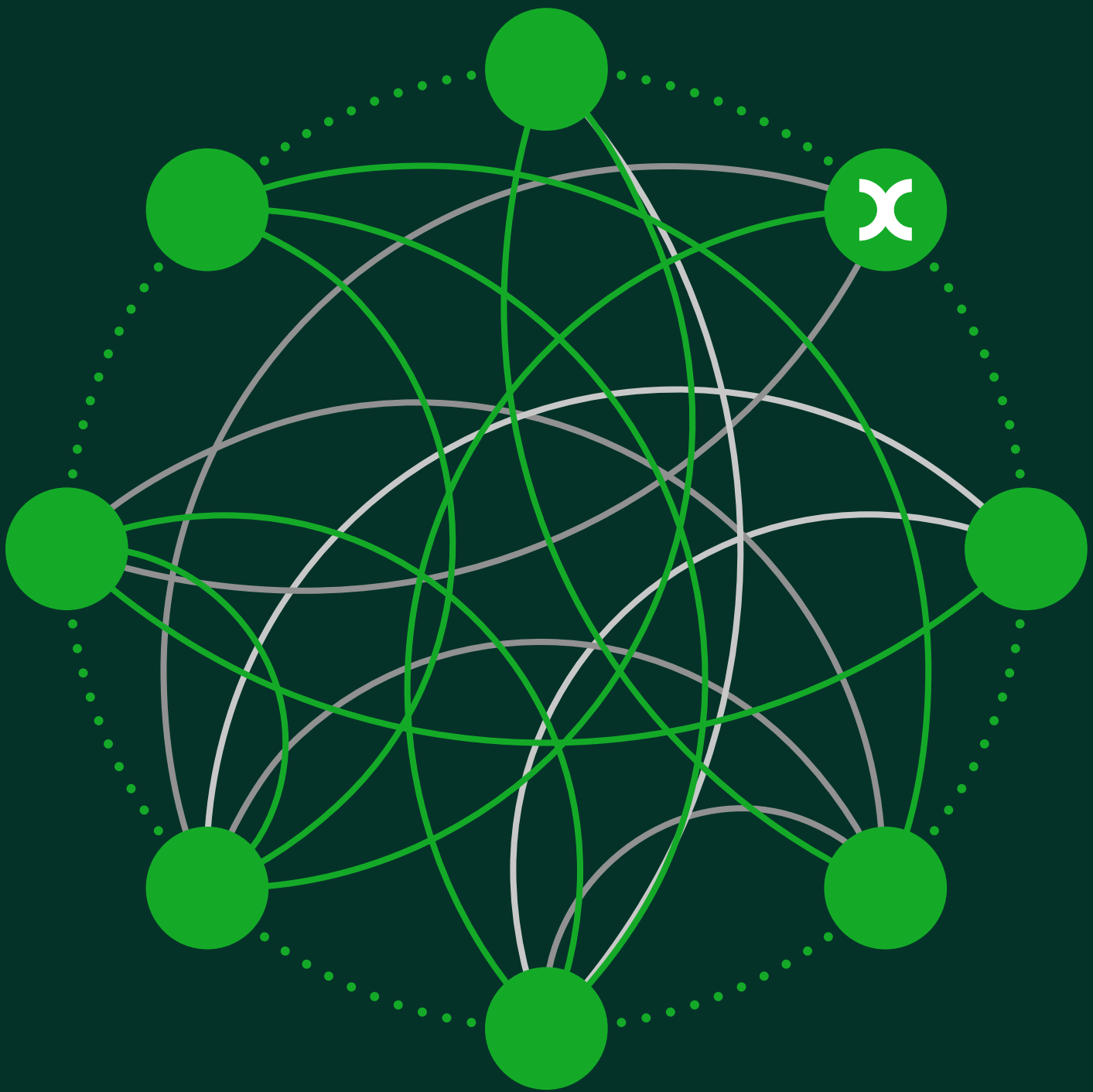
Short-term rentals and public policy intervention in the EU

—

A practical framework to assess necessity, causality and proportionality

20 February 2026



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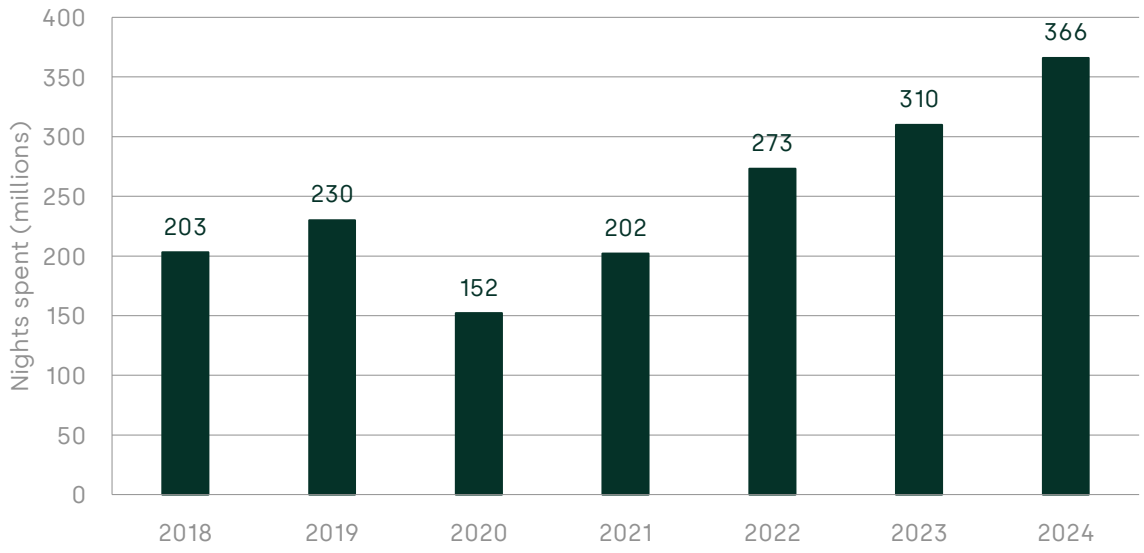
Executive summary

Short-term rental (STR) accommodation has become more popular over the last five years. In 2024 there were 366m nights spent in short-stay accommodation booked via online platforms in the EU, compared with 230m in 2019. This growth occurs within the broader context of Europe's standing as the world's most popular tourist destination.[1]

Figure 1.1 Guest nights spent in short-term accommodation in the EU booked via online platforms (2018–24)



Source: Eurostat CETOUR monthly 202501 F1, Q3 guest nights in the EU, 2018–24, accessed 19 February 2026.

As demand for STRs has grown, housing costs in many cities have increased. This has led to lower housing affordability. In some locations, increasing tourism has affected the urban environment, e.g. the structure of amenities and services.

In response, local authorities across the EU have introduced various STR restrictions to address housing concerns and protect the urban environment. While the introduction of STR has coincided with lower housing affordability and environmental concerns, it is not clear whether there is a causal relationship between STRs and these social outcomes. If there is a causal relationship, it may be appropriate to intervene in the market. When intervention is warranted, best practice is to choose the least distortive measure that remedies the failure—consistent with, and required by, the EU principle of proportionality.

[1] According to the United Nations World Tourism Organisation (UNWTO), Europe accounts for 50% of the world's tourist arrivals, making it the most visited continent. The UNWTO data shows that inbound arrivals into Europe totalled approximately 747m in 2024.

This aligns with the principles of the EU's Better Regulation Agenda,[2] which argues for evidence-based decision-making, impact assessments, and stakeholder consultation. This report, commissioned by Booking.com, aims to provide a methodological framework that supports such an evidence-based approach to STR regulation, and serves as a one-stop reference for local authorities.

1 The legal framework

The EU Directive 2006/123/EC of 12 December 2006 on services in the internal market ('Services Directive')[3] establishes rules to ensure the freedom of establishment and provision of services in the EU internal market. The main goals of the Services Directive are to protect service providers (including STR hosts) and to promote non-discriminatory access to services across Member States. The Services Directive sets out the conditions that Member States must respect when setting authorisation schemes (i.e. when service providers are required to be approved before operating) or requirements for services (i.e. when service providers are requested to comply with certain obligations such as health and safety or quantitative restrictions). We refer to both authorisation schemes and requirements under the umbrella term 'measure' in this report.

The diagram below illustrates the substantive requirements for STR measures under the relevant articles of the Services Directive.[4]

In particular, STR measures must:[5]

- be **non-discriminatory**: the measure must not discriminate against the service provider;
- be **necessary**: the measure must be indispensable to achieve the public objective;
- be **proportionate**: the measure must be suitable and not exceed what is needed to achieve the objective, i.e. balance between benefits and restrictions.

[2] European Commission, 'Better Regulation', https://commission.europa.eu/law/law-making-process/better-regulation_en, accessed 19 February 2026
[3] European Parliament (2006), DIRECTIVE 2006/123/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32006L0123.
[4] Articles 9, 15, and 16 of the Services Directive.
[5] For an explanation of the relevant EU legal precedents of these tests, see, for example, Sauter, W. (2013), 'Proportionality in EU Law: A Balancing Act?', *Cambridge Yearbook of European Legal Studies*, **15**, pp. 439–66.

To satisfy these requirements, it is important to understand why a causal impact analysis is essential when assessing the impact of STRs on rental prices. This is because rental price increases can also be driven by other factors, such as housing supply shortages, improvements in neighbourhood desirability, and inflation. Simply observing trends shows that these factors may move together (correlation), but it does not establish which factor is driving the change (causation).

Causal impact analysis is essential for understanding the true effects of market developments, such as increased STR usage, and policy interventions such as STR restrictions. By distinguishing correlation from causation, it provides a clearer estimate of whether—and to what extent—a rise in STRs is responsible for increasing rental prices.

A more accurate understanding of the causal impact of STRs enables policymakers to implement more effective and proportionate interventions when necessary. For instance, if rising rental prices in a given area are largely driven by factors such as a slowdown in new housing supply relative to population growth, restricting STRs is unlikely to improve long-term rental (LTR) prices or increase housing availability for local residents.

Without causal impact analysis, STR restrictions could be applied to the wrong geographic areas. For example, a city-wide STR ban might be introduced when, in reality, STR-driven rental price increases are concentrated in only a few neighbourhoods. In such cases, a broad ban is unlikely to achieve the intended outcome of lowering city-wide rental prices. At the same time, the economic costs, such as decreasing tourism revenues, of a blanket STR ban could outweigh the limited benefits of reducing rental prices in specific neighbourhoods of a city.

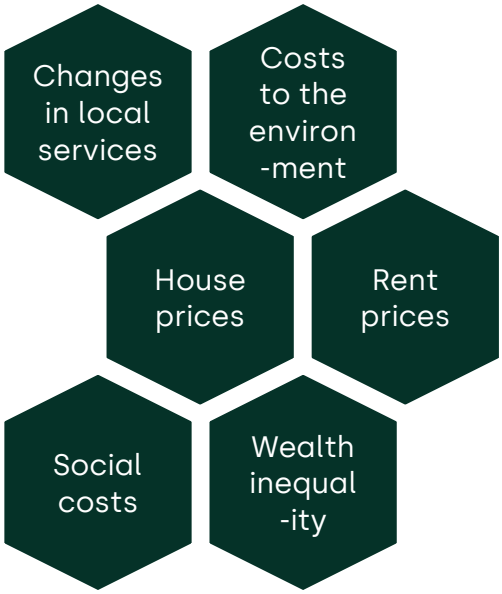
2 Assessing the necessity test

Within the legal framework to assess STR measures provided by the Services Directive, the first step is for local authorities to establish the **necessity** condition. This means that the measure must be **necessary** to achieve or further one or more:

- public interest objectives (under Articles 9 and 15 of the Services Directive); or
- reasons of public policy, public security, public health or the protection of the environment (under Article 16 of the Services Directive).

To argue that a measure is necessary to further a public policy objective, it must be justified by means of an economic analysis, and in particular, may be usefully articulated through the framework of **market failure**. Market failures are outcomes that arise due to the failure of the market to allocate resources in a socially optimal way.

In the context of STRs, authorities may be concerned that STR activity imposes negative externalities—costs borne by third parties rather than hosts or renters. These may include housing shortages, reduced affordability, or other costs shown below.

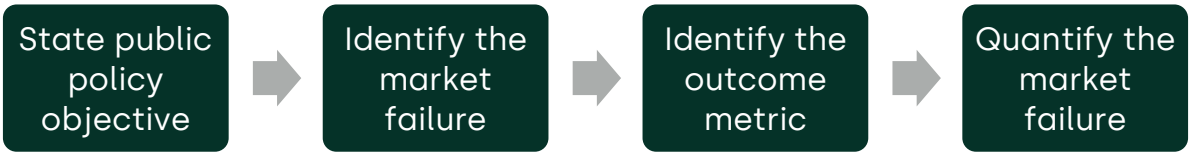


Since STR hosts do not factor these public costs into their pricing decisions, the market may oversupply STRs relative to the socially optimal level, depending on the extent of these external costs.

In the case of STR restrictions, valid public policy objectives according to Articles 9, 15 and 16 of the Services Directive would likely fall into one of the following categories:

- housing affordability;
- protection of the urban environment.

The diagram below demonstrates the four-step process that local authorities will need to follow in order to satisfy the necessity test.



Local authorities must clearly define the scope of the market failure when assessing the impact of STRs. This includes identifying the affected geographic areas, types of LTR properties, or specific STR concentrations that generate negative externalities.

Any negative externalities will need to be measured (possibly against the positive externalities) by means of a **quantitative analysis**. This requires the local authorities to first determine the relevant outcome metrics that best reflect the public policy objective.

Housing affordability can be assessed through quantitative metrics that measure the cost of renting relative to household income, broader economic conditions, and housing supply. These metrics can provide a comprehensive understanding of whether rents are within reach for the population. Such metrics are usually based on (i) total changes in LTR rent; (ii) average/median income of residents or households in the relevant geographic area; or (iii) rental inflation, in comparison to consumer price inflation.

