often face increased strain due to rising unemployment, reduced income, and diminished social services, which exacerbate existing vulnerabilities. These heightened vulnerabilities can lead to an increase in illegal activities, which in turn cause greater disruptions to businesses, particularly in locations that are more susceptible to these issues.

Regarding the third question, it was found that higher levels of public safety and infrastructure quality were associated with fewer location-based business disruptions. This finding highlights the importance of strategic investments in public safety and infrastructure as key components of economic and social policy, aligning with empirical findings from the US and Europe (Jeffery, 1971; Cohen and Felson, 1979; Felson, 1994; Piza, 2018; Welsh and Farrington, 2009; Cozens, Saville, and Hillier, 2005; Weisburd, 2021). Visible and active policing can deter potential offenders, thereby reducing crime rates

and location-based business disruptions. Furthermore, when businesses perceive an area as safe and well-maintained, they are more likely to invest and operate there, which attracts more customers, and enhances the overall economic health of the area. Investments in public infrastructure, such as well-maintained roads, lighting, and public spaces, contribute to the overall safety and appeal of an area, as well as reducing vulnerability. Well-designed urban spaces can discourage illegal activities and foster a more vibrant business environment.

A critical outcome of the study indicated that businesses operating for more than ten years in the areas under consideration experienced lower levels of location-based business disruptions. These businesses may have developed mechanisms to enhance capable guardianship due to their stronger financial positions. Such mechanisms can include investments in security infrastructure, such as surveillance systems, alarm systems, or improved lighting around the premises. Over time, these businesses become less suitable targets for criminal activity, as they present higher risks to offenders due to better protection. Moreover, the extended presence of businesses in areas characterised by criminality might enable them to better understand the dynamics of the local area, allowing them to predict and avoid risks more effectively. In addition, the trust that long-term businesses build with their employees, customers, and local authorities can serve as a stabilising force, insulating them from the full brunt of disruptions that affect newer businesses without these established networks. Hence, businesses that have operated for more than ten years in high-risk areas may have developed resilience, implemented effective security measures due to their stronger financial standing, and built strong reputations (OECD, 2022; Fennelly, 2016; Baker and Benny, 2012). These preventive factors, in turn, may contribute to a reduction in location-based disruptions.

9.2 Policy implications

Given the role of local economies and businesses as the economic foundation for sustainable development, this study highlights the importance of understanding business realities related to social vulnerability and illegal activities in the areas where they operate, as well as the economic conditions within the broader economy, such as recessions (Churchill et al., 2023; Scheaf and Wood, 2022; Acolin et al., 2022; Fe and Sanfelice, 2022; Ganson and Hoelscher, 2021; Hipp et al., 2019; Brown and Velásquez, 2017).

Policymakers should consider developing a comprehensive set of policies to address location-based business disruptions linked to social vulnerability and illegal activities, particularly during economic downturns. Priority should be given to allocating resources to enhance police visibility and patrolling in areas marked by high social vulnerability and illegal activities, alongside supporting the implementation of community policing strategies to foster trust between law enforcement and local communities. Collaboration between government agencies, law enforcement, businesses, and community

organisations is crucial to addressing the multifaceted nature of social vulnerability and illegal activities. Policies should support community engagement programmes, ensuring that residents are involved in decision-making processes and that policies address their specific needs and concerns.

Furthermore, policymakers should introduce financial support and incentives for businesses operating in high-risk areas, including tax breaks, grants, and low-interest loans. This assistance can help businesses withstand economic challenges and invest in security measures. Comprehensive crisis preparedness and response plans should be developed, including provisions for economic support, and infrastructure maintenance for businesses, especially during economic recessions. Data-driven approaches can help identify emerging trends and inform timely policy adjustments in the business environment (Drydakis, 2022a; 2022b; 2024b; 2024c).

Additionally, it is essential to allocate funding and resources to prioritise urban regeneration projects in vulnerable areas (South et al., 2023; Chalfin et al., 2022; Rozo, 2018; Welsh and Farrington, 2009). Such projects aim to improve public spaces, infrastructure, and amenities, thereby deterring criminal activities. Policymakers should ensure the regular maintenance of public infrastructure, including lighting, roads, and public spaces, to enhance safety and deter criminal behaviour.

Social services for groups such as illicit drug users, sex workers, homeless people, and beggars should receive increased resources (Drydakis, 2022c; 2023a; 2024a). Providing housing, healthcare, and addiction treatment can mitigate social vulnerability and associated criminal behaviour (Drydakis, 2022c; 2023a; 2024a). Moreover, initiatives focusing on job creation and vocational training programmes targeted at vulnerable populations can reduce incentives for engaging in illegal activities and foster community stability (Drydakis, 2024b).

9.3 Limitations and future work

While this study offers informative insights into the interplay between social vulnerability, illegal activities, and location-based business disruptions, it is important to acknowledge certain limitations. The reliance on cross-sectional data limits the study's ability to establish causal relationships, although the available longitudinal studies in the area are in line with the present study's outcomes (Churchill et al., 2023; Fe and Sanfelice, 2022). Longitudinal studies would provide a more robust understanding of how changes in social vulnerability, illegal activities, and economic conditions influence location-based business disruptions over time.

Additionally, the study's focus on the capital city may restrict the generalisability of findings to other contexts. Future research should aim to replicate these findings in diverse settings to enhance their applicability. Moreover, the study's reliance on observations from business owners and managers may overlook the perspectives of other individuals, such as employees, customers, and area residents.

