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From ownership to access: Policies to support the growth of peer-to-peer car sharing in Italy

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ABSTRACT

Although peer-to-peer (P2P) car sharing is increasingly promoted as a flexible, resource-efficient mobility option, its adoption in many countries, including Italy, remains limited. Policymakers are exploring fiscal and regulatory measures to stimulate participation, but evidence on how such policies affect potential car owners (supply) and renters (demand), as well as how responses vary across population groups, remains scarce. This study addresses this gap by examining how differentiated policy instruments shape individuals' willingness to participate in P2P car sharing in Italy.

We collected stated-preference data from two nationally representative samples of the Italian population, each totaling more than 4000 respondents, in a survey conducted in May 2025 that included both car owners and renters.

Results show that, on the supply side, fiscal incentives such as exemptions from the annual vehicle ownership tax and from income tax on car-sharing revenues significantly increase the likelihood of participation. On the demand side, renters respond most positively to subsidies for hourly rental rates and highway tolls. Policy effectiveness varies markedly across sociodemographic groups and regions: women aged 25 or older, those with higher levels of education, and those who are not employed are among the most responsive, with differing sensitivities emerging depending on place of residence and local accessibility levels.

Psychological and attitudinal factors, including perceived benefits, social influence, and environmental concern, also play a significant role in participation decisions. These findings underscore the need for policy designs and communication strategies that combine fiscal measures with targeted user segmentation based on both sociodemographic and attitudinal profiles.

1. Introduction

Urban areas today face mounting challenges related to traffic congestion, air pollution, and the economic unsustainability of private car ownership (Pribadi et al., 2025). Cars remain parked approximately 95 % of the time, making them an inefficiently used resource that occupies valuable urban space (Shoup, 2007). In this context, fostering the diffusion of car-sharing services has become increasingly important, not only to reduce the number of privately owned vehicles on the road but also to promote more sustainable, inclusive, and efficient urban mobility systems (Martinez et al., 2024; Nobis, 2006; van der Craats et al., 2025).

A particular type of car sharing is peer-to-peer (P2P) car sharing, in which private car owners rent out their vehicles to other individuals through a digital matching platform. A distinctive feature of this model is its economic viability even in small and medium-sized towns or low-density areas, as it does not require the substantial investment and maintenance costs typical of business-to-consumer schemes.

Globally, the P2P car-sharing market was valued at USD 2.5 billion in 2024 and is projected to reach USD 7.0 billion by 2030, corresponding to a CAGR of 18.4 % over 2024–2030 (Research and Markets, 2025). The model has gained significant traction in North America and Western Europe, with platforms such as Turo (with 340,000 active vehicles worldwide), Getaround (operating in France, Spain, Norway, Belgium, Austria, and Germany), and SnappCar (operating in the Netherlands, with over 10,000 vehicles) expanding rapidly in metropolitan areas and tourist destinations (Turoń et al., 2025). In contrast, P2P car sharing

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remains relatively unknown in Italy, with only two platforms currently operating: Volvero in Northern Italy, managing approximately 50 vehicles, and Auting in Central and Southern Italy, managing about 500 vehicles. This limited adoption is partly due to the platforms' launch coinciding with the onset of the COVID-19 pandemic, during which they received no fiscal policies or incentives that could have sustained their operations and stimulated market growth.

Moreover, Italy's high car ownership rates, among the highest in Europe, combined with an aging vehicle fleet, contribute to significant environmental and congestion-related challenges. The average age of Italian gasoline-powered cars exceeds 13 years, resulting in a fleet that is both inefficient and environmentally unsustainable (Italian Transport Ministry, 2024). These issues, compounded by a lack of supportive policies for shared mobility services, underscore the need for targeted interventions. Public awareness of P2P car-sharing services remains low, and local administrations have not yet provided the institutional or regulatory support needed to encourage widespread adoption. This represents a key gap in Italy's transport policy, as shared mobility solutions like P2P car sharing could help address urban congestion, reduce emissions, and contribute to a more sustainable transport system (Daniele et al., 2025). Without appropriate policies to incentivize users and service providers, the potential of P2P car sharing in Italy remains largely untapped, limiting the country's ability to meet broader environmental and mobility goals.

This limited adoption contrasts sharply with the urgent need for new forms of shared mobility in Italy. The country not only has the highest rate of car ownership in Europe, but also one of the oldest and most polluting vehicle fleets. The average age of gasoline and diesel cars is 15 and 13 years, respectively (Italian Transport Ministry, 2024). This combination creates significant challenges for environmental sustainability, contributes to high energy consumption, and exacerbates issues of social equity within the transport system.

Standard car-sharing services have gained some traction in Italy since their initial introduction by the Italian Ministry of Environmental Protection in 2001. However, their development has been largely concentrated in large, dense metropolitan areas, where demand is sufficient to ensure cost recovery for service providers (Rotaris and Danielis, 2018). However, in these same areas, the modal share of privately owned cars is relatively low, as residents can often rely on walking, cycling, or dense public transport networks to satisfy their mobility needs (ISFORT, 2025).