In the case of **protection of the urban environment**, local authorities must first identify which aspect(s) of the urban environment they are interested in protecting, e.g. environmental health, accessibility, infrastructure or social wellbeing. STRs can significantly affect several of these metrics, particularly those relating to social dynamics, infrastructure and economic wellbeing. Defining a quantifiable metric depends on the nature of the neighbourhood and the specific issues relating to an area.

Crucially, establishing a causal link between STR activity and these metrics is key to justifying policy interventions. Authorities can then use data analysis to test the existence and extent of this causal relationship.

3 Establishing a causal link

Control and treatment groups

The gold standard for estimating causal effects involves comparing outcomes between control and treatment groups, a method rooted in Randomised Controlled Trials (RCTs).

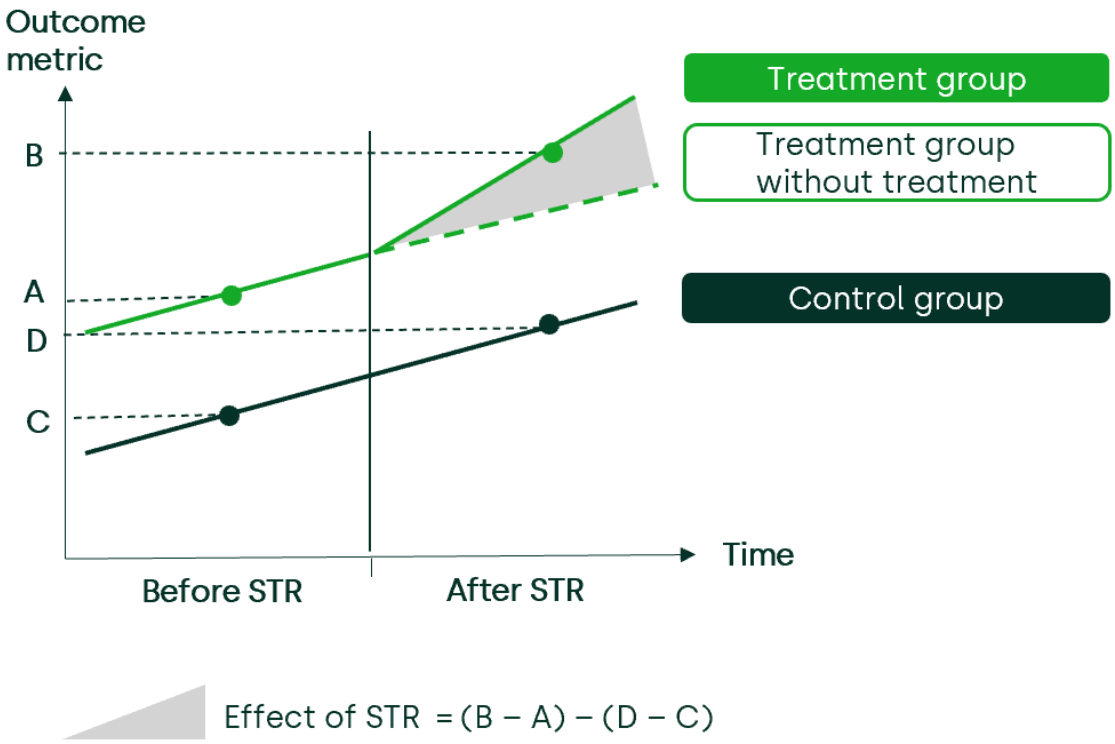
In the case of assessing the causal impacts of STR, the treatment is an introduction or large increase in STR activity over a specified time period, so the treatment group corresponds to a geographic area (or set of properties (e.g. dwelling types) in the geographic area) in which STR activity increased over this time period. The control group is an otherwise comparable geographic area (or set of properties) that did not experience an increase in STR activity. There are certain aspects of RCTs that are not feasible in this case, for example randomising STR activity across different areas. Nevertheless, the principles of this method provide a useful starting point for conducting a causal impact study of STR.

To isolate the causal impact of STRs, selecting a suitable control group is crucial. The control group should:

- **be similar:** resemble the treatment group in demographics, economic conditions, and geographic traits that may influence LTR prices;
- **avoid spillover effects from treatment:** remain unaffected by STR activity in nearby areas;
- **have adequate historical data:** provide sufficient pre-treatment data to establish baseline trends.

The causal impact of the treatment is calculated as the difference in the outcome metric between treatment and control, during and after an STR increase, i.e. a double-difference, also known as a **Difference-in-Differences (DiD)** approach. The DiD method works by controlling for any common time-varying factors (e.g. economic shifts, policy changes) that might affect both groups, and also any group-specific factors (e.g. population density, public transport links), thereby isolating the causal impact of the STR increase itself. This is illustrated in the diagram below.

Figure 1.2 Illustration of DiD approach



Source: Oxera.

Regression analysis with an Instrumental Variables approach

Local authorities may face challenges in identifying suitable treatment and control groups with sufficient data for robust causal analysis. While the control and treatment groups approach provides the most robust way to assess causal impacts, an Instrumental Variables (IV) approach offers an alternative for estimating causal effects.

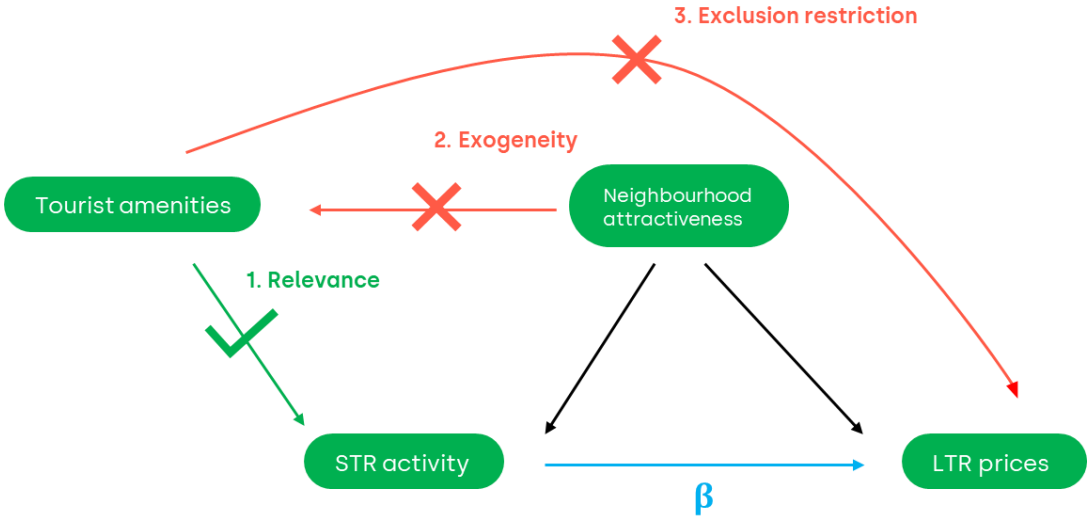
This method allows the researcher to **directly isolate** the causal effect of STR activity on the outcome variable, e.g. LTR rents. The approach works by identifying a third variable (neither the outcome nor an explanatory variable) which, importantly, strongly influences STR activity, known as an **instrumental variable**.

IV analysis helps isolate the effect of STR activity on outcomes such as LTR prices by controlling for observable factors that may also affect LTR prices, such as:

- **demographics:** such as household income, population density, and family size;
- **neighbourhood characteristics:** such as amenities, transport links, and crime rates;
- **macroeconomic conditions:** such as interest rates, GDP, and inflation.

The causal effect is then isolated by examining the instrumental variable's relationship with STR activity and its relationship with the outcome. For this approach to be valid, the instrumental variable must not suffer from the same confounding problems as STR activity and also must not affect the outcome directly—only indirectly through STR activity. This is illustrated in the diagram below.

Figure 1.3 Illustration of IV approach



Source: Oxera.

4 Assessing proportionality

A proportionate measure is likely to be one that addresses market failures with minimal market distortion, i.e. it is the least-restrictive policy intervention. To identify such a measure, local authorities should evaluate a range of interventions and select the one that effectively mitigates the issue while imposing the least cost to society. This applies even if a measure is assessed to pass the necessity test, i.e. it is indispensable for achieving the public-interest goal.

In practice, the findings from the causal impact analysis are useful in informing local authorities in assessing proportionality. First, the causal impact analysis provides an evidence base on, for example, whether an increase in STR causes a corresponding increase in rental prices and/or shortage of LTR supply in a meaningful way. Second,

depending on how the causal impact analysis is set up, it may be able to provide evidence identifying the relevant geographic area(s) where the impact of STR is indeed meaningful and thus would benefit from a measure to restrict STR.

It is important to be aware that if negative market outcomes exist, they are likely to exhibit a non-linear relationship with STR activities. More specifically, a low level of STR activities is unlikely to cause housing affordability and/or urban environment concerns. Therefore, STR measures would only be appropriate where impacts of STR can be evidenced to substantially contribute to these issues.

The link between the necessity and proportionality tests manifested here is consistent with what has been explored in the legal literature on the topic. To test proportionality, EU legal precedent sets out tests for the 'balancing of costs and benefits',[6] specifically employing the Least-Restrictive Means Test for this purpose, i.e. a test of whether the same level of protection cannot be provided by the alternative measures available (which are 'equally effective').

The proportionality test, therefore, requires local authorities to consider the full costs and benefits of such measures. For example, it would not be considered proportionate to impose a city-wide ban where there is a shortage only in certain types of housing, e.g. one-bedroom apartments, or in certain geographic areas. The more restrictive a measure, the more likely it is to incur a high cost to the wider economy and residents in the form of lost income and employment from tourism.

Moreover, the impact of tourism entails a broad spectrum of (both social and economic) costs and benefits, necessitating a rigorous cost–benefit analysis (CBA) to evaluate policy implications effectively. Given this complexity, a prudent policy approach would favour minimally distortive market interventions to mitigate the risk of unintended consequences.

While some of the data required for the analyses in this report may not be readily available to local authorities, it is important that they make every effort to obtain the necessary data to ensure robust analysis. The recent adoption of the EU Short-Term Rental Regulation (EUSTRR), coming into effect this year, marks a significant step towards greater transparency and data availability in the STR sector. The EUSTRR explicitly aims to facilitate a more informed approach to policy with the availability of comprehensive data.

This report, commissioned by Booking.com, outlines a range of approaches with varying data requirements, allowing authorities to choose methods that best suit their specific circumstances. When sufficient data is unavailable for rigorous analysis, authorities should validate the policy's impact once relevant data becomes available. This ensures that any intervention remains evidence-based and proportionate.

Sauter, W. (2013), 'Proportionality in EU Law: A Balancing Act?', *Cambridge Yearbook of European Legal Studies*, **15**, pp. 439–66.

1 Introduction

Tourism has both benefits and costs. Europe, as the world's most popular tourist destination, heavily relies on a thriving and well-regulated tourism sector. A well-established body of literature examines the costs and benefits of tourism from both economic (including financial) and social perspectives.[7] Economic benefits include job creation, industry diversification, and increased business activity. Tourism also contributes to industry diversification and supports regional economic development.[8]

Beyond economic gains, tourism can also drive social and cultural benefits. It can support the preservation of valued natural environments, flora, and fauna, enhance the variety of attractions and facilities available to residents, and create more opportunities for social and cultural exchange.[9]

Conversely, the literature also highlights several costs associated with tourism. These include the reliance on imported goods and services to meet tourist demand, which can crowd out locally produced alternatives, as well as increased pollution, congestion, and the degradation of fragile environments. Additionally, tourism growth can lead to adverse sociocultural impacts and may hinder the development of other sectors.

In recent years, local authorities across various EU jurisdictions have attempted to address concerns such as housing affordability, availability, and the preservation of urban environments through a range of restrictions, specifically aiming at STRs. STRs in the EU context refer to furnished properties rented out for short periods, typically less than a month, whereas LTRs involve leases lasting multiple months, intended as tenants' primary residences.

Several high-profile measures have been introduced in major European cities, and the European Commission has weighed in on the legal aspects of some of these measures. It emphasised that any restrictions must be appropriate, non-discriminatory, and proportionate. For example, in the case of Barcelona's proposed city-wide ban,[10] the Commission services conclude that 'in the case at hand the **suitability** of the restrictions to attain the pursued objective **has not been demonstrated**'. [Emphasis original]

In line with the EU's commitment to evidence-based decision-making under its Better Regulation Agenda, this report, commissioned by Booking.com, presents methodologies to support local authorities. The Better Regulation Agenda's emphasis on robust evidence is important given ongoing discussions about improving the functioning of the EU's internal

[7] Dwyer, L. and Forsyth, P. (1993), 'Assessing the benefits and costs of inbound tourism', *Annals of Tourism Research*, **20**, pp. 751–68.
[8] There may be further economic benefits when considering multiplier effects—where economic activity expands further as businesses supply additional inputs to the tourism sector and local residents increase spending due to higher incomes. See, for example, Ennew, C. (2003), 'Understanding the Economic Impact of Tourism', Som Nath Chib Memorial Lecture.
[9] Dwyer, L. and Forsyth, P. (1993), 'Assessing the benefits and costs of inbound tourism', *Annals of Tourism Research*, **20**, pp. 751–68.
[10] European Commission, 'Notifications of requirements under the Services Directive, Article 15(7) and 39(5)', https://ec.europa.eu/internal_market/imi-net/repositories/services-directive-notifications/spain_en.htm.

market for services. Reports by prominent figures such as Mario Draghi[11] and analyses from the IMF highlight the persistent fragmentation of the internal market, noting that high trade barriers for services within Europe can be equivalent to an ad valorem cost of 110%.[12] This fragmentation underscores the importance of clear, evidence-based guidance for Member States on how to apply the Services Directive. We also acknowledge that there is often a lack of clarity in academic literature on how to properly operationalise the principle of proportionality in the Services Directive; this report aims to provide practical guidance in this context.