Including these diverse viewpoints would offer a more comprehensive understanding of location-based business disruptions. Moreover, the utilisation of official police crime data and formal business operation data, such as actual turnover and gross assets, might be needed to verify the presented patterns.

A further limitation of this study is its reliance on a finite number of observations, which may not fully capture the diversity of experiences and perspectives within the studied population. Future research should address these limitations by employing more extensive and representative sampling techniques to ensure a comprehensive understanding of the phenomenon. Furthermore, it is important to acknowledge the challenge posed by unequal time periods in assessing social vulnerability. While GDP and the risk of poverty or social exclusion have been used as control variables to address some of the disparities, these measures alone may not fully capture the complexities of individuals' experiences and business performance over time. Additional factors, such as changes in social policies, are also essential to comprehensively assess how individuals are affected over lengthy periods. These factors may further influence the dynamics between unequal time periods of comparison, necessitating a broader approach in future research.

In addition, this study did not compare business conditions in areas characterised by low and high levels of criminality, nor did it examine businesses' investments in crisis management or further strategies for maintaining stability. As a result, it was unable to offer empirical insights into how better-positioned businesses cope with the impact of social vulnerability and illegal activities on their operations. It is important for future studies to examine which business policies can effectively reduce location-based business disruptions. Furthermore, incorporating qualitative research methods alongside quantitative approaches could yield richer insights into the experiences of businesses and communities affected by social vulnerability and illegal activities. Lastly, while this study synthesised several theoretical frameworks, exploring additional perspectives from fields such as entrepreneurship, social work, psychology, and economics could further deepen the understanding of the mechanisms driving business disruptions in vulnerable areas.

10. Conclusions

The study explored critical questions regarding social vulnerability, illegal activities, and their links to location-based business disruptions, particularly during economic downturns. Repeated cross-sectional data from 2008, 2014, and 2023 were utilised, gathered through interviews with business owners and managers in areas characterised by criminality. The findings revealed a positive association between social vulnerability, illegal activities, and location-based business disruptions. These disruptions included a range of issues such as physical assaults, burglary, vandalism, reputational damage, supply chain interruptions, and reduced turnover. Moreover, economic recessions were found to exacerbate these disruptions. Furthermore, the study found that public safety and the quality of infrastructure can reduce

these disruptions. In addition, the number of years a business has been in operation played a critical preventive role in reducing location-based business disruptions. The study underscored the need for policymakers to allocate resources towards initiatives aimed at strengthening policing, promoting urban redevelopment, and supporting vulnerable population groups. These measures are essential for effectively addressing the identified challenges and fostering resilient, thriving business environments and sustainable societies.