By contrast, much of the rest of the country is characterized by lower population densities, limited transport services, and significant car dependency. For many residents outside major urban centers, especially in peripheral and rural areas, owning a car remains a necessity, yet an increasingly unaffordable one. In these contexts, it would be neither feasible nor economically sustainable to finance a highly extensive public transport network. Thus, a shift from car ownership to car sharing, particularly in the form of P2P car sharing, offers a promising alternative.

In the literature, a few studies have examined the sociodemographic characteristics of P2P car-sharing users. Users tend to be young adults, primarily under the age of 40 (Ballús-Armet, 2014), typically male, and more highly educated (Beria et al., 2017; Mariotti et al., 2013; Münzel et al., 2019). They often reside in urban areas (Dill et al., 2017; Valor, 2020). Most users exhibit a cost-sensitive attitude and prefer active or public transportation modes, such as bicycles or buses (Beria et al., 2017; Mariotti et al., 2013). Additionally, they are more likely to have higher incomes than the general population, though they are not frequent car users (Shaheen et al., 2018). Overall, most users are male and demonstrate an environmentally conscious mindset, often motivated by sustainability concerns (Münzel et al., 2019).

Demand for P2P car sharing is driven by a combination of convenience, flexibility, and cost savings (Ballús-Armet, 2014). Users value the variety of vehicles available, which allows them to choose cars that suit their needs, as well as the reliability of the vehicles. Vehicle availability is crucial, as users seek easy access when needed, without the hassle of ownership (Dill et al., 2017). Economic benefits, such as cost and time savings, play a major role, particularly when compared with traditional car ownership (Münzel et al., 2019; Wilhelms et al., 2017). Renters also prioritize accessibility and accountability from both car owners and platform users, ensuring smooth transactions and clear responsibilities (Valor, 2020).

On the supply side, the primary motivator for car owners is the potential for additional income from renting out their vehicles (Wilhelms et al., 2017; Ballús-Armet et al., 2014). Owners also appreciate that their vehicles can be used more efficiently, contributing to environmental sustainability by reducing overall car ownership and encouraging shared use (Ballús-Armet, 2014). Many also view their participation as supporting social inclusion and contributing to the broader sharing economy (Dill et al., 2017). However, supply-side participants face several challenges, including concerns about liability, potential vehicle damage, and distrust between renters and owners (Shaheen et al., 2018). Some owners also find the organizational burden of managing rentals to be a drawback, particularly when dealing with maintenance or coordinating key transfers (Shaheen et al., 2018). Despite these challenges, cost savings, improved vehicle utilization, and environmental benefits remain strong motivators for participation.

While the sociodemographic characteristics of P2P car-sharing users and the technical and operational features that platforms should offer, particularly on the demand side, have been widely studied (Barbour et al., 2020; Bergantino et al., 2025; Hartl et al., 2025; Prieto et al., 2022), there remains a significant gap in the literature regarding the role of public policies in fostering the development of P2P car sharing. More specifically, limited attention has been given to the policy frameworks that could support both the demand side (renters) and the supply side (car owners), which are essential for the sustainable growth of this emerging market. Understanding the distinct needs of these two groups is crucial, as they face different barriers and incentives that can significantly influence the uptake of P2P car-sharing services.

This paper aims to address this gap by analyzing how public policies can be tailored to support both renters and car owners in the P2P car-sharing market. The study focuses on policy scenarios that could incentivize car owners to share their vehicles (e.g., free parking, access to bus lanes) while simultaneously ensuring that renters have access to convenient and affordable services (e.g., subsidized hourly rental rates, service availability through MaaS platforms). Despite growing interest in shared mobility, the absence of targeted policy interventions remains a significant barrier to scaling P2P car sharing, particularly in countries like Italy, where car ownership is high and car-sharing adoption is relatively low.

Italy represents a unique case study not only because of its high car ownership rates but also due to the socio-spatial divides that characterize the country. Leveraging digital innovations, such as widespread smartphone use, GPS technology, paperless payments, and the success of two-sided platforms in other sectors (e.g., Airbnb in tourism), could unlock the potential of this otherwise underutilized mode of transport. However, without targeted policies aimed at fostering market growth and achieving critical mass, digital innovation alone will not suffice.

By analyzing the potential impact of policies on both the supply and demand sides, this research provides a comprehensive policy framework to support the expansion of P2P car sharing. The insights gained offer actionable guidance for local and national policymakers to effectively address the challenges currently hindering market growth.

The goal of this paper is to fill this gap by presenting the results of a stated-preference (SP) survey conducted in Italy to explore how potential users, both renters and car owners, respond to various policy scenarios. To the best of our knowledge, this is the first study to jointly examine the policy effects on both the supply and demand sides of the P2P car-sharing market, with a particular focus on Italy. The insights gained will help policymakers design targeted interventions that address the specific needs of both sides of the market, ultimately fostering the

growth of P2P car sharing and contributing to broader goals of environmental sustainability and shared mobility.