Furthermore, the recent adoption of the EU Short-Term Rental Regulation (EUSTRR), coming into effect this year, marks a significant step towards greater transparency and data availability in the STR sector. The EUSTRR explicitly aims to facilitate a more informed approach to policy with the availability of comprehensive data. This report directly supports these objectives by providing analytical frameworks to assess whether STR measures, and if so what form of measures, would be suitable to address specific public policy concerns. The methodologies are grounded in well-established economic literature and take into account legal requirements, data availability, and technical feasibility.

The report is structured as follows.

- **Section 2** outlines the motivation for this report, considering both economic analysis and legal frameworks, including necessity, causal link, and proportionality tests.
- **Section 3** discusses how to assess the necessity test, with a focus on identifying policy objectives, market failures, and measurable outcome metrics.
- **Section 4** explores methodologies for establishing a causal link between STR increase and identified market failures.
- **Section 5** examines the proportionality of potential STR measures, evaluating the necessity and causal impact findings, as well as broader cost–benefit considerations.
- **Section 6** concludes the report with key takeaways.

This report aims to equip policymakers with a structured, evidence-based approach in STR policy intervention considerations, ensuring that any measures adopted are demonstrated to be necessary and proportionate.

[11] Draghi, M. (2024), 'The future of European competitiveness', https://commission.europa.eu/topics/eu-competitiveness/draghi-report_en.
[12] International Monetary Fund (2024), 'Regional Economic Outlook – A recovery short of Europe's full potential', https://www.imf.org/en/Publications/REO/EU/Issues/2024/10/24/regional-economic-outlook-Europe-october-2024.

2 Motivation for this report: why is causal impact analysis important?

2.1 What is causal impact and why is it important?

Media reports and local authority decisions on STR restrictions often cite correlations between observed trends—such as rising rental prices and increased STR usage within the same timeframe. A common conclusion drawn from this correlation is that the growth of STRs directly causes negative outcomes, such as rental price increases, leading local authorities to implement policy interventions to restrict STRs as a solution.

Although a high concentration of STRs in an area can negatively affect local markets, fluctuations in rental prices can also be influenced by other factors. These include housing supply shortages, shifts in neighbourhood desirability, and population growth,[13] as well as changes in interest rates and inflation. LTR price increases are not influenced by one single factor, but result from a combination of demand and supply factors, economic conditions, market dynamics and policy decisions. Simply observing trends shows that these factors may move together (correlation), but it does not establish which factor is driving the change (causation).

Causal impact analysis is essential for understanding the true effects of market developments, such as increased STR usage, and policy interventions, such as STR restrictions. By distinguishing correlation from causation, it provides a clearer estimate of whether—and to what extent—a rise in STRs is responsible for increasing rental prices.

A more accurate understanding of the causal impact of STRs enables policymakers to implement more effective and proportionate interventions when necessary. For instance, if rising rental prices in a given area are largely driven by factors such as a slowdown in new housing supply relative to population growth, restricting STRs is unlikely to improve LTR prices or increase housing availability for local residents.

Without causal impact analysis, STR restrictions could be applied to the following.

- **The wrong geographic scope**: for example, a city-wide STR ban might be introduced when, in reality, STR-driven rental price increases are concentrated in only a few neighbourhoods. In such cases, a broad ban is unlikely to achieve the intended outcome of lowering city-wide rental prices. At the same time, the economic costs of a blanket STR ban could outweigh the limited benefits of reducing rental prices in specific neighbourhoods of a city.
- **The wrong type of accommodation**: for instance, if STR restrictions apply to main residences rather than secondary residences, the measure would not combat housing shortage as main residences are in any case not leased on the market, unlike holiday homes.
- **Short-term fixes rather than long-term solutions:** STR restrictions may provide temporary relief, but fail to address underlying housing shortages caused by

[13] Including increased demand from industries like tech in cities such as San Francisco, London, and Berlin, as well as higher housing demand in suburban and secondary markets due to the rise of remote work.

inadequate new housing supply, ineffective zoning policies, or broader economic factors.

- **Situations where economic costs outweigh benefits**: blanket restrictions may reduce STR-related economic benefits such as tourism revenue, job creation, and local business support, ultimately harming local economies more than they help.

These considerations highlight the broader challenge of assessing the effects of STRs within the larger economic and social context. In particular, STRs offer significant benefits by (i) supporting local economies through job creation and visitor spending; (ii) providing diverse, flexible, and affordable lodging options for travellers; (iii) optimising housing stock and incentivising property maintenance; (iv) generating tax revenue; and (v) promoting balanced tourism growth. We discuss the 'balancing of costs and benefits' test in more detail in section 5.

2.2 The relevant legal framework for assessing STR measures

The EU Directive 2006/123/EC of 12 December 2006 on services in the internal market ('Services Directive') establishes rules to ensure the freedom of establishment and provision of services in the EU internal market.[14] The main goals of the Directive are to protect service providers (including STR hosts) from unwarranted intervention and to promote non-discriminatory access to services across Member States. The Directive sets out the conditions that Member States must respect when setting authorisation schemes (i.e. when service providers are required to be approved before operating) or requirements for services (i.e. when service providers are requested to comply with certain obligations such as health and safety or quantitative restrictions). We refer to both authorisation schemes and requirements under the umbrella term 'measure' in this report.

The diagram below illustrates the substantive requirements for STR measures under Articles 9, 15 and 16 of the Services Directive.[15]

[14] European Parliament (2006), DIRECTIVE 2006/123/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32006L0123.

[15] Article 9 of the Services Directive stipulates that any requirement for a business to obtain authorisation before providing services must be non-discriminatory, justified by an overriding reason of public interest, and proportionate. Article 15 requires Member States to review their existing laws and remove any unjustifiable or disproportionate burdens on service providers, such as fixed tariffs or restrictions on the number of establishments. Lastly, Article 16 establishes the fundamental right for businesses to provide services in any EU Member State without being subject to discriminatory, unnecessary, or disproportionate national requirements, thereby facilitating cross-border service provision.

In particular, STR measures must:[16, 17]

- **be non-discriminatory**: the measure must not discriminate against the service provider;
- **be necessary**: the measure must be indispensable to achieve the public objective;
- **be proportionate**: the measure must be suitable and not exceed what is needed to achieve the objective, i.e. balance between benefits and restrictions. The objective pursued cannot be attained by means of a less restrictive measure.

Both necessity and proportionality require a **causal link** between the measure and the intended public interest goal to be established. We discuss the evidence and analysis required for each test in the following sections. Although some data needed for the analyses in this report may not be immediately available to local authorities, they should take all reasonable steps to obtain it so the resulting analysis is robust. The EUSTRR will significantly improve data availability for local authorities, enabling them to better monitor STR activity and thus conduct the more rigorous evidence-based analyses as outlined in this report. This report outlines a range of approaches with varying data requirements, allowing authorities to choose methods that best suit their specific circumstances. When sufficient data is unavailable for rigorous analysis, authorities should validate the policy's impact once relevant data becomes available. This ensures that any intervention remains evidence-based and proportionate.

[16] For an explanation of the relevant EU legal precedents of these tests, see, for example, Sauter, W. (2013), 'Proportionality in EU Law: A Balancing Act?', *Cambridge Yearbook of European Legal Studies*, **15**, pp. 439–66.
[17] European Commission (2022), 'Handbook on the implementation of the Services Directive', https://op.europa.eu/en/publication-detail/-/publication/60e2d020-6c6f-11ed-9887-01aa75ed71a1.

Box 2.1 EUSTRR data

The EUSTRR will significantly enhance the data available to local authorities. Specifically, Article 5 of the Regulation requires hosts to provide essential information when registering their properties, including details about the unit itself (e.g. address, type, number of beds), whether it is a primary or secondary residence, and the host's identity and contact details.

Furthermore, under Article 9(1), online STR platforms must transmit data monthly to the competent authorities through the Member State's Single Digital Entry Point, but only for the areas authorities have requested. This data includes:

1 the number of nights a unit has been rented;
2 the number of guests per night for the unit;
3 the guests' countries of residence;
4 the registration number of the unit provided by the host;
5 the specific address of the unit;
6 the URL of the listing of the unit.

Data-sharing under the EUSTRR applies only from the Regulation's entry into force onward; historical data will not be made available.

Source: Oxera based on European Parliament and the Council of the European Union (2024), Regulation (EU) 2024/1247 of the European Parliament and of the Council of 24 April 2024 on data collection and sharing relating to short-term accommodation rental services and amending Regulation (EU) 2018/1724, https://eur-lex.europa.eu/eli/reg/2024/1028/oj/eng.

3 How to assess the necessity test

3.1 What is the necessity test?

Within the legal framework to assess STR measures provided by the Services Directive, the first step is for local authorities to establish the **necessity** condition. This means the measure must be **necessary** to achieve or further one or more:

- public interest objectives (under Articles 9 and 15 of the Services Directive); or
- reasons of public policy, public security, public health or the protection of the environment (under Article 16 of the Services Directive).

To argue a measure is necessary to further a public policy objective, it must be justified by means of an economic analysis, and in particular, may be usefully articulated through the framework of **market failure**. Market failures are outcomes that arise due to the failure of the market to allocate resources in a socially optimal way, such that society as a whole can be made better off through market intervention (see Box 3.1 for a more detailed explanation).

In this case, authorities may be concerned that STR activity imposes **negative externalities** (i.e. external costs not borne by the host or renter) on third parties or markets, such as housing and LTR shortages, non-affordability, or damage to the urban environment.

Since private parties within the market (e.g. STR hosts) do not take into account public policy issues when they decide whether to let a property as an STR (or what price to set), these external costs are not passed on in market prices, leading to the market over-supplying STR relative to the socially optimal level, where the degree of over-supply depends on the magnitude of the external costs imposed on third parties.[18]

Box 3.1 The economics of 'market failure'

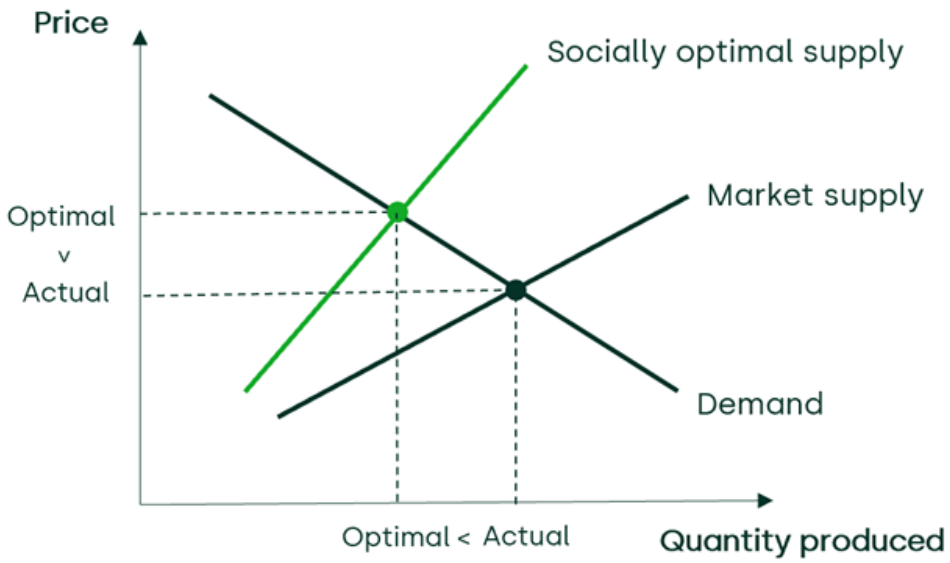
The term 'market failure' is used to describe a situation where a market will under- or over-supply certain goods or services relative to the socially optimal level, leading to sub-optimal outcomes. Therefore, this term refers to a 'failure' of the market to allocate resources in a socially efficient way. In such cases, markets can lead to an inefficient allocation of resources (relative to the socially optimal benchmark).

The figure below demonstrates how the existence of an externality (one type of

[18] The mechanism of this over-supply is similar to a situation in which a seller ignores a certain cost involved in producing a good, thereby making them more willing to supply the good compared with if they knew the true (total) cost. This results in an over-production relative to the optimal amount from a profit-maximising perspective. From a welfare-maximising perspective, these 'ignored' costs may include external costs imposed on third parties.

market failure) can lead to a market providing a particular good or service in higher amounts than is socially optimal.

Graphical depiction of a market failure



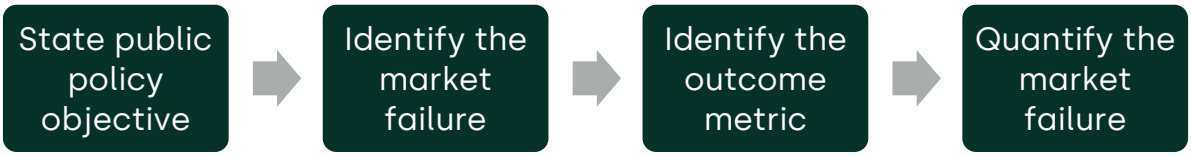
Note: In a competitive market, the price and amount of STR are determined by the intersection of supply and demand curves. The socially optimal supply (green curve) takes into account the social costs of STR imposed on the environment, whereas the market supply does not.
Source: Oxera.

In the situation above, society as a whole can be made 'better off' if the volume of the good or service produced was restricted to the optimal amount, and not left to the market. For example, if the external costs were internalised (e.g. through taxes), this could align the actual amount provided by the market with the socially optimal amount that is desirable for society.

Another example of a market failure is in the case of the market provision of public goods, such as green spaces or street lights. In these cases, the *non-rivalry* and *non-excludability* of these resources leads to a 'free-rider' problem, in which people have little incentive to pay for them, and as such, these resources are under-produced by the market (relative to the socially optimal level).

Figure 3.1 below demonstrates the four-step process that local authorities will need to follow in order to satisfy the necessity test.