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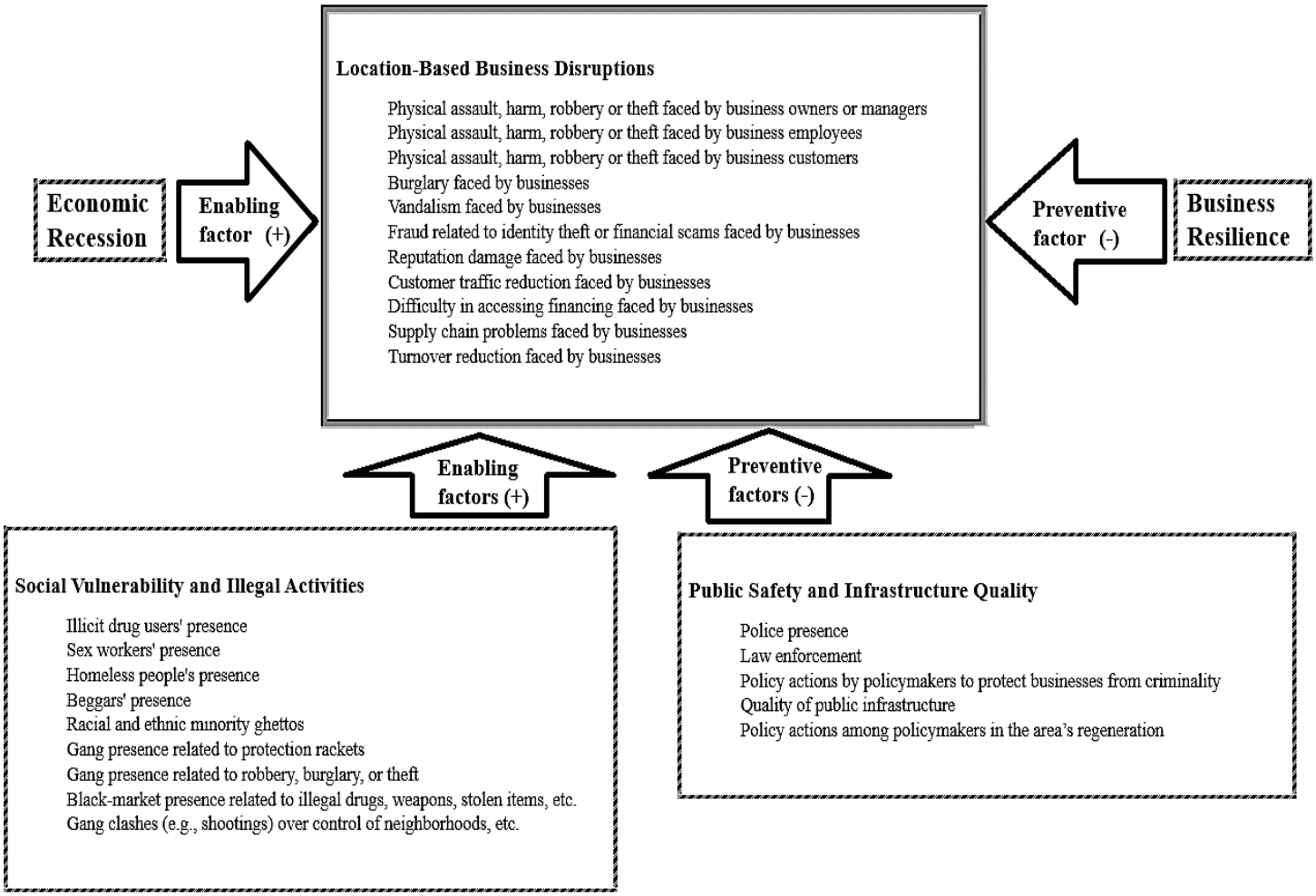
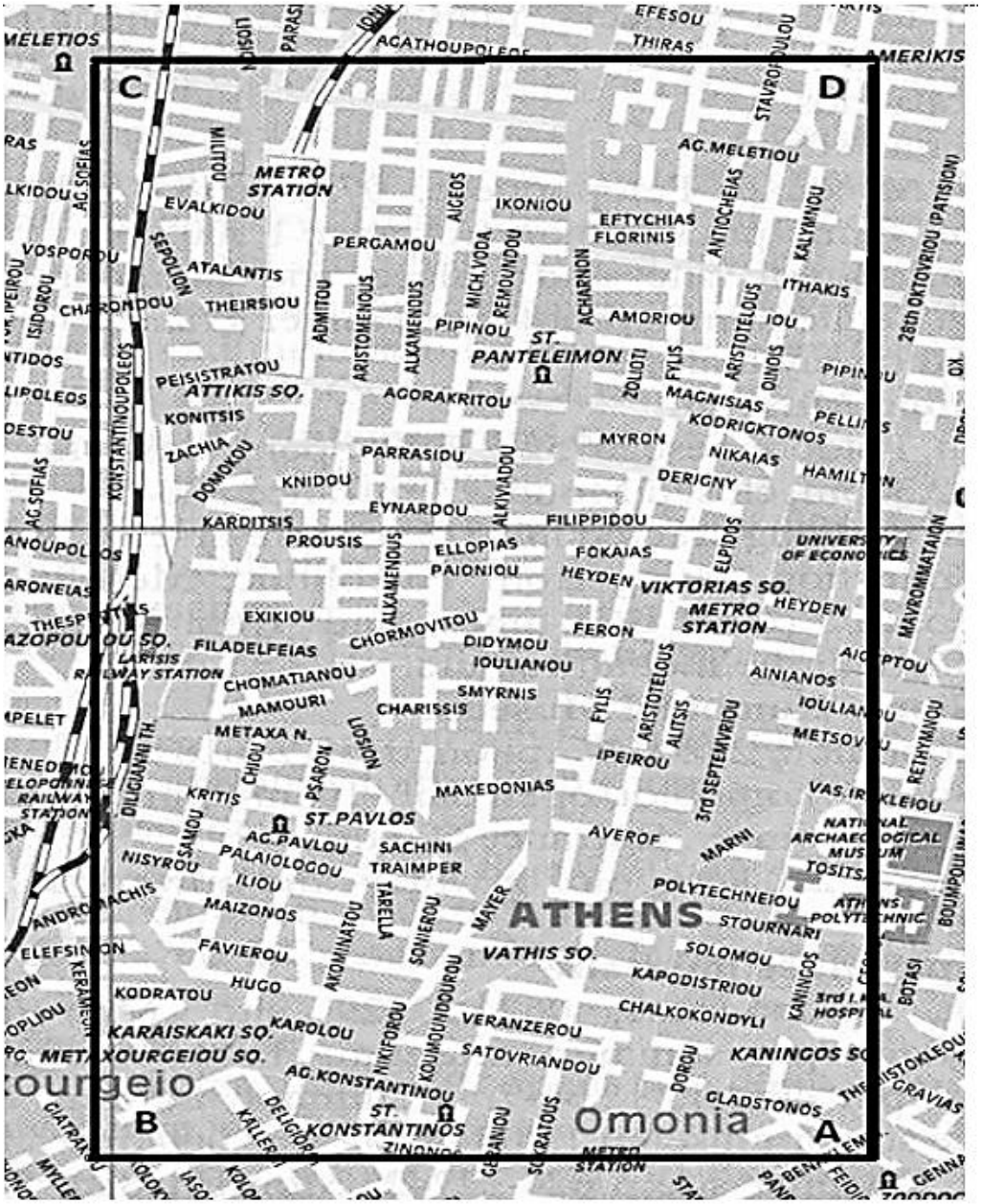
Figure 1. Model of Location-Based Business Disruptions



Notes: The figure presents the theoretical relationships of the study, indicating that (a) social vulnerability and illegal activities in an area, and (b) the economic recession of a country, enable an increase in location-based business disruptions in areas characterized by criminality. In addition, (c) public safety and infrastructure quality, and (d) business resilience act as preventive factors against location-based business disruptions in such areas.