The remainder of the paper is organized as follows: Section 2 reviews the relevant literature on car sharing and mobility policy. Section 3 outlines the survey design, describes the methodology, and details the structure of the econometric model. Section 4 presents the results of the econometric analysis, along with the findings from the scenario-based simulations. Section 5 discusses the policy implications of the results and concludes with reflections and directions for future research.

2. Literature review

The selection of papers reviewed in this study was guided by the specific objective of identifying policies that could promote the uptake of car-sharing services. Only recent studies (published within the last eight years) that explicitly consider policy measures supporting car sharing were included. A summary of the main characteristics of the selected studies is provided in Table 1.

The reviewed studies exhibit substantial methodological diversity in terms of data collection, sample size, and analytical focus. Several studies rely on stated preference (SP) experiments, such as Li and Kamargianni (2020), Monteiro et al. (2023), and Zawieska et al. (2025), to simulate choice scenarios and test how variations in attributes, such as travel time, cost, parking, or other incentives, affect car-sharing adoption. Other studies use revealed preference (RP) data, capturing mobility habits and car ownership, or a combination of RP and SP, as in Tuominen et al. (2019), allowing for analysis of actual travel behavior alongside hypothetical scenarios. Moreover, the attributes considered in SP experiments vary considerably across studies, reflecting specific policy or operational questions, ranging from parking costs and bus lane access to the number of car sharers and engine type (internal combustion vehicles versus electric vehicles).

Some studies adopt qualitative approaches, such as Shemesh and Parag (2024), using focus groups to explore user perceptions, preferences, and policy responses, providing insights into behavioral motivations that quantitative data alone may not capture. Surveys are another common method, exemplified by van der Linden et al. (2025), which collect socio-demographic information, mobility habits, and latent variable indicators to understand broader patterns and attitudinal drivers of car-sharing use.

Sample sizes and geographic contexts also vary widely, from small qualitative groups (e.g., 9–10 participants per focus group) to large-scale surveys and trip datasets exceeding 16,000 observations (Tuominen et al., 2019). Most studies focus on European countries, with only one conducted in China and one in Israel. Notably, none of the reviewed studies are situated in the USA, Central or Latin America, Africa, or other parts of Asia.

Across the reviewed studies, several policy-relevant findings emerge. Financial and accessibility incentives consistently encourage car-sharing adoption: measures such as higher parking costs for private cars, reduced parking availability, off-peak discounts, and dedicated or reserved car-sharing parking spots increase the attractiveness of shared vehicles (Li and Kamargianni, 2020; Monteiro et al., 2023; Shemesh and Parag, 2024; Zawieska et al., 2025). Users are also more likely to choose car sharing when it is perceived as cost-effective, especially for short, off-peak trips, where it often complements or substitutes public transport (Fitschen et al., 2024). The studies further indicate that car sharing is most effectively promoted in urban areas and regions with high car ownership, particularly where population and employment density are sufficient to support its use (Tuominen et al., 2019). Additionally, interventions such as allowing shared cars to use bus lanes and focusing on increasing the number of car sharers rather than the frequency of use are

Table 1
Overview of reviewed car-sharing policy studies.

Authors	Country; year; obs.	Methodology	Research question	Findings
Fitschen et al. (2024)	Germany, 2020; 807 individuals recruited through a professional panel provider	Stated perceived travel costs according to travel mode, trip length, and trip purpose	Are traveler segments sensitive to biased travel-cost estimations, and what are the implications for car-sharing use?	Perceiving short leisure trips as cheaper encourages users to choose shared mobility. This helps explain why car-sharing is mainly used for short, off-peak trips and often complements or substitutes transit.
Li and Kamargianni (2020)	Taiyuan(China); 2015; 3.698	RP and SP data from six choice tasks, each with six alternatives, varying by mode, travel time/cost, parking attributes, walking time to bus, bus frequency, and mobile app features.	How could policy interventions make car-sharing a more attractive transport mode?	Increasing parking costs for private car usage increases the demand for car sharing.
Monteiro et al. (2023)	Copenhagen (Denmark), Munich (Germany), Tel Aviv (Israel); 2020; 1.276	SP data from three choice tasks with four alternatives, featuring eight attributes, including discounted rates, redeemable credits (e.g., clothing or grocery discounts), and seamless door-to-door ticketing.	Examine how mobility incentives help retain and attract P2P car-sharing members.	Converting parking spaces into reserved car-sharing spots and offering off-peak discounts for shared-car usage.
Shemesh and Parag (2024)	Tel Aviv (Israel); 2023; 3 focus groups of 10-9 people	The discussion addressed reactions to shared vehicle services as an alternative to private cars, preferences for electric versus non-electric shared vehicles, and views on implementing shared services in participants' residential buildings.	Willingness to use shared vehicle services in multi-unit residential buildings and the impact of policies subsidizing rooftop photovoltaic panels.	Increasing car ownership costs and parking fees, while reducing on- and off-street parking availability for private cars.
Tuominen et al. (2019)	Helsinki and Tampere (Finland); 2015–2017; 16.513 (car trips)	Analysis of residents' socio-economic and mobility habits, car-sharing usage (RP data), and interviews with operators and city officials.	How to develop and implement sustainable car-sharing services based on urban form characteristics.	Support car sharing in car-oriented areas where density is sufficient to complement public transport and reduce second-car ownership.
Van der Linden et al. (2025)	The Netherlands, 2023; 1.281	Online survey on socio-demographics, mobility habits (including car sharing), and ratings of measurement indicators of latent variables influencing car-sharing use.	Determine whether car-sharing services are beneficial in reducing car ownership through the reduction of parking pressure.	Increase the number of car sharers, target high car ownership and urban areas, and promote car sharing as a complement to public transport.
Zawieska et al. (2025)	Warsaw (Poland); 2023; 1.157	SP data from 10 choice tasks, with two alternatives each, varying by car sharing rate, distance to car, area served, engine type, bus lane use, and extra benefits (e.g., reserved parking).	Provide practical guidance in designing a car-sharing service that could attract a larger part of the population.	Many respondents see incentives like dedicated parking and bus lane access as key to participating in car sharing.