Figure 3.1 Process of satisfying the necessity test



Source: Oxera.

In particular, local authorities will need to do the following.

1 **State the public policy objective(s)** which satisfies the conditions laid out in the Services Directive.
2 **Identify the relevant market failure** (i.e. how STR activity might lead to sub-optimal outcomes according to the public policy objectives).
3 **Identify the outcome metric** to be able to measure the extent of the market failure.
4 **Quantify the market failure** using data (i.e. estimate a causal link between STR and a deterioration in the quantifiable outcome metric).

The first three steps will be addressed in the remainder of this section. The fourth step will be addressed in section 4.

3.2 Identify the public policy objective

To justify the market intervention, local authorities must first present a relevant and valid public policy objective, which is used to articulate the market failure. Without first establishing the public policy objective, it is impossible to determine what the 'optimal' outcome of a market would look like, and therefore to articulate in what sense a particular market leads to sub-optimal outcomes from a social welfare perspective.

In the case of STR restrictions, valid public policy objectives according to Articles 9, 15 and 16 of the Services Directive would likely fall into one of the two following categories.[19]

1 **Housing affordability.**
2 **Protection of the urban environment.**

[19] European Commission (2018), 'Summary of Workshops on short-term accommodation rental services discussed during conference', 10 October, https://ec.europa.eu/docsroom/documents/32062/attachments/1/translations/en/renditions/native.

For example, if the public policy objective is the protection of the urban environment, then any market that causes worse environmental outcomes can be said to be sub-optimal, i.e. a market failure.

European Union Member States have implemented restrictions on STR activities due to concerns over urban environmental degradation, displacement of local residents, and escalating property and rent prices. Notable examples include the below.

- **Budapest, Hungary:** in September 2024, Budapest's sixth district held a referendum to potentially ban STRs. Mayor Tamas Soproni highlighted issues such as housing affordability and availability and residents' quality of life.[20]
- **Barcelona, Spain**: in June 2024, Mayor Jaume Collboni announced plans to prohibit tourist-oriented STRs by the end of 2028, aiming to address housing shortages and preserve community life.[21]
- **Palma de Mallorca, Spain**: the city voted to ban almost all STR listings after a 50% increase in tourist lets led to a 40% rise in residential rents and exacerbated housing affordability issues for locals.[22]
- **Berlin, Germany**: the city implemented the Zweckentfremdungsverbot law, restricting landlords from renting out entire properties without a permit, to combat the shortage of affordable housing.[23]

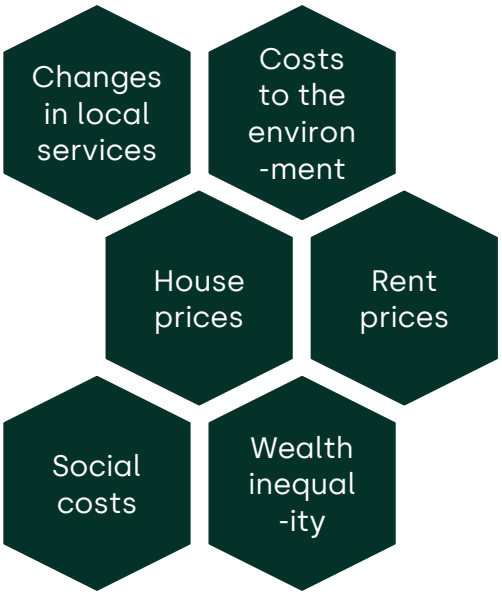
3.3 Identify the market failure

After establishing the goal of the market intervention, local authorities must then articulate the market failure(s), i.e. how, without intervention, the relevant market (STR market in this case) leads to a sub-optimal outcome according to the public policy objectives. The existence of a market failure requires the existence of a (negative) **causal effect** of the market activity on the outcome of interest, rather than a mere statistical correlation. This is discussed in section 4.

There are several forms of market failure—in this case, market failure may be best articulated using the concept of **negative externalities**. As explained in Box 3.1, negative externalities are costs imposed on third parties (i.e. those not involved in a transaction), which are not reflected in market prices. Examples of externalities of STR are illustrated in Figure 3.2 below.

[20] Reuters (2024), 'Budapest district votes on banning short-term rentals', September, https://www.reuters.com/world/europe/budapest-district-votes-banning-short-term-rentals-2024-09-05/, accessed 19 February 2026.
[21] Starcevic, S. (2024), 'Five European cities taking on short-term rentals', November, https://www.politico.eu/article/5-european-cities-taking-on-short-term-rentals/, accessed 19 February 2026.
[22] Reuters (2018), 'Palma in Spain's Balearic islands bans almost all Airbnb-style rentals', https://www.reuters.com/article/business/palma-in-spains-balearic-islands-bans-almost-all-airbnb-style-rentals-idUSKBN1HX1VX/, 26 April, accessed 19 February 2026.
[23] Reuters (2016), 'Berlin court upholds short-term home rental ban' https://www.reuters.com/article/markets/berlin-court-upholds-short-term-home-rental-ban-idUSL8N19035F/, 8 June, accessed 19 February 2026.

Figure 3.2 Examples of negative externalities of STR



Source: Oxera.

In particular, externalities of STR might include the following.

- **Environmental costs (noise, pollution, congestion) due to increased tourism:** local authorities may be concerned that neighbourhoods with heavy STR activity experience higher noise levels and physical overcrowding,[24] or the overuse of public spaces, littering, and reduced maintenance of urban green spaces.[25]
- **Costs on locals due to changes in local services make-up**: local authorities may be concerned that STR activity can shift the focus of local businesses towards tourist-oriented services (souvenir shops, bars, and express grocery stores) rather than amenities for residents (supermarkets, hairdressers).[26] This may impact the diversity of services available and may add an additional cost to residents.
- **Increased costs (prices) of houses due to increased demand for houses:** as it becomes more profitable to short-term let, local authorities may be concerned that the increased demand for houses drives up real estate prices and exacerbates housing affordability challenges for local residents.[27]
- **Increased costs (prices) in LTR market due to fewer dwellings available:** as more properties are diverted to short-term use, local authorities may be concerned that

[24] Jordan, E.J. and Moore, J. (2017), 'An in-depth exploration of residents' perceived impacts of transient vacation rentals', *Journal of Travel & Tourism Marketing*, **35**:1, pp. 90–101.
[25] Kourkouridis, D., Rizos, A., Frangopoulos, I. and Salepaki, A. (2024), 'Airbnb and Urban Housing Dynamics: Economic and Social Impacts in Greece', *Urban Science*, **8**:3, p. 148.
[26] Hidalgo, A., Riccaboni, M. and Velázquez, F.J. (2024). 'The effect of short-term rentals on local consumption amenities: Evidence from Madrid', *Journal of Regional Science*, **64**:1, pp. 28–55.
[27] Gonçalves, D., Peralta, S. and Pereira dos Santos, J. (2022), 'Short-Term Rental Bans and Housing Prices: Quasi-Experimental Evidence from Lisbon', IZA Discussion Paper No. 15706, November.

the diminished supply of LTRs may intensify competition among tenants, driving up rental prices and exacerbating housing affordability challenges for local residents.[28]

- **Social costs (crime, lack of community) due to increased tourism:** STRs may correlate with increases in disturbances in a neighbourhood, due to the transient nature of tourists and their unfamiliarity with the surroundings, particularly in residential neighbourhoods.[29]
- **Wealth redistribution away from tenants towards landlords due to higher LTR prices:** local authorities may be concerned that STRs, in pushing up rents and house prices, benefit high-income households that let their property as STR at the expense of higher housing costs for low-income households. This dynamic could cause population displacement, increasing income inequality in the neighbourhood, accelerating the process of gentrification and contributing to making the neighbourhood unaffordable for current residents.[30]

It is important to **define the scope** of any market failure, e.g. the **geographical area** affected, subset of LTR dwelling types affected or subset of STRs that lead to externalities. For example, it may be that an issue lies in one particular street or district but not in the wider area, or that only the market for specific properties is affected by STR activity.

It is also important to recognise that STRs may also bring **positive externalities**, i.e. benefits to third parties that are not reflected in the market. For example, by attracting short-term visitors, STRs could boost foot traffic and create demand for businesses catering to tourists, such as cafes, restaurants, souvenir shops, bars and nightclubs. These new businesses could revitalise under-utilised commercial space and stimulate economic activity in the neighbourhood.[31]

Additionally, in cases where negative market outcomes do exist, they are likely to exhibit a **non-linear relationship** with STR activities. For example, a study of the relationship between Airbnb listings and house prices (focusing on the correlation, rather than establishing a causal link between the two variables) finds that in areas where Airbnb activity already takes place, increasing intensity of this activity is statistically positively correlated with house prices. At the same time, the initial emergence of Airbnb listings is correlated, in certain areas, with a decrease in house prices. These results suggest that the availability of properties for STRs and house prices are subject to a complex process of co-evolution.[32]

In all cases, the negative externalities will need to be measured (possibly against the positive externalities) by means of a **quantitative analysis**. This requires the local

[28] Barron, K., Kung, E. and Proserpio, D. (2017), 'The Effect of Home-Sharing on House Prices and Rents: Evidence from Airbnb', National Bureau of Economic Research Working Paper No. 23658, July.
[29] Lanfear, C.C. and Kirk, D.S. (2024), 'The promise and perils of the sharing economy: The impact of Airbnb lettings on crime', *Criminology*, **62**:4, October.
[30] Wachsmuth, D. and Weisler, A. (2018), 'Airbnb and the Rent Gap: Gentrification Through the Sharing Economy', *Environment and Planning A: Economy and Space*, **50**:3.
[31] Tourism Economics (2024), 'Harnessing the short-term rental advantage in Europe: an economic assessment of the STR segment in the EU and the impact of regulation', https://news.airbnb.com/wp-content/uploads/sites/4/2024/12/Harnessing-the-Short-Term-Rental-Advantage-in-Europe-Oxford-Economics-December-2024-web.pdf.
[32] Mitas, O., van Haaren, J, Vermeulen, S., Jeroen, K. and Koens, K. (2023), 'A Matter of Perspective: Short-Term Rentals, Housing Markets, and Quality of Life', 26 December, https://ssrn.com/abstract=4676143.

authorities to first determine relevant outcome metrics that best reflect the public policy objective.

3.4 Determine the outcome metrics

Local authorities will need to identify and use relevant metrics to demonstrate whether (and to what extent) potential market failures have manifested. In this section, we discuss the relevant considerations when choosing a metric for each of the public policy objectives set out in section 3.2: i.e. housing affordability and protection of the urban environment.

3.4.1 Housing affordability

Housing affordability can be assessed through quantitative metrics that measure the cost of renting relative to household income, broader economic conditions, and housing supply. These metrics can provide a comprehensive understanding of whether rents are within reach for the population. Below, we outline some commonly used approaches.

- **Rent-to-income ratio** is the proportion of household income spent on rent. On average in 2023, EU households spent 19.7% of their disposable income on housing.[33]

$$Rent\ to\ income\ ratio = \frac{Monthly\ LTR\ Rent}{Monthly\ Household\ Income} \times 100$$

  The rent-to-income ratio is useful since it adjusts for differences in income levels between neighbourhoods.

- **Changes in real rents** track the inflation-adjusted rental price trends over time to assess affordability pressures.

$$Real\ Rent = \frac{Nominal\ Rent}{Inflation\ Index\ (CPI\ excluding\ housing)} \times 100$$

  Tracking changes in real rents provides a clearer picture of how rents are changing relative to economy-wide inflation, excluding housing costs.[34] This allows us to separate nominal rent increases due to underlying inflation in the wider economy from increases due to housing market pressures.

[33] Eurostat (2024), 'Housing in Europe – 2024 edition', https://ec.europa.eu/eurostat/web/interactive-publications/housing-2024#housing-cost. The housing cost overburden rate, which shows the share of the population living in a household where total housing costs represent more than 40% of disposable income, tends to be higher in cities than in rural areas (10.6% and 7% respectively). Additionally, a rent-to-income ratio of 30% or more is usually considered unaffordable in the UK. See Office for National Statistics (2024), 'Private rental affordability, England, and Wales QMI', https://www.ons.gov.uk/peoplepopulationandcommunity/housing/methodologies/privaterentalaffordabilityenglandwalesandnorthernirelandqmi.

[34] For example, if the rent for a small flat in Paris was €1,200 in 2020 and €1,500 in 2024, and CPI excluding housing costs was 100 in 2020 and 120 in 2024, then although the nominal increase was 25%, the real rent increase was only 4%.

From an economic perspective, the affordability of LTR is inherently linked to the availability of LTR in an area, i.e. areas with fewer LTR properties available would raise the rental price of LTRs, making LTRs more unaffordable, all else equal.[35] This means indicators of LTR availability may also serve as useful outcome metrics in the absence of reliable affordability metrics (or if LTR prices are strictly regulated). For example, the **rental vacancy rate** is the proportion of LTR units that are currently unoccupied and available for lease. Usually, a vacancy rate of 5–8%[36] is considered to be healthy, although each city and neighbourhood would have its own natural vacancy rate.

LTR prices and supply would be the most direct variables on the topic of housing affordability that may be impacted by STRs. However, potential drawbacks of these factors include data availability/quality of data, as well as impacts from other regulations such as rent control. Therefore, studies in this area tend to use **house prices** as the outcome metric that is likely to be recorded in local land registration databases.

In theory, LTR prices (i.e. rent) are a fundamental determinant of the value of housing and as such should not move too far out of line with house prices. While LTR prices and house prices may exhibit short-term deviations from equilibrium, the **rent-price ratio** (LTR price/house price) may help predict future changes in rents to some extent.[37] The economic literature in general shows that there is a long-term relationship between these two variables. However, it is useful to note that there are cases where evidence may indicate that house prices could be too high, compared with LTR prices.[38]

Similarly to LTR affordability, several well-established metrics can be used to assess house price affordability, including the below.