Figure 2. Survey locations: Athens city-centre map



Notes: The survey locations are defined by the following avenues:
A) 28th Octovriou, B) Agiou Konstantinou, C) Konstantinoupoleos, and D) Agiou Meletiou.

Table 1. Factor analysis of scales

Panel I		Panel II		Panel III	
Location-Based Business Disruptions (LBBD) scale	**Rotated factor loadings (Factor 1): Location-Based Business Disruptions (LBBD) scale**	**Social Vulnerability and Illegal Activities (SVIA) scale**	**Rotated factor loadings (Factor 1): Social Vulnerability and Illegal Activities (SVIA) scale**	**Public Safety and Infrastructure Quality (PSIQ) scale**	**Rotated factor loadings (Factor 1): Public Safety and Infrastructure Quality (PSIQ) scale**
Level of physical assault, harm, robbery or theft faced by business owners or managers due to the location of the businesses in this area	0.825	Level of illicit drug users' presence in this area	0.844	Level of police presence in this area	0.869
Level of physical assault, harm, robbery or theft faced by business employees due to the location of the businesses in this area	0.812	Level of sex workers' presence in this area	0.846	Level of law enforcement in this area	0.867
Level of physical assault, harm, robbery or theft faced by business customers due to the location of the businesses in this area	0.812	Level of homeless people's presence in this area	0.851	Level of policy actions by policymakers to protect businesses from criminality in this area	0.906
Level of burglary faced by businesses due to their location in this area	0.865	Level of beggars' presence in this area	0.886	Level of the quality of public infrastructure in this area	0.884
Level of vandalism faced by businesses due to their location in this area	0.779	Level of racial and ethnic minority ghettos (i.e., an area where a minority lives isolated) in this area	0.747	Level of policy actions among policymakers in the regeneration of this area	0.882
Level of fraud related to identity theft or financial scams faced by businesses due to their location in this area	0.612	Level of gang presence related to protection rackets in this area	0.872		
Level of reputation damage faced by businesses due to their location in this area	0.844	Level of gang presence related to robbery, burglary, or theft in this area	0.830		
Level of customer traffic reduction faced by businesses due to their location in this area	0.834	Level of black-market presence related to illegal drugs, weapons, counterfeit goods, stolen items, etc., in this area	0.836		
Level of difficulty in accessing financing faced by businesses due to their location in this area	0.720	Level of gang clashes (e.g., physical fights, shootings) over control of neighborhoods, drug dealing, etc., in this area	0.829		
Level of supply chain problems faced by businesses due to their location in this area	0.813				
Level of turnover reduction faced by businesses due to their location in this area	0.860				

Notes: The data set covers the years 2008, 2014 and 2023. N=319.

Table 2. Scales validation

	Panel I Location-Based Business Disruptions (LBBD) scale	**Panel II Social Vulnerability and Illegal Activities (SVIA) scale**	**Panel III Public Safety and Infrastructure Quality (PSIQ) scale**
Cronbach's Alpha (Alpha)	0.94	0.95	0.93
Loevinger's Coefficient (H)	0.67	0.70	0.76
Chi-Square/Degrees of Freedom (chi2/df)	4.7	2.8	8.2
Root Mean Square Error of Approximation (RMSEA)	0.107	0.075	0.151
Standardised Root Mean Square Residual (SRMR)	0.043	0.025	0.023
Normed Fit Index (NFI)	0.923	0.968	0.967
Relative Noncentrality Index (RNI)	0.939	0.979	0.971
Comparative Fit Index (CFI)	0.939	0.979	0.971
Incremental Fit Index (IFI)	0.939	0.979	0.971
Model Consistency Index (MCI)	0.777	0.926	0.945

Notes: The data set covers the years 2008, 2014 and 2023. N=319.

Table 3. Descriptive statistics. Means and standard deviations				
	Panel I Year: 2008	**Panel II Year: 2014**	**Panel III Year: 2023**	**Panel IV Total sample**
Women (%)	27.96 (0.45)	34.02 (0.47)	35.57 (0.48)	32.28 (0.46)
Non-natives (%)	31.35 (0.46)	36.08 (0.48)	35.57 (0.48)	34.16 (0.47)
Business owners (%)	72.88 (0.44)	75.25 (0.43)	79.80 (0.40)	75.86 (0.42)
Micro-sized businesses^ (%)	83.05 (0.37)	88.65 (0.31)	89.42 (0.30)	86.83 (0.33)
Businesses operating more than ten years in the area (%)	45.76 (0.50)	42.26 (0.49)	37.50 (0.48)	42.00 (0.49)
Retail sector (%)	25.42 (0.43)	21.64 (0.41)	22.11 (0.41)	23.19 (0.42)
Services sector (%)	21.18 (0.41)	17.52 (0.38)	16.34 (0.37)	18.49 (0.38)
Hospitality and tourism sector (%)	14.40 (0.35)	15.46 (0.36)	13.46 (0.34)	14.42 (0.35)
Transportation sector (%)	9.32 (0.29)	6.18 (0.24)	10.57 (0.30)	8.77 (0.28)
Construction sector (%)	8.47 (0.27)	8.24 (0.27)	10.57 (0.30)	9.09 (0.28)
Manufacturing sector (%)	2.54 (0.15)	5.15 (0.22)	3.84 (0.19)	3.76 (0.19)
Creative sector (%)	5.08 (0.22)	6.18 (0.24)	4.80 (0.21)	5.32 (0.22)
Real estate sector (%)	6.77 (0.25)	7.21 (0.26)	5.76 (0.23)	6.58 (0.24)
Education and training sector (%)	3.38 (0.18)	5.15 (0.22)	5.76 (0.23)	4.70 (0.21)
Healthcare sector (%)	3.38 (0.18)	7.21 (0.26)	6.73 (0.25)	5.64 (0.23)
GDP (c.)	€355.8 (0.0)	€235.5 (0.0)	€242.3 (0.0)	€282.21 (56.53)
Risk of poverty or social exclusion (%)	24.7 (0.0)	31.3 (0.0)	26.1 (0.0)	27.16 (2.80)
Observations	118	97	104	319

Notes. (c) Continuous variable. (^) The reference category comprises small, medium and large-sized businesses.