Note: SP = stated preferences; RP = revealed preferences.

seen as influential in expanding participation (Zawieska et al., 2025).

While a substantial body of literature focuses on identifying population segments most likely to use car sharing, either as renters or as owners participating in peer-to-peer schemes, as discussed in the Introduction, very few studies explicitly analyze policies aimed at promoting car sharing. Existing work typically treats policy measures as just one among many factors rather than as the central focus. Moreover, all the reviewed papers address policies for business-to-consumer car sharing, and, to the best of our knowledge, no studies specifically examine P2P car-sharing policies. This paper seeks to fill this gap by exclusively examining policies that can support car-sharing adoption, with the added contribution of analyzing interventions from both the supply and demand sides of the P2P market.

Since no policies currently exist in Italy to support P2P car sharing, we employ a SP choice experiment to test the acceptability and relative attractiveness of a set of hypothetical policy measures. In addition, we explore differentiated policies for both sides of the market and survey two large samples of approximately 4000 individuals each, representing potential suppliers and potential users. The resulting sample sizes are therefore substantially larger than those found in the existing literature.

Finally, none of the reviewed studies incorporate latent variables within a discrete choice framework, with the sole exception of van der Linden et al. (2025), who measure indicators of latent constructs without integrating them into the choice model. By contrast, our experiment explicitly models latent attitudes and embeds them within a discrete choice structure.

3. Materials and methods

3.1. Survey

To investigate the impact of different policies aimed at fostering the demand and supply of P2P car-sharing services, we designed two separate survey instruments: one for prospective users interested in renting vehicles, and another for private car owners open to sharing their vehicles through P2P platforms. Both questionnaires included the following key sections:

- household vehicle availability and travel behavior – capturing mobility patterns, vehicle ownership, and usage at the household level;
- perceptions of P2P carsharing – assessing perceived benefits, barriers, and risks associated with participating in P2P carsharing, tailored respectively to renters and providers;
- SP experiments – including six hypothetical choice tasks to evaluate respondent preferences under different policy scenarios;
- socio-demographic profile – collecting data on respondents' age, gender, education, income, employment status, and other relevant characteristics.

The questionnaire design process began with two focus groups comprising experts in transport economics and behavioral sciences, who provided feedback on content validity, structure, and phrasing. The indicators for the latent variables were based on the findings of Rotaris (2022) and Rotaris and Scorrano (2023), who conducted an exploratory analysis of P2P car-sharing markets in Italy. The measurement indicators are detailed in the Appendix. Each questionnaire was subsequently pre-tested on a sample of 150 respondents. Insights from the pre-test informed revisions to the wording and sequencing of questions, with the aim of improving clarity, respondent comprehension, and overall engagement. To enhance data reliability, both surveys included two attention-check questions designed to identify and filter out inattentive respondents. For the supply side of the P2P car-sharing market, these were: "Everything else being equal, would you prefer to pay or to be exempted from the vehicle ownership tax?" (with answers being either yes or no), and "Everything else being equal, would you prefer to pay or to be exempted from the income tax on car-sharing earnings?" (with answers being either yes or no). For the demand side, the attention checks were: "Everything else being equal, would you prefer a higher or a lower discount on the hourly rental rates?" (with answers being either higher or lower), and "Everything else being equal, would you prefer a higher or a lower highway subsidy when using a P2P car-sharing service?" (with answers being either higher or lower).

The final version of each questionnaire was administered online in May 2025 by a professional market research firm. The sample consisted of two nationally representative cohorts of approximately 4000 individuals each, all residing in Italy.