- **Price-to-income ratio** is the ratio of the median house price to the median household income. A ratio of 4 to 5 is often considered a sign of affordability issues. The price-to-income ratio is useful since it adjusts for differences in income levels between neighbourhoods.

$$Price\ to\ income\ ratio = \frac{Median\ house\ price}{Median\ household\ income} \times 100$$

- **Real house price index** tracks the average inflation-adjusted house price.

$$Real\ House\ price = \frac{Average\ nominal\ house\ prices}{Inflation\ Index\ (CPI\ excluding\ housing)} \times 100$$

[35] In terms of LTR supply metrics the following can be useful indicators: Number of active LTR listings, LTR vacancy rate, LTR stock change over time, Share of housing stock used as STR 'entire home', and Net conversion rate of LTR to STR.
[36] Economic Indicators Library (2024), 'Vacancy Rate (Residential)', accessed 20 January 2026.
[37] Clark, T. (1995), 'Rents and prices of housing across areas of the United States. A cross-section examination of the present value model', *Regional Science and Urban Economics*, **25**:2, pp. 237–47.
[38] Gallin, J. (2008), 'The long-run relationship between house prices and rents', *Real Estate Economics*, **36**:4, pp. 635–58; and Ayuso, J. and Restoy, F. (2006), 'House prices and rents: An equilibrium asset pricing approach', *Journal of Empirical Finance*, **13**:3, pp. 371–88.

3.4.2 Protection of the urban environment

In the case of **protection of the urban environment**, local authorities must first identify which aspect(s) of the urban environment they are interested in protecting, e.g. environmental health, accessibility, infrastructure or social wellbeing. STRs can significantly affect several of those metrics, particularly those relating to social dynamics, infrastructure and economic wellbeing.[39] Defining a quantifiable metric depends on the nature of the neighbourhood and the specific issues relating to an area, but common examples include:

- **crime rates**: e.g. recorded crimes per thousand per day;[40]
- **income inequality**: measured with the Gini coefficient at the neighbourhood level;
- **retail and service business density**: e.g. tourism services per km-squared;
- **urban noise levels**: e.g. average decibels;
- **environmental metrics**: e.g. carbon footprint per stay;[41]
- **local service mix**: share of tourist-oriented businesses and business turnover rate.

Explaining the causal link between STR activity and the quantifiable metrics for measuring the market failure are key steps for establishing the justification for the proposed measures. Once the causal link between STR and the relevant outcome metric has been hypothesised, local authorities will be in a position to test the existence and magnitude of this causal link using data.

[39] Nieuwland, S. and van Melik, R. (2020), 'Regulating Airbnb: how cities deal with perceived negative externalities of short-term rentals', *Current Issues in Tourism*, **23**:7, pp. 811–25.
[40] Police incident reports per 1,000 residents, noise complaints, and nuisance complaints (compared with complaints coming from other accommodation options).
[41] Visitor nights per km², air/noise complaint rates, carbon footprint per stay, and waste generation per resident-equivalent (could also be compared with other accommodation options, so that STR would not be the only target).

4 How to test for a causal link

In section 2.1, we introduced the need for assessing causal effects rather than correlations. In this section, we discuss methods that the local authorities can use to establish a causal link between STR activity and the outcome metrics, e.g. housing affordability. That is, local authorities must offer a statistical decomposition of the correlation between STR activity and LTR affordability, which identifies the correlation that can only be attributed to the **causal effect** of STR on LTR affordability.

EU law requires the demonstration of a causal link, not merely causation. The Court of Justice of the European Union (CJEU) has consistently rejected abstract assumptions and required objective evidence showing that restrictive measures genuinely contribute to their stated objectives. A key part of this is demonstrating causation with sufficient evidence.[42]

The gold standard method for estimating causal effects typically compares the outcomes between **control** and **treatment** groups, as explained in the next section.

4.1 Control and treatment groups

The idea of using control and treatment groups comes from experimental research where participants are randomly divided into two groups, only one of which receives a particular treatment. The two groups are compared to determine the effect of the treatment. This type of research, typically used in medical trials and public policy studies, deploys **Randomised Controlled Trials** (RCTs)—considered the gold standard for studying causal impacts. One of the key features of RCTs is that participants are randomly assigned to groups to ensure that participants in each group are comparable and the observed differences are not due to differences in the group composition.

For example, if the treatment and control groups were not randomly chosen, but differ systematically in important ways before the treatment, then a comparison between the treatment and control groups would be influenced by the **underlying group differences**, as well as the causal effect of the treatment.

In the case of assessing the causal impacts of STR, the treatment is an introduction or large increase in STR activity over a specified time period, so the treatment group corresponds to a geographic area (or set of properties (e.g. dwelling types) in the geographic area) in which STR activity increased over this time period. The control group is an **otherwise comparable** geographic area (or set of properties) that did not experience an increase in STR activity. There are certain aspects of RCTs that are not feasible in this case—for example, randomising STR activity across different areas—nevertheless, the principles of this method provide a useful starting point for conducting a causal impact study of STR.

[42] To see case examples from the CJEU that are relevant to this matter, see Court of Justice of the European Union, Judgment of the Court (Grand Chamber) in cases: *The Queen v Minister of Agriculture, Fisheries and Food and Secretary of State for Health, ex parte: Fedesa and others* (Case C-331/88); *Hartlauer Handelsgesellschaft mbH v Wiener Landesregierung and Oberösterreichische Landesregierung* (Case C-169/07); Commission v Spain (Case C-400/08); and N.W. v Sanofi Pasteur (Case C-621/15).

We discuss further considerations in choosing control and treatment groups below.

4.1.1 How to choose control groups

To isolate the causal impact of STR, a control group must be carefully selected to enable a meaningful (like-for-like) comparison to be made. The control group should satisfy the following criteria.

- **Similarity**: control areas should resemble treatment areas in terms of demographic, economic, and geographic characteristics or trends that may influence LTR prices. For instance, neighbourhoods with similar housing market dynamics, tourism intensity, or population density can serve as appropriate control groups. This also relates to the parallel trends assumption discussed below.
- **Unaffected by spillover effects of the treatment**: control areas should not be indirectly affected by the treatment. For example, the introduction of STRs in treated areas must not affect the outcomes in non-treated areas.
- **Sufficient data exists before the treatment**: sufficient historical data from both control and treatment groups must be available to establish baseline trends. We discuss the data requirements below.

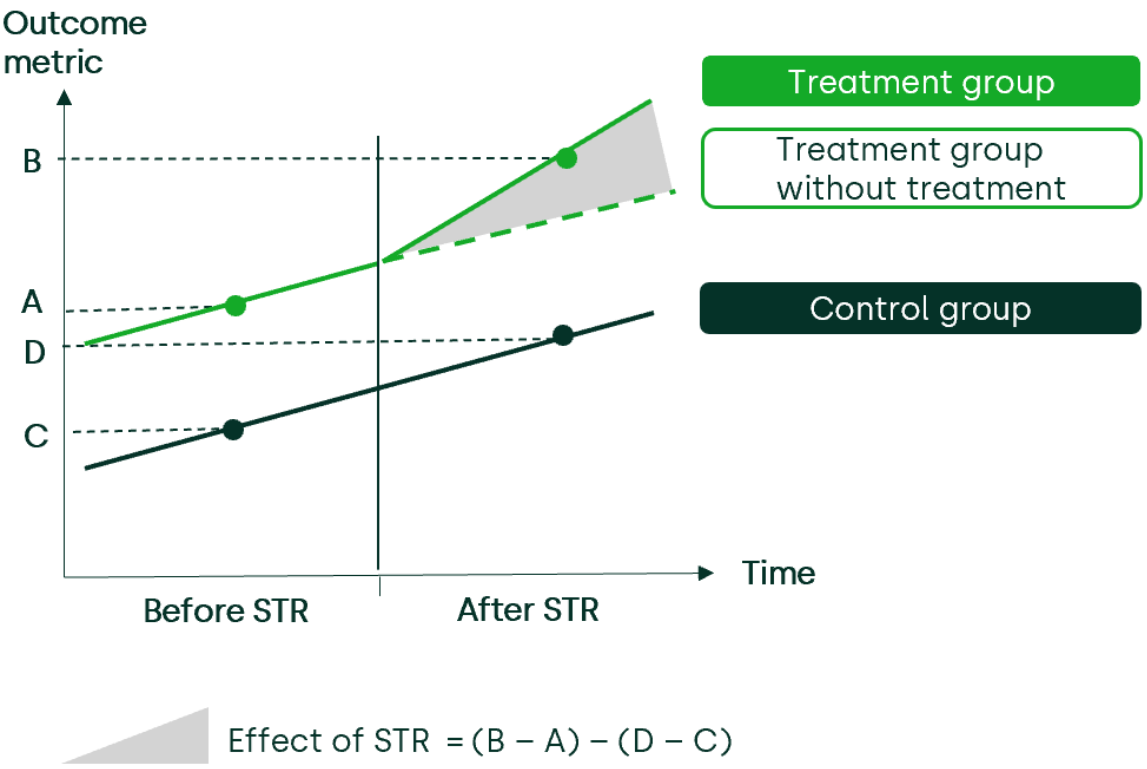
In practice, a perfectly comparable control group may not always exist. This is particularly true in cases such as the study of STRs, where there may be only one treated unit (e.g. a specific city experiencing an increase in STRs) and multiple potential control cities, none of which represent comparable control units on their own. When such a perfectly matched control group cannot be identified, the **synthetic control approach** can be a valuable tool. This approach involves constructing a weighted combination of control units to create a synthetic (or artificial) version of the treated unit.

In the case of STRs, this means that, if a single city experiences a surge in STR activity, the synthetic control approach can be used to generate a comparison city that closely mirrors the pre-treatment characteristics of the treated area, offering a robust counterfactual for estimating causal effects.

4.1.2 How to estimate causal impacts

Once control and treatment groups are identified, the causal impact can be estimated as essentially the average difference between the outcomes (e.g. LTR affordability) between the treatment and control groups. This is demonstrated in Figure 4.1 below.

Figure 4.1 Estimating the causal effect (difference between treatment and control)



Note: the effect of the STR activity is equivalent to the difference between the treatment and control before the treatment (A-C) and the difference between the treatment and control after the treatment (B-D).
Source: Oxera analysis.

This approach involves estimating what the outcome metric (e.g. housing affordability) would have been in the treatment group had the treatment not occurred. In Figure 4.1 above, this is given by the green dashed line (which uses the trend in the outcome metric extrapolated from the control group, given by the black line). The causal impact of the treatment is calculated as the difference in the outcome metric between treatment and control, during and after STR, i.e. a double-difference, also known as a **Difference-in-Differences (DiD)** approach.

The DiD method works by controlling for any common time-varying factors (e.g. economic shifts, policy changes) that might affect both groups, and also any group-specific factors (e.g. population density, public transport links) thereby isolating the causal impact of the STR increase itself.

An important assumption for the DiD method to be reliable is the parallel trends assumption. The parallel trends assumption requires that, in the absence of treatment, the outcome metric **would have** followed the same trajectory in both groups. While this cannot be proven with certainty, the plausibility of this assumption can be tested using pre-treatment trend analysis.

In this case, this may involve comparing trends in housing availability or affordability between the areas affected and unaffected by STRs **before the introduction of STRs actually happened** (at time *t*). If the trends appear very different before time *t*, then it is likely that they would have continued to be different after time *t* (even if the treatment had not occurred). This can be used as evidence against the plausibility of the parallel trends assumption.

Box 4.1 Selected studies using control and treatment analysis

Gonçalves et al. (2022) test the impact of STR regulation on housing supply and prices in neighbourhoods in Lisbon using a Regression Discontinuity Design approach. They compare changes in house prices in neighbourhoods that are affected by the regulation (treatment group) to those that are not affected by the regulation in the immediate vicinity (control group), before and after the introduction of the regulation in 2018. The authors are able to estimate the effect of STR limitations on house prices, which is not biased by (a) general trends in house prices over time (which would bias a purely inter-temporal comparison) nor (b) neighbourhood-specific differences in house prices (which would bias a static comparison of treatment and control groups). The authors find that the reform decreases real estate prices by 8%, particularly in two-bedroom dwellings, for which the price drops 20%.

Bei and Celata (2023) examine the effectiveness of regulations to curb STR activity, and on the spatial concentration of STRs. They do this by comparing outcomes across 16 European cities, specifically between regulated cities (treated) and unregulated cities (control). They find that cities' regulations produce a persistent reduction in STR activity, and commercialisation of the market, but have minimal effect on the decongestion of the neighbourhoods most affected by tourism.

Duso et al. (2024) examine the effect of rental supply and prices as a result of STR-restricting reforms in Berlin in 2016 and 2018. To assess whether the policies were effective in increasing rental supply, they run a DiD analysis where treated units are the areas in which Airbnb rentals are present before the restrictions. While they find a statistically significant impact of the 2016 reform on the rental supply in treated geographies, this is not the case for the 2018 policy intervention.

Sources: Gonçalves, D., Peralta, S. and Pereira dos Santos, J. (2022), 'Short-Term Rental Bans and Housing Prices: Quasi-Experimental Evidence from Lisbon', IZA Discussion Papers, 15706; Bei, G. and Celata, F. (2023), 'Challenges and effects of short-term rentals regulation: A counterfactual assessment of European cities', *Annals of Tourism Research*, **101**:103605; Duso, T., Michelsen, C., Schäfer, M. and Tran, K.D. (2024), 'Airbnb and rental markets: Evidence from Berlin.' *Regional Science and Urban Economics*, **106**:104007.

Alternatively, a **Regression Discontinuity Design** (RDD) approach relies on the same concepts in DiD, but specifically examines differences in outcomes between units either side of a cut-off, which determines whether a unit is treated. For example, if STR platforms initially launched services in cities above a certain population size, cities just above (i.e. the treatment group) and just below this threshold (i.e. the control group) can be compared. The identifying assumption is that units just above and just below the threshold are similar in all respects (e.g. economic conditions, demographic profiles) except for their exposure to STR. RDD is particularly useful for policies or market changes with clear eligibility rules and can provide highly credible causal estimates.