Table 4. Location-Based Business Disruptions (LBBD) scale. Descriptive statistics

	Panel I Year: 2008 Mean (s.d.) [%]^	**Panel II Year: 2014** Mean (s.d.) [%]^	**Panel III Year: 2023** Mean (s.d.) [%]^	**Panel IV Total sample** Mean (s.d.) [%]^	**Difference between the year 2008 and the year 2014**	**Difference between the year 2008 and the year 2023**
Level of physical assault, harm, robbery or theft faced by business owners or managers due to the location of the businesses in this area	1.73 (0.91) [12.71]	2.40 (0.93) [23.71]	2.85 (0.90) [27.88]	2.30 (1.03) [21.00]	t=5.31*** [z=2.10**]	t=9.20*** [z=2.82***]
Level of physical assault, harm, robbery or theft faced by business employees due to the location of the businesses in this area	1.77 (0.91) [11.01]	2.40 (0.90) [26.80]	2.87 (0.80) [36.53]	2.32 (0.99) [24.13]	t=5.08*** [z=2.99***]	t=9.58*** [z=4.51***]
Level of physical assault, harm, robbery or theft faced by business customers due to the location of the businesses in this area	1.61 (0.84) [6.77]	2.27 (0.87) [25.77]	2.61 (0.75) [45.19]	2.14 (0.92) [25.07]	t=5.62*** [z=3.85***]	t=9.37*** [z=6.61***]
Level of burglary faced by businesses due to their location in this area	1.50 (0.94) [9.32]	2.02 (0.95) [32.98]	2.50 (0.83) [39.42]	1.99 (1.00) [26.33]	t=4.01*** [z=4.32***]	t=8.42*** [z=5.28***]
Level of vandalism faced by businesses due to their location in this area	1.37 (0.80) [2.54]	1.92 (0.75) [12.37]	2.63 (0.81) [35.57]	1.95 (0.94) [16.30]	t=5.19*** [z=2.82***]	t=11.63*** [z=6.39***]
Level of fraud related to identity theft or financial scams faced by businesses due to their location in this area	0.57 (0.63) [0.0]	1.57 (0.78) [9.27]	2.40 (0.79) [36.53]	1.47 (1.06) [14.73]	t=10.19*** [z=3.38***]	t=18.91*** [z=7.21***]
Level of reputation damage faced by businesses due to their location in this area	1.19 (0.77) [7.62]	1.95 (0.86) [27.83]	2.57 (0.99) [32.69]	1.87 (1.04) [21.94]	t=6.76*** [z=3.95***]	t=11.48*** [z=4.71***]
Level of customer traffic reduction faced by businesses due to their location in this area	1.38 (0.90) [8.47]	1.91 (1.04) [10.30]	2.56 (1.00) [27.88]	1.93 (1.09) [15.36]	t=3.95*** [z=0.46]	t=9.19*** [z=3.79***]
Level of difficulty in accessing financing faced by businesses due to their location in this area	1.12 (0.64) [2.54]	1.71 (0.73) [12.37]	2.30 (0.78) [25.0]	1.68 (0.87) [12.85]	t=6.23*** [z=2.82***]	t=12.22*** [z=4.95***]
Level of supply chain problems faced by businesses due to their location in this area	1.72 (1.05) [16.94]	2.02 (1.07) [30.92]	2.53 (0.93) [43.26]	2.08 (1.07) [29.78]	t=2.06** [z=2.41***]	t=6.10*** [z=4.30***]
Level of turnover reduction faced by businesses due to their location in this area	1.56 (0.94) [16.94]	2.01 (1.00) [39.17]	2.59 (0.85) [53.84]	2.03 (1.02) [35.73]	t= 3.37*** [z=3.65***]	t= 8.52*** [z=5.78***]
Location-Based Business Disruptions (LBBD) scale	15.59 (7.35)	22.22 (7.23)	28.48 (6.54)	21.81 (8.86)	t=6.64***	t=13.83***
Observations	118	97	104	319		

Notes: The table presents the means; the parentheses indicate the corresponding standard deviations. (^) The square brackets indicate the percentage for the category 'High Level'. (***) Statistically significant at the 1% level. (**) Statistically significant at the 5% level.