The SP component of the questionnaire was structured around four key attributes, chosen to represent the most relevant and promising policy measures aimed at encouraging the adoption of P2P car sharing. These attributes were identified through a combination of existing literature and insights gathered from the pre-test phase of the study, during which respondents highlighted the most impactful measures. To capture the distinct perspectives of the two main market segments, separate sets of attributes and levels were developed for car owners (potential suppliers) and car renters (potential demanders). Table 2 summarizes these attributes along with their corresponding levels for each group. The following attributes were selected based on their theoretical and empirical relevance:

- Free urban parking: Identified as a promising policy lever in several studies (Li and Kamargianni, 2020; Monteiro et al., 2023; Shemesh and Parag, 2024; Zawieska et al., 2025), which show that parking incentives can significantly influence car-sharing adoption.
- Access to bus-only lanes: This measure has been identified as relevant for P2P car sharing in urban areas, particularly due to its potential to enable faster and more reliable travel (Zawieska et al., 2025).
- Cost components: The relevance of cost incentives, such as exemption from the annual vehicle ownership tax and income tax on car-sharing earnings for the supply side, and subsidies for hourly rental rates and highway tolls for the demand side, is grounded in studies showing that users are highly sensitive to cost-related factors (Ballús-Armet, 2014; Beria et al., 2017; Mariotti et al., 2013; Münzel et al., 2019; Wilhelms et al., 2017).
- MaaS platform booking and payment: The potential role of a Mobility-as-a-Service (MaaS) platform was included based on findings from Daniele et al. (2025), which suggest that MaaS platforms may influence the adoption of shared mobility services.

An efficient experimental design, constructed using Ngene (ChoiceMetrics) software and informed by prior parameter estimates from the pre-test data, was used to generate the choice sets. This design

Table 2
Attributes and attributes' levels.

Car owners (potential supply side of the market)	Levels
Free urban parking	available; not available
Access to bus-only lanes and limited traffic zones	available; not available
Exemption from annual vehicle ownership tax	available; not available
Exemption from income tax on carsharing earnings	available; not available
Car renters (potential demand side of the market)	**Levels**
Free urban parking	available; not available
Subsidization of hourly rental rates	not available; 25 %; 50 %
Highway toll subsidy	not available; 25 %; 50 %
Booking and payment through a MaaS platform	not available; only booking; both booking and paying

maximizes statistical efficiency, minimizes standard errors, and ensures robust results, as discussed in Rose et al. (2008).

As depicted in Fig. 1, respondents were presented with two hypothetical scenarios and the option to select none.

3.2. Sample

The initial sample targeting potential car providers comprised 4050 individuals. From this group, we excluded respondents who indicated a complete unwillingness to rent out their vehicle under any conditions, economic or otherwise (n = 1253). An additional 582 respondents were removed for failing the embedded attention checks, and a further 289 were excluded due to exhibiting lexicographic preferences in the SP tasks. The resulting analytical sample consisted of 1926 valid observations.

Similarly, the initial sample of potential car renters included 4056 individuals. We excluded 716 respondents who declared they would never consider renting a car under any circumstances. A further 830 participants failed the attention check questions, and 302 demonstrated lexicographic response patterns, leading to their exclusion. The final sample available for analysis included 2208 respondents.

In addition to the overall analysis, we examined whether respondents' preferences varied according to their place of residence. Moving beyond conventional North–South or East–West geographic divisions, we focused on two territorially and behaviorally distinct areas: Southern Italy, often associated with unique mobility patterns and attitudes toward sharing, and the *Italia di Mezzo*. The latter encompasses regions characterized by medium-sized cities, peri-urban areas, and territories with a strong agricultural presence. This classification reflects a more nuanced spatial framework, capturing transitional zones situated between metropolitan cores and peripheral inland regions.

As noted by Kercuku et al. (2023), the *Italia di Mezzo* is marked by what they describe as "elasticity" and "plasticity," territorial qualities that enable it to serve as a strategic intermediary between urban centers and remote hinterlands. These areas often function as "hinges" within broader socio-spatial networks, supporting both metropolitan decongestion and regional connectivity. Donadoni and Beria (2024) further emphasize that mobility behaviors in the *Italia di Mezzo* defy traditional urban–rural dichotomies and instead call for new analytical frameworks. Indeed, the area is characterized by specific infrastructural and accessibility patterns that challenge conventional planning approaches.

Given that medium-sized urban centers, metropolitan fringes, and urban–rural interfaces within the *Italia di Mezzo* account for a significant share of Italy's population and territory, this cluster is particularly relevant for assessing spatial variation in both the potential supply and demand for P2P car sharing. Its hybrid socio-economic profile and infrastructural complexity make it a strategically important context for testing differentiated adoption patterns and informing targeted policy interventions.

Our samples closely mirror the national distribution by gender and region, including representation across the North, Center, South, and the *Italia di Mezzo* area, as shown in Table 3. However, educational attainment differs noticeably: our respondents possess substantially higher qualifications than the broader Italian population. The age distribution of the samples also broadly reflects that of the Italian population, except for the youngest and oldest segments, both of which are slightly underrepresented in our study.