Box 4.2 Study using RDD to assess impacts of STR regulation

Koster et al. (2021) use an RDD approach to test the effect of STR regulation (Home Sharing Ordinances or HSOs) on housing affordability (house prices) in cities across the Los Angeles County. HSOs effectively ban informal STRs such as Airbnb. The authors compare house prices in cities affected by the regulation with house prices just outside the borders of the affected cities that are not affected by the regulation. The houses that are affected by the regulation form the treatment group, while the neighbouring houses form the control group. Properties close to the border of an area where an HSO is implemented are otherwise identical, except that STR is restricted. This allows the effect of STR to be identified separately from other factors relating to the location of the properties. The authors find that the STR regulation reduced Airbnb listings by 50% and house prices by c. 2% on average.

Source: Koster, H.R.A., van Ommeren, J. and Volkhausen, N. (2021), 'Short-term rentals and the housing market: Quasi-experimental evidence from Airbnb in Los Angeles', *Journal of Urban Economics*, **124**:103356.

4.1.3 Data requirements

Robust causal analysis depends on high-quality data that aligns with the methodologies outlined above. Analysis requires both temporal and spatial variation in STR listings and outcomes across distinct geographic areas to avoid spillover effects and ensure robust comparisons. Therefore, it is critical that data availability extends back to periods of stable STR activity **before** their introduction or increase to establish accurate baselines for causal analysis. Online platforms offering longer-term rentals or property for sale can be useful sources.

In addition, local authorities are likely to require disaggregated data by geographic area, property type, and time period, providing a detailed basis for employing methods such as DiD, synthetic control, or regression discontinuity.

Given the relevant legal framework (as set out in section 2), local authorities are required to demonstrate a causal link between STR activities and their identified market failure(s) before implementing any policy interventions. When sufficient data is unavailable for a control and treatment group analysis, we propose alternative approaches, such as leveraging studies of **policy interventions** or using instrumental variables in a regression framework. These methods rely on different data sources that local authorities may already have access to.

The EUSTRR will significantly improve data availability for local authorities, but may not provide local authorities with sufficient historical data to conduct a DiD analysis. Historical data on STR activity may be obtained from other sources, including Eurostat (only post-2018),[43] the Inside Airbnb project (for selected cities in Europe),[44] or purchased from third-party data providers such as AirDNA.[45]

In cases where local authorities lack the necessary data to conduct any of the analyses outlined in this report with sufficient robustness, it is essential to validate the policy's impact once relevant data becomes available. This ensures that any intervention is evidence-based and proportionate (see section 4.1.4 below for a discussion on leveraging policy intervention studies).

4.1.4 Leveraging policy intervention as a treatment

Above, we have outlined the methodology for studying the causal impact of STRs on housing affordability. It is important to distinguish this from analysing the causal impact of a **policy intervention**, such as the effect of an STR regulation on house prices. These two approaches are closely related—if STRs indeed drive house prices up, then a policy restricting STRs would be expected to have the opposite effect, reducing house prices, assuming all other factors remain constant. Essentially, rather than considering a large increase in STRs as the treatment, the policy measure itself (which would likely lead to a significant reduction in STRs) would serve as the treatment.

In practice, studying the causal impact of a recent policy intervention is often **more feasible**, as relevant data is more readily available. In contrast, assessing the direct causal impact of STRs typically requires more historical data, making it more challenging (see section 4.1.3 above). As a result, many existing studies focus on policy interventions rather than direct changes in STR numbers. While leveraging findings from such studies (or commissioning new ones) can provide valuable insights, it is crucial to account for local variations in key factors. This would ensure a robust evidence base to determine whether and how an STR measure may be proportionate to specific circumstances.

[43] Eurostat (2025), 'Short-stay accommodation offered via online collaborative economy platforms', https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Short-stay_accommodation_offered_via_online_collaborative_economy_platforms .
[44] Inside Airbnb, https://insideairbnb.com/, accessed 20 January 2026.
[45] AirDNA, https://www.airdna.co/, accessed 20 January 2026.

4.2 Instrumental variables approach

The control and treatment groups approach requires the below.

1 A treatment, i.e. an introduction or a large increase in STR activity in an area over a specified time period.
2 Suitable control and treatment groups, i.e. areas that were affected by STR and areas that were not affected by STR, which are otherwise comparable.
3 Sufficient data for the period before and after the treatment for both the control and treatment groups.

If local authorities find it difficult to identify areas that constitute suitable treatment and control groups with access to sufficient data before and after an increase in STRs, they may want to consider using an I**nstrumental Variables (IV) approach**. In this section, we set out a framework and guidance on how to conduct this analysis robustly.

4.2.1 Introduction to regression analysis

Regression analysis is a statistical method to estimate the relationships between an outcome variable (for example, one of the metrics that we discuss in section 3.4) and one or more explanatory variables (i.e. the factors that are likely to impact the outcome metric). A key strength of regression analysis, over comparing pairwise correlations,[46] is its ability to reveal the independent effect of each explanatory variable on the outcome, i.e. holding the other factors constant.

In this case, a regression identifies the relationship between STR activity and an outcome metric (e.g. LTR prices), while **controlling** for observable factors such as demographics or local amenities. The simplest regression model could be expressed in the equation below:

$$Y = \alpha + \beta\ STR\ activity + \gamma X\ + \epsilon,$$

Where:

- Y represents the outcome metric (e.g. LTR prices);
- STR activity represents level of STR activity (e.g. number of listings);
- X represents the control variables, i.e. other factors that influence the outcome variable, e.g. demographic factors or local amenities;
- ε represents unobservable factors that also influence the outcome;
- β represents how much the outcome changes when STR activity increases by 1 unit, holding other factors (X) constant—this is the effect we are interested in estimating.

In order to obtain estimates of the causal effect of STR activity on the outcome, given by β in the above model, local authorities would first need to obtain sufficient data on X and Y.

[46] This would involve looking at the statistical correlation between each explanatory variable and the outcome variable separately.

That is, for each area and year, the level of STR activity and the associated outcome metric (e.g. LTR prices).[47]

Local authorities may also want to collect data on other factors (X) to use as control variables, to improve the model's ability to estimate β accurately. For each control variable, local authorities will need to consider carefully which control variables to include, based on which are likely to explain the particular outcome metric used.[48] For example, if measuring the effect of STR activity on LTR prices, local authorities should control for other factors which affect LTR prices. Some candidates for control variables are provided below.

- **Demographics**: number of households, average household income, population density, household sizes, and generational composition.
- **Neighbourhood characteristics**: access to amenities, transport connections, crime rates, and unemployment.
- **Macroeconomic conditions**: interest rates, GDP per capita, inflation, and property taxes. While the variables in the two categories above ideally would be specific to a geographic area, most, if not all, of the macroeconomic variables are likely to be the same for the whole country and thus would only vary over time.

Supply and demand: system of simultaneous equations

The model specification presented above is considered a **reduced form** of a system of demand and supply equations. In general, LTR prices is an outcome of the demand and supply of LTR. On the demand side, demographic factors, neighbourhood characteristics, and certain macroeconomic variables, such as interest rates and unemployment, play a role in determining the level of demand for LTR. The supply of LTR is determined by total housing supply minus housing for other usages, such as STR. Therefore, STR activities, as well as factors affecting the total housing supply, for example, new housing policies and construction costs, can impact the supply of LTR.

4.2.2 The endogeneity problem

A key challenge in evaluating the impact of STRs is establishing **causality**: do increases in STR activity actually *cause* higher LTR prices, or are there other factors (e.g. neighbourhood attractiveness) that can account for both? For example, neighbourhoods with high LTR rents might naturally attract more STR activity due to their overall attractiveness to residents or tourists. This makes it difficult to determine whether and to what extent STR activity causes higher LTR prices, as distinct from other factors, such as ease of commute, access to local amenities, or proximity to the city centre.

A common way to address this issue is by carefully **selecting control variables** (X) that can capture these confounding factors. For example, in order to control for neighbourhood

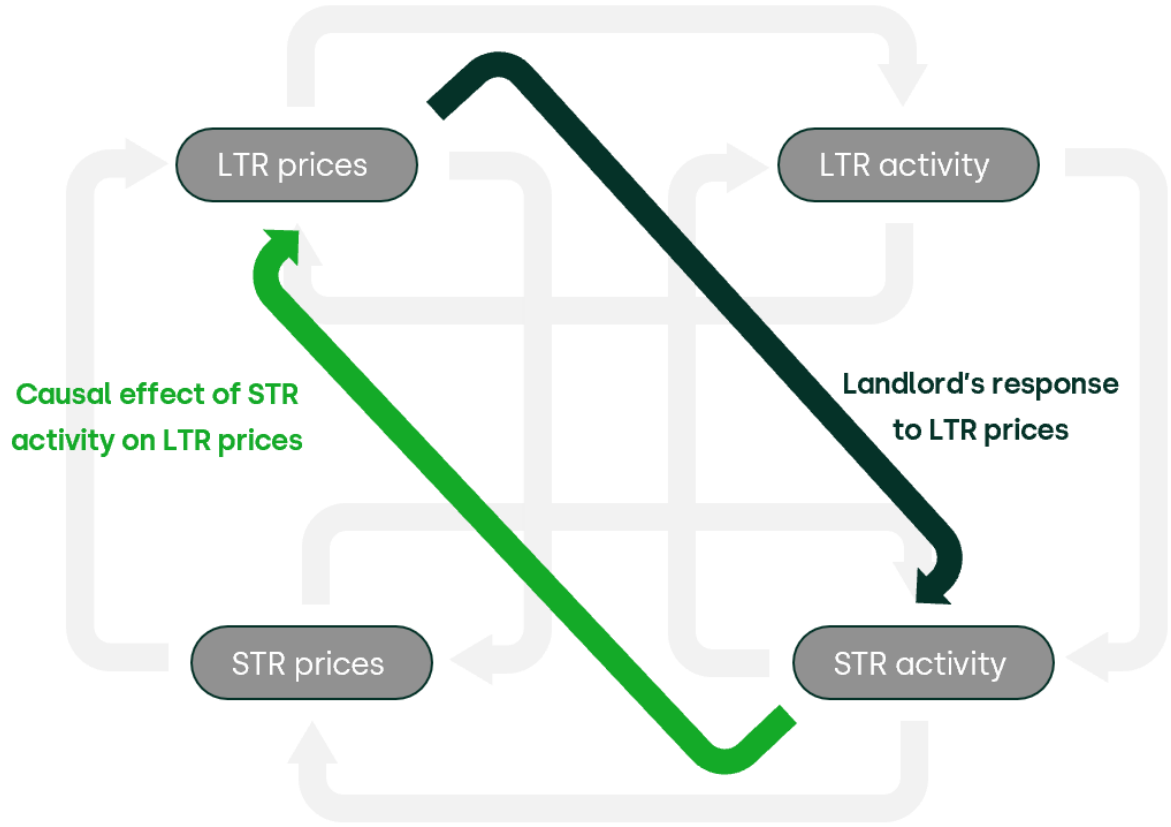
[47] While data over time is not strictly necessary, data over time may also be used to improve the model performance.
[48] Control variables should also not themselves be affected by STR activity, nor should they be affected by the outcome metric.

attractiveness, local authorities may wish to measure this by collecting data on the proximity to the city centre, or access to local amenities and transport connections.

However, the main problem with this approach is if the confounding variables are **unobservable** they cannot be controlled for. Even if local authorities are able to obtain relevant metrics to represent these confounding variables, they may not fully capture the underlying factors. For example, there may be other aspects to neighbourhood attractiveness that are not represented by proximity to the city centre or access to amenities.

Furthermore, even if causality is established, there remains a problem of **reverse causality**: do LTR prices also affect STR activity? For example, higher LTR prices may also incentivise landlords to switch their STR offerings to LTR, decreasing the number of STRs available, and thus the amount of STR activity. This (negative feedback) effect would counteract the causal effect of STR activity on LTR prices, making it difficult to observe the effect we are interested in directly. This problem is represented in Figure 4.2 below. Selecting appropriate control variables is unlikely to mitigate this potential problem.

Figure 4.2 Causal relationships within and between LTR and STR markets



Source: Oxera.

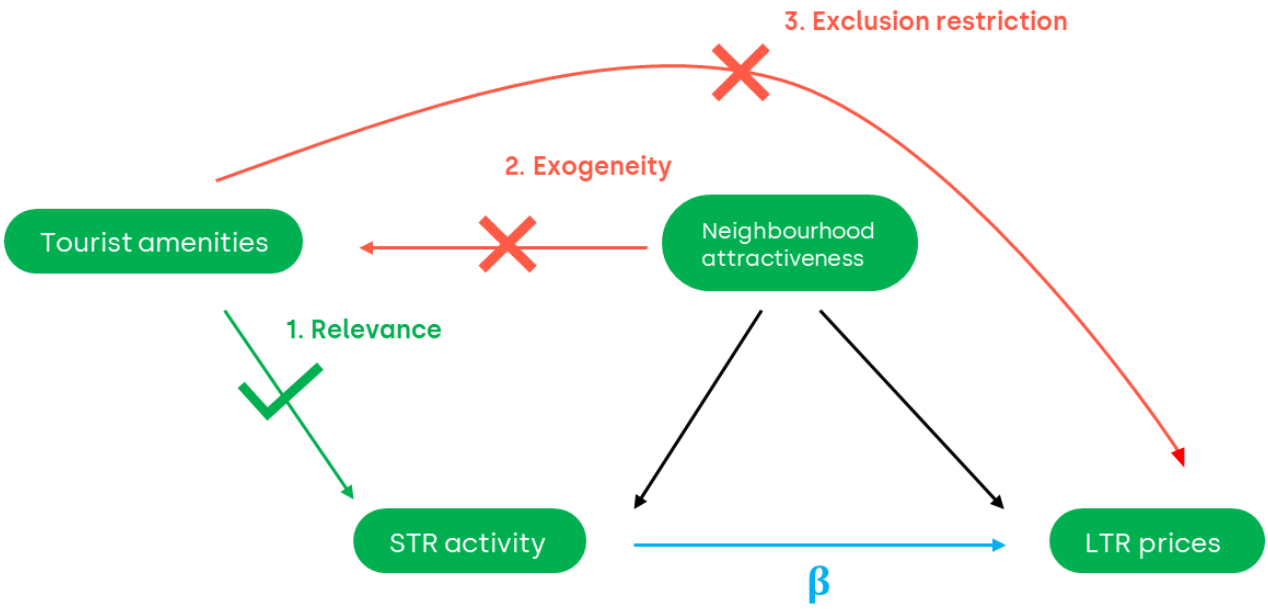
4.2.3 Instrumental variables

To address this challenge, a common strategy is an IV regression approach. This method allows the researcher to **directly isolate** the causal effect of STR activity on the outcome variable e.g. LTR rents (rather than indirectly by using control variables).