Table 5. Social Vulnerability and Illegal Activities (SVIA) scale. Descriptive statistics

	Panel I Year: 2008 Mean (s.d.) [%]^	**Panel II Year: 2014** Mean (s.d.) [%]^	**Panel III Year: 2023** Mean (s.d.) [%]^	**Panel IV Total sample** Mean (s.d.) [%]^	**Difference between the year 2008 and the year 2014**	**Difference between the year 2008 and the year 2023**
Level of illicit drug users' presence in this area	1.69 (1.20) [16.10]	2.24 (1.11) [17.52]	2.55 (1.02) [23.07]	2.14 (1.17) [18.80]	t=3.49*** [z=0.28]	t=5.77*** [z=1.31]
Level of sex workers' presence in this area	1.59 (1.22) [16.10]	2.09 (1.01) [26.80]	2.28 (0.91) [35.57]	1.97 (1.10) [25.70]	t=3.29*** [z=1.92*]	t=4.81*** [z=3.33***]
Level of homeless people's presence in this area	1.73 (1.16) [18.64]	2.27 (1.10) [22.68]	2.54 (0.97) [35.57]	2.16 (1.13) [25.39]	t=3.49*** [z=0.73]	t=5.66*** [z=2.84***]
Level of beggars' presence in this area	1.59 (1.17) [17.79]	2.14 (1.16) [17.52]	2.43 (1.02) [27.88]	2.03 (1.17) [21.00]	t=3.44*** [z=0.05]	t=5.71*** [z=1.79*]
Level of racial and ethnic minority ghettos (i.e., an area where a minority lives isolated) in this area	1.62 (1.20) [16.10]	1.89 (1.02) [19.58]	2.09 (0.88) [25.96]	1.86 (1.06) [20.37]	t=1.75* [z=0.67]	t=3.35*** [z=1.80*]
Level of gang presence related to protection rackets in this area	1.83 (1.32) [16.10]	2.21 (1.30) [17.52]	2.47 (1.06) [22.11]	2.15 (1.26) [18.49]	t=2.15** [z=0.27]	t=4.00*** [z=1.14]
Level of gang presence related to robbery, burglary, or theft in this area	1.72 (1.26) [18.64]	2.21 (1.09) [25.77]	2.36 (0.97) [36.53]	2.08 (1.15) [26.64]	t=3.04*** [z=1.26]	t=4.27*** [z=2.99***]
Level of black-market presence related to illegal drugs, weapons, counterfeit goods, stolen items, etc., in this area	1.79 (1.22) [17.79]	2.26 (1.19) [14.43]	2.53 (1.04) [20.19]	2.18 (1.19) [17.55]	t=2.84*** [z=0.66]	t=4.87*** [z=0.45]
Level of gang clashes (e.g., physical fights, shootings) over control of neighborhoods, drug dealing, etc., in this area	1.63 (1.32) [17.79]	2.06 (1.13) [31.95]	2.35 (0.88) [43.26]	2.00 (1.12) [30.40]	t=2.53** [z=2.41**]	t=4.83*** [z=4.14***]
Social Vulnerability and Illegal Activities (SVIA) scale	15.23 (9.61)	19.42 (8.39)	21.65 (6.48)	18.60 (8.74)	t= 3.36***	t= 5.89***
Observations	118	97	104	319		

Notes: The table presents the means; the parentheses indicate the corresponding standard deviations. (^) The square brackets indicate the percentage for the category 'High Level'. (***) Statistically significant at the 1% level. (**) Statistically significant at the 5% level. (*) Statistically significant at the 10% level.

Table 6. Public Safety and Infrastructure Quality (PSIQ) scale. Descriptive statistics						
	Panel I Year: 2008 Mean (s.d.) [%]^	**Panel II Year: 2014** Mean (s.d.) [%]^	**Panel III Year: 2023** Mean (s.d.) [%]^	**Panel IV Total sample** Mean (s.d.) [%]^	**Difference between the year 2008 and the year 2014**	**Difference between the year 2008 and the year 2023**
Level of police presence in this area	2.16 (1.15) [22.03]	1.73 (1.09) [19.58]	1.21 (0.93) [7.69]	1.72 (1.13) [16.61]	t=2.79*** [z=0.44]	t=6.80*** [z=2.96***]
Level of law enforcement in this area	2.16 (1.12) [22.88]	1.59 (1.17) [20.61]	1.19 (0.89) [5.76]	1.67 (1.14) [16.61]	t=3.63*** [z=0.40]	t=7.08*** [z=3.57***]
Level of policy actions by policymakers to protect businesses from criminality in this area	2.10 (1.01) [32.20]	1.70 (1.04) [19.58]	1.21 (0.91) [2.0]	1.68 (1.05) [18.49]	t=2.85*** [z=4.73***]	t=6.91*** [z=5.83***]
Level of the quality of public infrastructure in this area	2.25 (1.12) [21.18]	1.85 (1.09) [15.46]	1.39 (0.90) [6.73]	1.85 (1.10) [14.73]	t=2.63*** [z=1.07]	t=6.34*** [z=3.05***]
Level of policy actions among policymakers in the regeneration of this area	1.99 (0.87) [30.50]	1.63 (1.00) [21.64]	1.16 (0.81) [4.80]	1.61 (0.95) [19.43]	t=2.82*** [z=1.46]	t=7.36*** [z=4.92***]
Public Safety and Infrastructure Quality (PSIQ) scale	10.66 (4.73)	8.52 (4.70)	6.17 (3.61)	8.55 (4.76)	t=3.31***	t=8.00***
Observations	118	97	104	319		

Notes: The table presents the means; the parentheses indicate the corresponding standard deviations. (^) The square brackets indicate the percentage for the category 'High Level'. (***) Statistically significant at the 1% level.