A substantial share of respondents reported familiarity with the concept of P2P car sharing: 74 % among car owners and 63 % among car renters. These levels of awareness are considerably higher than those observed in earlier studies (Rotaris, 2022; Rotaris and Scorrano, 2023). It is important to note, however, that our sample is composed exclusively of individuals open to participating in the P2P car-sharing market, either as providers or users, which may partially account for the higher familiarity rates.

Fig. 2 illustrates the share of car owners and potential renters whose minimum acceptable rental price (for owners) and maximum willingness to pay (for renters) fall below or above the values indicated along the horizontal axis. The intersection of the two curves represents a potential market equilibrium, occurring at an hourly rental rate of €7. At this price point, approximately 40 % of both groups indicate a willingness to participate in the P2P car-sharing market.

3.3. Econometric model

To examine the dataset, we adopted a discrete choice modeling

Table 3
Socio-demographic characteristics of the samples and of the Italian population.

Characteristics	Car owners' sample	Car renters' sample	Italian population
Gender	Female 51 %; Male 49 %	Female 52 %; Male 48 %	Female 51 %; Male 49 %
Age	18–24 10 %; 25–44 34 %; 45–64 48 %; 65–70 9 %	18–24 11 %; 25–44 35 %; 45–64 44 %; 65–70 10 %	18-24 15 %; 25–44 33 %; 45–64 36 %; 65–75 16 %
Education level	Bachelor's degree or higher 53 %	Bachelor's degree or higher 67 %	Bachelor's degree or higher 22 %
Residential area	North 45 %; Center 20 %; South 35 %	North 46 %; Center 19 %; South 35 %	North 46 %; Center 20 %; South 34 %
Living in the *Italia di Mezzo*	59 %	58 %	62 %

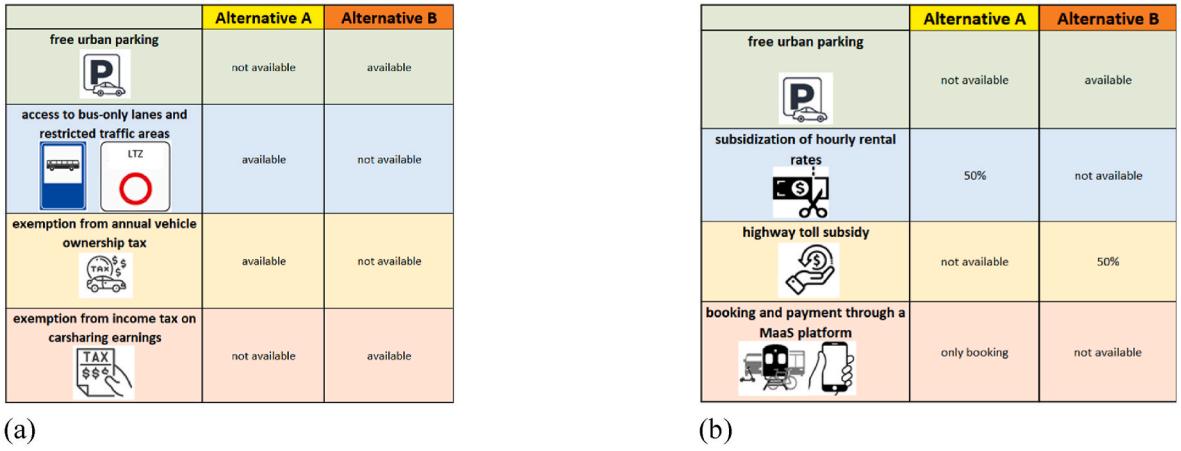

Fig. 1. Choice task examples shown to (a) car owners and (b) car renters.

Fig. 2. Estimated supply and demand curves for P2P car sharing market.

framework that incorporates latent variables, following the approach outlined by Hess and Daly (2024). This method was chosen to capture the influence of individual attitudes and perceptions on choice behavior. The underlying assumption is that, in each decision-making instance $t \in T$, individual n evaluates all J available alternatives and selects the one yielding the highest utility. The utility associated with option j in task t is expressed as a function of X (policy mix characterizing the alternatives), Z (individual-level socio-demographic factors and travel behavior), and LV (latent constructs reflecting unobserved attitudes and perceptions) (Equation (1)).

$$U_{njt} = ASC_j + \beta'_{nj} X_{njt} + \alpha'_j Z_n + \lambda'_{njl} LV_{nl} + \mu'_n C_{nj} + \varepsilon_{njt} = V_{njt} + \varepsilon_{njt} \quad (1)$$

The vector β'_n represents heterogeneity in preferences across the N individuals in the sample. These parameters are modeled as triangularly distributed random parameters, constrained to be positive. The choice of constrained triangular distributions was motivated by both empirical and theoretical considerations. Empirically, prior knowledge exists regarding the expected direction of the parameters, grounded in established findings and theoretical expectations. The triangular distribution ensures that coefficients remain positive, reflecting the nature of the variables (e.g., discounts, free urban parking). As suggested by Hensher et al. (2015), a triangular distribution is appropriate here because it allows subjectivity in setting priors while maintaining economic interpretability. Moreover, unlike normal or lognormal distributions, the constrained triangular distribution avoids excessively long tails that could lead to unrealistic estimates.