The approach works by identifying a third variable (neither the outcome nor an explanatory variable) which, importantly, strongly influences STR activity, known as an **instrumental variable**. The causal effect is then isolated by examining the instrumental variable's relationship with STR activity and its relationship with the outcome. For this approach to be valid, the instrumental variable must not suffer from the same confounding problems as STR activity and also must not affect the outcome directly—only indirectly through STR activity.

In the case of the causal effect of STR activity on LTR prices, Figure 4.3 below illustrates the conditions required for an instrument (e.g. the proximity to tourist amenities) to be valid.

Figure 4.3 Conditions for a valid instrumental variable



Source: Oxera analysis.
Note: β represents the causal effect of STR activity on LTR prices.

Namely, the conditions required for a valid instrumental variable are as follows.

1 **Relevance**: the instrument must strongly influence the level of STR activity in an area. Failure to meet this criterion results in a weak instrument, which can lead to imprecise and unreliable estimates of the causal effect.

2 **Exogeneity**: the instrument must not be affected by the confounding factors affecting LTR prices and STR activity. In practice, this means that random processes that determine STR activity—e.g. a lottery or ballot—often represent good exogenous instruments. If this is not satisfied, the estimates of the causal effect would be biased.
3 **Exclusion restriction**: the instrument must not directly affect LTR prices, except through STR activity.

In the case of examining the effect of STR activity on LTR prices, several candidate instrumental variables are used in the literature.

- **Tourist amenities**: proximity to tourist amenities and attractions (e.g. museums) stimulate demand for STRs, as tourists generally prefer being accommodated close to tourist attractions. This approach relies on the fact that tourist demand drives STR activity, but the presence of tourist sites themselves does not directly impact LTR rents or house prices, e.g. as part of gentrification or urban transformation.
- **Regulatory changes**: STR regulations can be used as an instrumental variable, as they are likely to fulfil two conditions: (i) they strongly affect STR activity; (ii) they do not directly affect rents, house prices, or housing supply (the dependent variables), except through their effect on STR activity. However, if the regulatory changes were introduced in areas that are more attractive to long-term renters, then the instrument would no longer satisfy exogeneity (suffering from the same problem as the treatment variable).
- **Major sports or cultural events**: a major sporting event, festival or international conference held in a city can cause a temporary spike in tourist demand. It is likely to boost demand for STR in specific areas that are close to where the event is held, satisfying the condition for relevance, and, since the event is a one-off, it should not be directly related to the underlying local housing market conditions, so should not drive LTR rents directly. However, since these events are only temporary, it may be the case that not enough time has passed for the increase in STR activity to affect the LTR market in any meaningful way, and for a causal effect of STR to be observed.

Any IV analysis must address issues of robustness and interpretation. Robustness checks, such as testing alternative instruments or model specifications, are critical to validating the findings. Controlling for potential confounders and performing diagnostic tests (e.g. over-identification tests) are important steps to strengthen the analysis and ensure reliable conclusions.

Box 4.3 Studies that use IV analysis

Garcia-Lopez (2020) investigates the impact of Airbnb's expansion on housing rents and property prices in Barcelona. Utilising detailed data on rents and both transaction and posted prices, the researchers employed a shift–share instrument to predict when and where Airbnb listings would appear, and used these predicted Airbnb listings to examine the effect on rents and house prices. In particular, the author used the proximity to tourist amenities (share) to predict **where** Airbnbs would be listed, alongside Google search counts for 'Airbnb Barcelona' (shift) to predict **when** Airbnbs would be listed. The two measures are combined to form a shift–share instrument for STR activity. The author finds that rents increased by approximately 1.9%, transaction prices by 5.3%, and posted prices by 3.7%.

Source: García-López, M.-À., Jofre-Monseny, J., Martínez-Mazza, R. and Segú, M. (2020), 'Do short-term rental platforms affect housing markets? Evidence from Airbnb in Barcelona', *Journal of Urban Economics*, **119**:103278.

4.2.4 How to implement the IV approach

The IV approach is most commonly implemented using regression analysis, in particular, using an estimation method known as **two-stage least squares (2SLS) regression**. This is an extension of the simple regression introduced in section 4.2.1, and consists of two stages.

1 **First stage**: predict STR activity using the instrumental variable.
2 **Second stage**: examine the effect of the predicted STR activity on the outcome metric (e.g. LTR affordability).

First stage

In the **first stage**, we use regression analysis to predict STR activity using the instrumental variable, such as proximity to tourist attractions or regulatory changes. We can express the model as follows:

$$STR\ Activity = \alpha + \delta\ Instrument + \gamma X + \epsilon,$$

which could be estimated in the same way as the regression in section 4.2.1. We then extract the predicted STR activity in each neighbourhood using this model. This stage ensures that the STR activity is exogenous, i.e. not influenced by confounding factors that also affect rents, house prices, or housing supply.

Second stage

In the **second stage**, we use the predicted values of STR activity (from the first stage) as the explanatory variable in the regression in section 4.2.1, to estimate its effect on LTR affordability.

$$Y = \alpha + \beta\ Predicted\ STR\ activity + \gamma X + \epsilon$$

The two-stage process can be thought of as first identifying the part of STR activity that is driven by external factors (such as tourism or regulation) and then examining how this '**cleaned'** variation in STR activity impacts LTR affordability.

For example, in the first stage, we might observe that areas close to tourist attractions experience more STR listings due to external tourist demand. In the second stage, we examine whether this particular growth in STR activity (i.e. caused by tourist demand) leads to higher LTR rents.

The use of the control or treatment groups, or instrumental variables, is essential in order to estimate a causal effect of STR on LTR affordability, housing affordability or the urban environment, and not mere correlations between the two. Evidence of a causal link is required to satisfy the necessity test.

4.2.5 Data requirements and other technical notes

To conduct the analysis outlined in this approach, local authorities will require a panel dataset that spans multiple geographic areas (e.g. postcodes, municipalities), i.e. the cross-sectional dimension, and extends over time (e.g. monthly, quarterly), i.e. the time dimension. A key requirement for regression analysis is **sufficient data variation** to produce reliable impact estimates. Generally, larger samples and longer timeframes enhance the robustness of results. Therefore, using smaller geographic units and higher-frequency data, when available, may be beneficial.

Data on STR activity will be provided by the EUSTRR. However, the approach outlined above also requires data on control variables such as demographics, in addition to instrumental variables themselves. While the data source for the instrumental variable would depend on the exact variable in question, data on neighbourhood characteristics such as demographics, socio-economic and environmental data can be obtained through the Eurostat City Statistics Portal.[49]

A **larger sample size** is also necessary when incorporating multiple independent variables in a regression. To begin with, a simpler regression model may be advisable, especially with limited data. However, this approach risks omitting important variables that influence the outcome metric, potentially reducing the reliability of the results. Therefore, it is important to assess sample size requirement before conducting an analysis.

[49] Eurostat, 'City Statistics – Introduction', https://ec.europa.eu/eurostat/statistics-explained/index.php?title=City_statistics_%E2%80%93_introduction, accessed 20 January 2026.

Additionally, it is important to consider correlations between variables in the analysis. Highly correlated variables in a regression can create **multicollinearity**, making it difficult to isolate the effect of each variable while holding others constant. This can lead to unstable and unreliable model coefficients, even if the overall model fit appears strong. To mitigate this, examining a correlation matrix to assess pairwise correlations among variables is useful, particularly for macroeconomic factors that tend to be interrelated.

Another technical consideration is the equilibrium state of the housing market. In theory, the market reaches equilibrium when the quantity of housing demanded equals the quantity of housing supplied. In practice, however, short-term disequilibrium is common, even if long-term equilibrium holds. This occurs because factors affecting housing supply and demand, such as policy incentives for new construction, take time to influence the market. Addressing these dynamics may require time-series econometric techniques, such as a **vector error-correction model**.[50]

[50] A vector error-correction model captures the relationship between non-stationary time series variables that are cointegrated. Cointegration implies that while individual time series may be non-stationary, a linear combination of them is stationary, indicating a long-run equilibrium relationship. See, for example, Parker, J. (2012), 'Vector Autoregression and Vector Error-Correction Models', *Economics 312 Course Materials*, chapter 5, Reed College, https://www.reed.edu/economics/parker/s14/312/tschapters/S13_Ch_5.pdf.

5 How to assess proportionality

To assess STR measures within the legal framework of the Services Directive, local authorities need to meet the **proportionality** condition, in addition to the necessity test outlined previously. The necessity test, as outlined previously, establishes whether a measure is indispensable for achieving a public interest objective. However, the proportionality test imposes that even if a measure is deemed necessary, its impacts must not be excessive in relation to the objective pursued.

When competitive markets work well, they deliver efficient outcomes for society. However, there are times when markets do not deliver socially optimal outcomes. In these cases, interventions in markets, such as STR measures,[51] can help to mitigate these market failures—but they also add distortions to markets, which often have a cost to society. Proportionality, therefore, requires a careful **balancing of these competing interests**. It demands that the chosen measure does not go beyond what is appropriate to remedy the problem, ensuring that the societal costs of the regulation do not outweigh its benefits.

Examples of these societal costs include the below.

- **Negative impact on local businesses**: the economic and tourism sectors also face disruptions from heavy STR regulations. By limiting STR accommodation options, such measures can negatively impact local businesses that rely on visitor spending, such as restaurants, shops, and cultural attractions. Additionally, tourism-related jobs in cleaning, property management, and maintenance may decline. In some cases, strict STR policies benefit large hotel chains at the expense of independent hosts, shifting demand away from locally owned accommodations. Overregulation can also divert tourism to less-regulated areas, reducing economic benefits in cities/areas imposing these restrictions.
- **Housing market distortion**: STR regulations, while intended to address housing affordability and neighbourhood stability, can create significant market distortions and unintended consequences. Excessive restrictions may push STR activity underground, leading to an informal market where rentals operate without registration, tax contributions, or compliance with safety regulations, making enforcement more challenging.
- **Barriers to entrepreneurship**: excessive regulation may create high barriers to entry for new entrepreneurs looking to enter the STR market. High licensing fees, complicated regulations, or the need for extensive compliance measures can deter small-scale hosts from participating. This, in turn, reduces the diversity of accommodation options available to tourists and limits the potential for new business ventures to grow, especially in cities where STRs may represent an important source of income for residents.

A proportionate measure is likely to be the measure that produces the least distortive effects on the workings of the market. To identify such a measure, it is good practice to

[51] Examples: mandatory licensing or registration, night caps, limits on future conversion to STRs, taxing STR stays, zoning laws, and bans. Recent surveys suggest local populations are often aware of these trade-offs and can be supportive of measures to mitigate the negative impacts of tourism. See European Commission (2021), 'Flash Eurobarometer 499: Attitudes of Europeans towards tourism', https://data.europa.eu/data/datasets/s2283_499_eng?locale=en.

consider a range of potential measures that could address the market failure and select the one that effectively mitigates the issue while imposing the least cost on society.

In the context of measures to limit any negative effects from STRs, these could include:

- removing restrictions on building to increase the supply of accommodation;
- restrictions on secondary residences and vacant properties;
- taxing STR stays and using the revenue to fund services to mitigate the externality, such as rubbish collection and street cleaning;
- mandatory licensing or registration restrictions to monitor compliance and enforce local housing policies;
- night caps that limit the number of nights a property can be rented out in a year;
- limits on future conversion to STRs in a geographic area;
- zoning laws, geographic and/or volume restrictions to prevent too many STRs from operating within a given neighbourhood;
- banning STRs completely in a geographic area.

Recent legal precedent from the CJEU provides a clear example of how proportionality is assessed in practice. In the Cali Apartments case,[52] the CJEU upheld a restrictive **authorisation scheme** in France because it was deemed proportionate to the public interest goal of combating a housing shortage. The Court found the measure was appropriately tailored, as it was specifically limited to large municipalities and other areas with a demonstrable housing shortage. In contrast, the European Commission has emphasised that, while addressing housing shortages can constitute a legitimate public interest, any restrictions must be appropriate, non-discriminatory, and proportionate, in the case of Barcelona's city-wide ban.[53] This underscores that the more restrictive a measure is, the stronger and more specific the evidence base must be to prove it is proportionate. In practice, the findings from the causal impact analysis are useful in informing local authorities in assessing proportionality.