Table 7. Correlation matrix

	Location-Based Business Disruptions (LBBD) scale	Social Vulnerability and Illegal Activities (SVIA) scale	Public Safety and Infrastructure Quality (PSIQ) scale	GDP	Risk of poverty or social exclusion
Location-Based Business Disruptions (LBBD) scale	1				
Social Vulnerability and Illegal Activities (SVIA) scale	0.77***	1			
Public Safety and Infrastructure Quality (PSIQ) scale	-0.77***	-0.87***	1		
GDP	-0.52***	-0.29***	0.33***	1	
Risk of poverty or social exclusion	0.15***	0.12**	-0.08	-0.70***	1

Notes: The dataset covers the years 2008, 2014, and 2023. N=319. (***) Statistically significant at the 1% level. (**) Statistically significant at the 5% level.

Table 8. OLS Estimates. Location-Based Business Disruptions (LBBD) scale				
	Model I	**Model II**	**Model III**	**Model IV**
Social Vulnerability and Illegal Activities (SVIA) scale	0.450 (0.055)***	0.436 (0.057)***	0.440 (0.058)***	0.431 (0.059)***
Public Safety and Infrastructure Quality (PSIQ) scale	-0.453 (0.107)***	-0.460 (0.112)***	-0.456 (0.112)***	-0.459 (0.114)***
Year 2014^	3.774 (0.602)***	3.661 (0.618)***	3.643 (0.615)***	3.680 (0.624)***
Year 2023^	7.955 (0.657)***	7.818 (0.663)***	7.832 (0.665)***	7.819 (0.678)***
Fixed Effects: Businesses' Location	No	Yes	Yes	Yes
Controls: Businesses' Sector of Operation	No	No	Yes	Yes
Controls: Participants and Businesses Characteristics (^^)	No	No	No	Yes
F	224.71	45.67	33.06	29.03
Prob>F	0.000	0.000	0.000	0.000
R-squared	0.760	0.77	0.779	0.783

Notes: *The dataset covers the years 2008, 2014, and 2023. N=319. (^) The reference category is the year 2008. (^^) The model controls for participants' gender, ethnicity, and ownership of the business, as well as business size and years of operation. Robust standard errors are given in parentheses. (***) Statistically significant at the 1% level.*

Table 9. Ordered Probit estimates. Location-Based Business Disruptions (LBBD) scale factors

	Model I Level of physical assault, harm, robbery or theft faced by business owners or managers due to the location of the businesses in this area	**Model II** Level of physical assault, harm, robbery or theft faced by business employees due to the location of the businesses in this area	**Model III** Level of physical assault, harm, robbery or theft faced by business customers due to the location of the businesses in this area	**Model IV** Level of burglary faced by businesses due to their location in this area	**Model V** Level of vandalism faced by businesses due to their location in this area	**Model VI** Level of fraud related to identity theft or financial scams faced by businesses due to their location in this area	**Model VII** Level of reputation damage faced by businesses due to their location in this area	**Model VIII** Level of customer traffic reduction faced by businesses due to their location in this area	**Model IX** Level of difficulty in accessing financing faced by businesses due to their location in this area	**Model X** Level of supply chain problems faced by businesses due to their location in this area	**Model XI** Level of turnover reduction faced by businesses due to their location in this area
Social Vulnerability and Illegal Activities (SVIA) scale	0.073 (0.016)***	0.045 (0.015)***	0.074 (0.017)***	0.093 (0.016)***	0.043 (0.015)***	0.044 (0.014)***	0.087 (0.015)***	0.069 (0.016)***	0.054 (0.015)***	0.071 (0.016)***	0.102 (0.016)***
Public Safety and Infrastructure Quality (PSIQ) scale	-0.064 (0.028)***	-0.082 (0.032)***	-0.069 (0.032)***	-0.047 (0.031)	-0.086 (0.030)***	-0.020 (0.027)	-0.037 (0.029)	-0.101 (0.031)***	-0.023 (0.029)	-0.175 (0.028)***	-0.078 (0.029)***
Year 2014^	0.654 (0.169)***	0.601 (0.169)***	0.732 (0.173)***	0.397 (0.156)**	0.658 (0.168)***	1.525 (0.174)***	0.930 (0.174)***	0.330 (0.157)**	0.863 (0.176)***	-0.226 (0.164)	0.150 (0.156)
Year 2023^	1.072 (0.183)***	1.059 (0.179)***	1.093 (0.183)***	0.865 (0.182)***	1.758 (0.204)***	2.788 (0.205)***	1.559 (0.190)***	0.960 (0.179)***	1.704 (0.191)***	0.140 (0.184)	0.802 (0.180)***
Wald chi2	240.18	190.03	268.87	283.53	233.60	275.01	299.87	282.41	235.37	279.86	251.46
Prob>chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.272	0.258	0.307	0.305	0.308	0.314	0.314	0.296	0.271	0.367	0.358

Notes: The dataset covers the years 2008, 2014, and 2023. N=319. (^) The reference category is the year 2008. The models control for fixed effects based on businesses' location, and control for businesses' sector of operation, participants' gender, ethnicity, and ownership of the business, as well as business size and years of operation. Robust standard errors are presented in parentheses. (***) Statistical significance at the 1% level. (**) Statistical significance at the 5% level.