The likelihood that respondent n selects alternative j is calculated as a weighted integral of the logit probability across different values of β, with weights derived from the density function $f(\beta|\varphi)$. The parameter vector φ characterizes the distribution of β', while α'_j captures how socio-demographic attributes influence preferences for a given option. The vector λ' captures the effect of the latent attitudinal variables. The random error component consists of two parts: ε_{nj}, assumed to follow an i.i.d. extreme value distribution, and μ, a normally distributed error term (with zero mean and estimable variance) introduced to reflect the nested structure of the model due to the presence of a no-choice alternative. A dummy variable C_{nj} is included, equal to one for the actual alternatives and zero for the opt-out.

Socio-demographic variables were incorporated both into the utility specification of the opt-out alternative and as interaction terms with the policies characterizing the available options. This modeling strategy was intended to reveal how individual socio-demographic profiles contribute to variations in preferences for the policies under investigation.

An exploratory factor analysis was conducted to guide the selection of latent variables and to identify suitable indicators (I_{LV}) for each latent dimension. The measurement component of the model was specified according to Equation (2), while the structural equations, linking latent constructs to socio-demographic variables, follow the formulation in Equation (3). In this context, γ denotes the relationship between indicator i and latent variable l, whereas ζ captures the influence of socio-demographic factor z on latent variable l.

$$I_{nLV_l} = \gamma'_{ni_l} LV_l + \sigma_{ni_l} \quad (2)$$

$$LV_{nl} = \zeta'_{z_l} Z_n + \eta_{nl} \quad (3)$$

Figs. 3 and 4 provide graphical representations of the econometric models developed to analyze the determinants of participation on the supply and demand sides of the P2P car-sharing market, focusing on car owners and car renters, respectively.

The parameters were estimated using Apollo, which employs Expectation-Maximization algorithms to obtain Maximum Likelihood estimates. For the estimation process, we applied the Broyden–Fletcher–Goldfarb–Shanno algorithm along with 1000 Sobol draws (Hess and Palma, 2019).

4. Results

4.1. Car owners' model

Table 4 presents the estimation results for the sample of car owners, along with the coefficients from the structural equations. Corresponding estimates for the measurement indicator equations are provided in Table 5. The model produces an adjusted Rho-squared value of 0.24. A total of 11,556 choice observations were used in the estimation, resulting in 126 parameters being identified. By comparison, a multinomial logit model estimated on the same dataset but with fixed parameters and no latent variables yielded an adjusted Rho-squared value of 0.19.

The results presented in Table 4 suggest that, overall, car owners do not exhibit a significant predisposition either in favor of or against participating in the P2P car-sharing market. This is indicated by the alternative-specific constant for the choice to rent out one's car versus not doing so (0.31), which is not statistically significant.

However, several sociodemographic characteristics are significantly associated with a greater likelihood of willingness to rent out a personal