- First, the causal impact analysis provides an evidence base on, for example, whether an increase in STR causes a corresponding increase in rental prices and/or shortage of LTR supply in a meaningful way.[54]
- Second, depending on how the causal impact analysis is set up, it may be able to provide evidence identifying the relevant geographic area(s) where the impact of STR is indeed meaningful and thus would benefit from a measure to restrict STR.[55]

[52] *Cali Apartments SCI* v *Ville de Paris* (Cases C-724/18 and C-727/18), EU:C:2020:743, judgment of the Court of Justice, 22 September 2020, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:62018CJ0724.
[53] European Commission, Notifications of requirements under the Services Directive, Article 15(7) and 39(5), https://ec.europa.eu/internal_market/imi-net/repositories/services-directive-notifications/spain_en.htm.
[54] Assessing through statistical tests and the magnitude of the impact from STR, relative to other impacts.
[55] Indeed, for STRs, the measure must be tailored to the local situation. National and general measures are often inadequate, while measures that grant local authorities the power and discretion to implement restrictions are more suitable to ensure that the implemented measures are adequate in light of the specific circumstances of each of the local communities concerned. When a central government gives regions or local authorities/administrations the discretion to set such measures on their territory, the latter must do so within material and geographical delimitations that effectively meet the needs of the territory. Such needs must be expressly justified, neighbourhood by neighbourhood, by objective studies or statistics, and local administrations must demonstrate how the scope of the measure does not go beyond what is proportionate to remedy the threat to the public interest objective.

It is important to be aware that if negative market outcomes exist, they are likely to exhibit a **non-linear relationship** with STR activities. More specifically, a low level of STR activities is unlikely to cause housing affordability and/or urban environment *concerns*.[56] Therefore, STR measures would only be appropriate where impacts of STR can be evidenced to substantially contribute to these issues.

The link between the necessity and proportionality tests manifested here is consistent with what has been explored in the legal literature on the topic. However, under proportionality, the 'balancing of costs and benefits' test also becomes relevant.[57] More specifically, the EU legal precedents have employed the **Least Restrictive Means Test** widely, i.e. assessing whether the same level of protection can be achieved through alternative measures that are 'equally effective' but less restrictive (see Annex 1 for the guide to apply the Least Restrictive Means Test).[58] Portugal's precedent in the Local Accommodation legal framework demonstrates that regular reviews are also an essential component of regulating markets. This ensures that measures remain effective and any ineffective measure should be repealed.[59]

A 'strict' proportionality test may go beyond the Least Restrictive Means Test as it would require a balancing of the weight of the public interest against the intensity and cost of the interference. For example, an increase in STRs in a city may show a causal link to higher long-term rents, yet the size of the effect may be modest relative to broader demand pressures. Framed narrowly, a city-wide ban might clear a least-restrictive-means check (if no other measure reduces the STR-specific margin as much), but proportionality does not end at necessity. 'Strict' proportionality requires weighing the incremental affordability gain against the ban's wider costs—lost income and jobs, diminished neighbourhood amenities, and heavy enforcement burdens—and asking whether less-intrusive and equally effective options exist outside of STR limitations (e.g. re-activating vacant homes). An example of this is the European Commission's assessment that Barcelona's STR regulation was likely disproportionate because it did not consider re-activating vacant properties.

It is also important to recognise that, when weighing the public interest against the costs of intervention, the geographic scope of any measure is critical. Limiting measures to the areas where they are genuinely required helps ensure that intervention is proportionate and avoids unnecessary distortive effects beyond the location of the policy measure.

To aid in this balancing process, **cost–benefit analysis (CBA)** is a crucial tool for local authorities when assessing the proportionality of STR regulations. By providing a systematic framework, CBA enables policymakers to weigh the expected benefits—such as increased housing affordability and urban stability—against potential economic and social costs, including reduced tourism revenue, deterioration of urban environment, loss of tax revenue and employment losses. Incorporating CBA ensures that regulatory

[56] Mitas, O., van Haaren, J., Vermeulen, S., Jeroen, K. and Koens, K. (2023), 'A Matter of Perspective: Short-Term Rentals, Housing Markets, and Quality of Life', https://ssrn.com/abstract=4676143.
[57] Sauter, W. (2013), 'Proportionality in EU Law: A Balancing Act?', *Cambridge Yearbook of European Legal Studies*, **15**, pp. 439–66.
[58] Ibid., p. 19. The application of the proportionality test in EU law involves a balancing of interests. The 'least restrictive' part of the test requires that, once the necessity of the measure is established, the measure should be carefully scrutinised to determine whether a less restrictive but equally effective alternative exists.
[59] Ordem Dos Advogados (2024), 'Local accomodation', 12 December, https://portal.oa.pt/publicacoes/informacao-juridica/direito-nacional/%C3%A1reas-de-referencia/urbanismo-habitacao-ordenamento-do-territorio-patrimonio-imobiliario/alojamento-local/.

measures are not only effective, but also proportionate to the specific issues they aim to address. This approach complements causal impact analysis and helps policymakers determine whether stricter regulations are necessary or if alternative, less restrictive measures could achieve similar outcomes with fewer economic disruptions.

The proportionality test, therefore, requires local authorities to consider the full costs and benefits of such measures. For example, it would not be considered proportionate to impose a city-wide ban where there is a shortage only in certain types of housing, e.g. one-bedroom apartments, or in certain geographic areas. The more restrictive a measure, the more likely it is to incur a high cost to the wider economy and residents in the form of lost income and employment from tourism.

The impact of tourism entails a broad spectrum of (both social and economic) costs and benefits, necessitating a rigorous CBA to evaluate policy implications effectively. For instance, if empirical evidence confirms that STRs contribute to rising LTR prices in a given geographic area or housing segment, policymakers should weigh the net welfare effects of potential regulatory interventions. However, the implementation of a comprehensive CBA is inherently complex, as it requires accounting for a broad range of factors. Given this complexity, a prudent policy approach would favour minimally distortive market interventions to mitigate the risk of unintended consequences.

The **growth versus fairness debate**—how to balance economic competitiveness with social equity—has become increasingly prominent in EU policymaking. While economic growth is essential for creating jobs and wealth, it can also exacerbate inequality if its benefits are not fairly distributed. Local authorities face this trade-off when considering STR measures. STRs can support local economic activity by attracting tourists, generating income for property owners, and benefiting nearby businesses. However, a rapid expansion of STRs may worsen housing affordability, displace long-term residents, and undermine the fabric of local communities. A CBA may offer the most effective framework for assessing and balancing these competing objectives.

In determining the most appropriate policy intervention, other quantitative approaches may also be useful as a stand-alone or in combination with causal impact analysis and/or CBA, including:

- **scenario modelling:** simulating the effects of different regulatory approaches on key variables such as rental prices, STR availability, and business revenue;
- **impact metrics:** defining measurable thresholds (e.g. percentage increase in LTR availability or percentage decline in STR-related tourism spending) to determine at what point regulation remains proportionate.

6 Concluding remarks

As local authorities across the EU grapple with concerns around the growth of STRs, it is crucial that any measures are grounded in robust evidence and adhere to legal principles of necessity, causality, and proportionality.

This report has outlined methodologies to support policymakers in making informed decisions regarding STR measures. By applying robust economic analysis based on the relevant legal tests, authorities can assess whether restrictions are justified, establish causal links between STR activity and market failures, and evaluate the proportionality of different policy interventions.

A well-balanced approach to STR regulation should be evidence-based, targeted, and proportionate to the specific challenges faced by each jurisdiction. By leveraging the methodologies presented in this report, policymakers can craft measures that can suitably address public policy concerns while minimising unintended consequences. In balancing the opposing costs and benefits of a policy intervention, it is generally advisable to favour less-intrusive policy designs, where possible. Additionally, where data limitations hinder robust analysis, local authorities should determine what assessments are currently feasible and identify areas for further empirical analysis to strengthen future policymaking.

A1 Guide for applying the Least Restrictive Means Test to short-term rental policies

Purpose: This guide establishes a systematic framework for evaluating whether a proposed STR policy measure constitutes the least restrictive means available to achieve the desired public policy goals. A 'strict' proportionality test employs the same analytical framework but incorporates a full assessment of both the costs and benefits associated with the measure.

Example: 'Least Restrictive Means Test' for a complete ban on STRs in city X.

Step 1: identify the legitimate objective

Before implementing any restrictions, it is essential to clearly define the legitimate objective that local authorities would like to achieve through the policy intervention. This could include objectives around housing affordability and protection of the urban environment.

After establishing the goal of the market intervention, local authorities must then articulate the market failure(s), i.e. how, without intervention, the relevant market (STR market in this case) leads to a sub-optimal outcome according to the public policy objectives.

Action: clearly define the specific objective you aim to achieve and articulate the market failure(s).

Step 2: assess the full range of policy options

In the context of measures to limit any negative effects from STRs, these could include:

- removing restrictions on building to increase the supply of accommodation;
- taxing STR stays and using the revenue to fund services to mitigate the externality, such as rubbish collection and street cleaning;
- mandatory licensing or registration restrictions to monitor compliance and enforce local housing policies;
- night caps that limit the number of nights a property can be rented out in a year;
- limits on future conversion to STRs in a geographic area;
- zoning laws, geographic and/or volume restrictions to prevent too many STRs from operating within a given neighbourhood;
- banning STRs completely in a geographic area.

Once the legitimate objective is defined, assess the full range of policy options to achieve these goals. It is essential to assess whether the policy will adequately address the identified issues. For example:

- **housing availability**: will the policy (e.g. a total ban on STRs) significantly increase the number of properties available for LTR?
- **neighbourhood impact**: will the policy reduce noise complaints, safety concerns, or neighbourhood disruptions?
- **public safety**: will the policy ensure that STR properties meet safety standards and are properly monitored?

Determine whether the policy is necessary to achieve the identified objective. Consider which measures could most effectively address the issue at hand.

Action: collect and analyse relevant data on the impacts of STRs in your community, including housing vacancy rates, noise complaints, traffic disruptions, and safety reports. The analyses include identifying quantifiable outcome metrics and conducting causal impact analysis to establish the evidence base for the ban on STRs or determining a more appropriate policy intervention.

Step 3: evaluate and compare the alternatives

The **Least Restrictive Means Test requires** that you assess which options could achieve the same goals but impose less burden on individuals and businesses.

Once these policies are identified, conduct a comparison of the policies for effectiveness and proportionality. Focus on the following factors:

- **housing availability:** how do the alternatives compare in terms of increasing the supply of LTR housing?
- **neighbourhood disruption**: how effective are the alternatives at reducing noise, congestion, and safety issues compared with the full ban?
- **cost and feasibility**: how much will it cost to implement and enforce each alternative and what resources will be required (e.g. enforcement, administration)?
- **public opinion**: consider community feedback—are residents more likely to support a regulated system versus an outright ban?

Action: use quantitative metrics (e.g. housing data, cost analysis, community surveys) to compare the impact of each alternative on the community.

Step 4: make a final determination

After evaluating the policy options, determine which is the least-restrictive means of achieving the government's compelling interest. The test is whether one of the options achieves the same goal but with less impact on STR owners and residents. For example, if a licensing system or zoning restrictions can meet the government's housing and neighbourhood goals without completely banning STRs, the original policy (ban) may not be the least-restrictive means.

Action: document your findings, clearly explaining why the chosen policy (or an alternative) is the least-restrictive means to achieve your goals.

Step 5: implement and monitor the policy

Once a decision has been made, the policy can be implemented. However, continuous monitoring and evaluation are essential. Collect data on housing availability, neighbourhood impact, and public opinion after the policy is implemented. This helps to ensure that the policy is achieving its goals without unintended negative consequences.

Action: set up an ongoing evaluation process to monitor the impact of the policy and adjust if necessary.

A2 Glossary

Term	Definition
Authorisation scheme	Authorisation schemes are examples of STR measures that require service providers to be approved before operating.
Causation	A relationship between two or more variables that implies that one or more variable causes the other(s).
Control group	A group of individual units that are not exposed to treatment, but are otherwise similar to the individuals in the treatment group.
Control variable	A variable that is included in a regression model that is not the primary explanatory variable of interest is held constant to isolate the true effect of the key explanatory variable on the outcome.
Correlation	A statistical relationship between two or more variables.
CJEU	Court of Justice of the European Union
Difference-in-Differences (DiD)	An estimation method that involves comparing outcomes between treatment and control groups before and after the introduction of a treatment to estimate the causal effect of a treatment. Individuals in control groups are assumed to be otherwise similar to individuals in the treatment group.
Endogeneity	A situation where an explanatory variable in a regression model is correlated with the error term, such that the variable being studied is influenced by factors not captured in the model, leading to biased estimates of the causal effect of the explanatory variable on the outcome.
Externalities	External costs/benefits borne by third parties or markets as a result of a private transaction.
Instrumental variables (IV) approach	An estimation approach that involves using an exogenous variable that affects the treatment variable but does not affect the outcome variable directly, to estimate the causal effect of a treatment.
LTR	Long-term rental.
Market failure	Market failures are outcomes that arise due to the failure of the market to allocate resources in a socially optimal way.

Term	Definition
Necessity test	A test to determine whether a measure is necessary to further one or more public policy objectives.
Non-rivalry	A characteristic of public goods whereby the consumption by one user does not limit the consumption of another (e.g. street lights).
Non-excludability	A characteristic of public goods wherein it is not possible to prevent someone from using the good, regardless of whether they pay for it (e.g. street lights).
Proportionality test	A test to determine whether a measure is suitable and will not exceed what is needed to achieve the objective, i.e. balance between benefits and restrictions.
Spillover effects	In the context of control-treatment analysis, spillover effects are unintended effects of the treatment on the control group.
STR	Short-term rental.
Regression analysis	A statistical technique that is used to estimate the relationships between an outcome variable and one or more explanatory variables.
Regression Discontinuity Design	Estimation approach that compares outcomes between individuals either side of a cut-off, where only individuals on one side of the cut-off are treated, to estimate the causal effect of a treatment. Individuals either side of the cut-off are assumed to be otherwise similar.
Synthetic control approach	This approach involves constructing a weighted combination of control units to create a synthetic (or artificial) version of the treated unit to compare with the treated unit.
Treatment group	A group of individual units exposed to a treatment (e.g. areas experiencing an increase in STRs).
Two-stage-least-squares	An estimation technique that implements an IV approach using regression analysis.

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