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Table 10. OLS Estimates. Location-Based Business Disruptions (LBBD) scale

	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII	Model IX
Level of illicit drug users' presence in this area	2.098 (0.340)***	-	-	-	-	-	-	-	-
Level of sex workers' presence in this area	-	0.992 (0.356)***	-	-	-	-	-	-	-
Level of homeless people's presence in this area	-	-	1.568 (0.384)***	-	-	-	-	-	-
Level of beggars' presence in this area	-	-	-	2.274 (0.341)***	-	-	-	-	-
Level of racial and ethnic minority ghettos (i.e., an area where a minority lives isolated) in this area	-	-	-	-	0.609 (0.317)*	-	-	-	-
Level of gang presence related to protection rackets in this area	-	-	-	-	-	2.069 (0.332)***	-	-	-
Level of gang presence related to robbery, burglary, or theft in this area	-	-	-	-	-	-	1.034 (0.355)***	-	-
Level of black-market presence related to illegal drugs, weapons, counterfeit goods, stolen items, etc., in this area	-	-	-	-	-	-	-	1.620 (0.326)***	-
Level of gang clashes (e.g., physical fights, shootings) over control of neighborhoods, drug dealing, etc., in this area	-	-	-	-	-	-	-	-	0.737 (0.403)*
Public Safety and Infrastructure Quality (PSIQ) scale	-0.766 (0.088)***	-0.983 (0.093)***	-0.873 (0.098)***	-0.729 (0.097)***	-1.075 (0.082)***	-0.729 (0.092)***	-0.977 (0.094)***	-0.849 (0.087)***	-1.024 (0.103)***
Year 2014^	3.635 (0.605)***	3.878 (0.639)***	3.715 (0.632)***	3.676 (0.614)***	4.005 (0.635)***	4.091 (0.629)***	3.917 (0.646)***	3.856 (0.622)***	3.951 (0.644)***
Year 2023^	7.320 (0.706)***	7.538 (0.734)***	7.498 (0.715)***	7.513 (0.698)***	7.555 (0.736)***	7.998 (0.705)***	7.656 (0.729)***	7.613 (0.716)***	7.521 (0.723)***
F	29.78	22.20	24.70	31.45	24.78	29.66	25.40	25.88	26.37
Prob>F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	0.776	0.751	0.760	0.777	0.746	0.776	0.752	0.764	0.748

Notes: The dataset covers the years 2008, 2014, and 2023. N=319. (^) The reference category is the year 2008. The models control for fixed effects based on businesses' location, and control for businesses' sector of operation, participants' gender, ethnicity, and ownership of the business, as well as business size and years of operation. Robust standard errors are presented in parentheses. (***) Statistical significance at the 1% level. (*) Statistical significance at the 10% level.

Table 11. OLS Estimates. Location-Based Business Disruptions (LBBD) scale

	Model I	Model II	Model III	Model IV	Model V
Social Vulnerability and Illegal Activities (SVIA) scale	0.481 (0.045)***	0.531 (0.046)***	0.592 (0.046)***	0.568 (0.051)***	0.569 (0.044)***
Level of police presence in this area	-1.621 (0.357)***	-	-	-	-
Level of law enforcement in this area	-	-1.147 (0.363)***	-	-	-
Level of policy actions by policymakers to protect businesses from criminality in this area	-	-	-0.528 (0.384)	-	-
Level of the quality of public infrastructure in this area	-	-	-	-0.710 (0.422)***	-
Level of policy actions among policymakers in the regeneration of this area	-	-	-	-	-0.971 (0.397)**
Year 2014^	3.739 (0.631)***	3.616 (0.640)***	3.744 (0.650)***	3.779 (0.646)***	3.758 (0.637)***
Year 2023^	8.009 (0.647)***	8.120 (0.672)***	8.341 (0.674)***	8.353 (0.675)***	8.197 (0.675)***
F	29.29	27.73	26.59	27.06	27.51
Prob>F	0.000	0.000	0.000	0.000	0.000
R-squared	0.786	0.778	0.773	0.774	0.776

Notes: The dataset covers the years 2008, 2014, and 2023. N=319. (^) The reference category is the year 2008. The models control for fixed effects based on businesses' location, and control for businesses' sector of operation, participants' gender, ethnicity, and ownership of the business, as well as business size and years of operation. Robust standard errors are presented in parentheses. (***) Statistical significance at the 1% level. (**) Statistical significance at the 5% level.

Table 12. OLS Estimates. Location-Based Business Disruptions (LBBD) scale			
	Model I	**Model II**	**Model III**
Social Vulnerability and Illegal Activities (SVIA) scale	0.372 (0.063)***	0.362 (0.074)***	0.443 (0.069)***
Public Safety and Infrastructure Quality (PSIQ) scale	-0.644 (0.124)***	-0.824 (0.137)***	-0.613 (0.123)***
GDP	-0.045 (0.005)***	-	-
Risk of poverty or social exclusion	-	0.213 (0.105)**	-
Year 2008^	-	-	-3.295 (1.390)**
Social Vulnerability and Illegal Activity (SVIA) scale × Year 2008^	-	-	-0.126 (0.067)*
F	28.60	20.04	28.77
Prob>F	0.000	0.000	0.000
R-squared	0.748	0.682	0.756

Notes: *The dataset covers the years 2008, 2014, and 2023. N=319. (^) The reference category is the years 2014 and 2023. The models control for fixed effects based on businesses' location, and control for businesses' sector of operation, participants' gender, ethnicity, and ownership of the business, as well as business size and years of operation. (***) Statistically significant at the 1% level. (**) Statistically significant at the 5% level. (*) Statistically significant at the 1% level.*