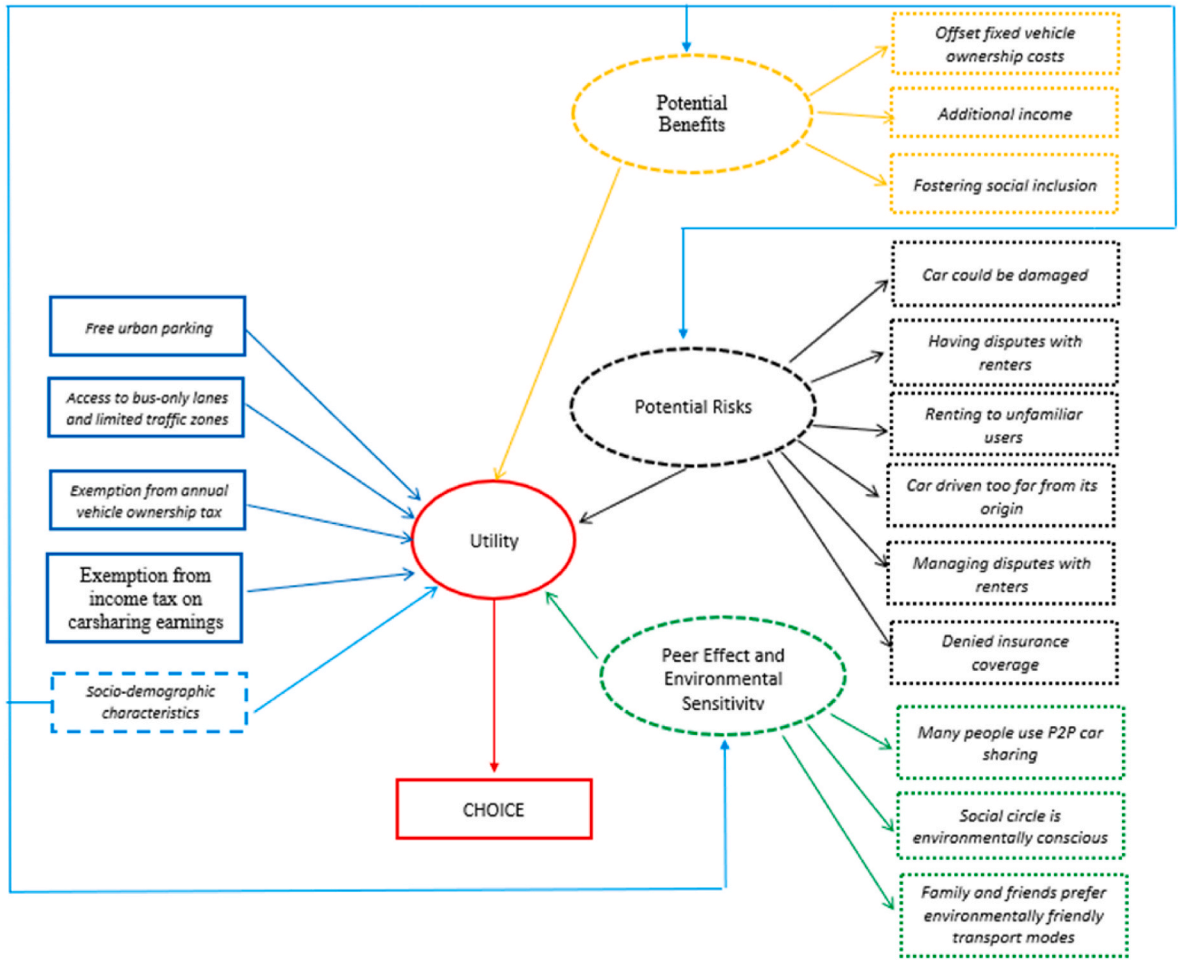

Fig. 3. Graphical representation of the econometric model designed for car owners.

vehicle. Specifically, being younger (−1.11), having a higher level of education (−0.29), and being employed (−0.41) are all statistically significant and negatively associated with the probability of not renting out a car, suggesting a higher propensity to participate on the supply side of the market. Conversely, being female (0.31) is positively associated with the unwillingness to rent out a vehicle, indicating lower participation likelihood among women. These findings align with existing studies, such as Ballús-Armet et al. (2014), who highlighted a higher propensity for younger individuals to engage in P2P car sharing. Similarly, our results support evidence reported by Beria et al. (2017), Mariotti et al. (2013), and Münzel et al. (2019), which found that higher educational attainment positively influences the likelihood of using P2P car-sharing services. Notably, our study also confirms Münzel et al. (2019) in finding that gender plays a significant role: women, in both our case study and theirs, are less likely to engage in P2P car sharing. No prior research directly addresses the geographical variable of residence in Southern Italy as a factor influencing supply-side participation. However, we observe that individuals residing in Southern Italy are more likely to engage in P2P car sharing, which could reflect local market dynamics, cultural factors, or the availability of alternative transportation options.

Regarding attitudinal and psychological variables, Perceived Potential Benefits (−0.17) is the only factor significantly and negatively associated with the unwillingness to participate as a car-sharing provider. This supports the findings of Wilhelms et al. (2017) and Ballús-Armet (2014), who also identified perceived benefits as a key motivator for car-sharing participation. By contrast, neither Perceived Potential Risks (0.06) nor Perceived Peer Effect and Environmental Sensitivity (0.05) shows statistically significant relationships with the decision not to participate. The lack of significance for Perceived Potential Risks contrasts with the findings of Shaheen and Cohen (2018), who reported that perceived risks are a significant barrier to P2P car sharing. This discrepancy may be attributed to differences in the socio-demographic characteristics of our case study, which may not share the same level of risk concern as the population studied by Shaheen and Cohen (2018).

More specifically, as reported in Table 5, the latent variable Perceived Potential Benefits is positively associated with several motivational factors. These include the possibility of offsetting fixed vehicle ownership costs (2.68), the opportunity to generate additional income (2.27), and the belief that renting out one's car can promote social inclusion by enabling access to car use for individuals who do not own one (1.53).

Conversely, the latent variable Perceived Potential Risks is positively associated with a range of concerns, including the possibility of vehicle damage (3.65), potential disputes with renters (3.54), discomfort in dealing with strangers or unfamiliar users (1.97), concerns about the car being taken too far from its origin (1.90), difficulty in managing conflicts with renters (2.54), and fears that insurance coverage may be denied in the event of damage (2.34).

Finally, the latent variable Peer Effect and Environmental Sensitivity is reflected in indicators such as the perception that many people use P2P car sharing (2.40), the belief that one's willingness to rent out the car would increase if family and friends were more environmentally conscious (1.39), and the importance placed on environmental concerns when choosing transport modes (2.44).

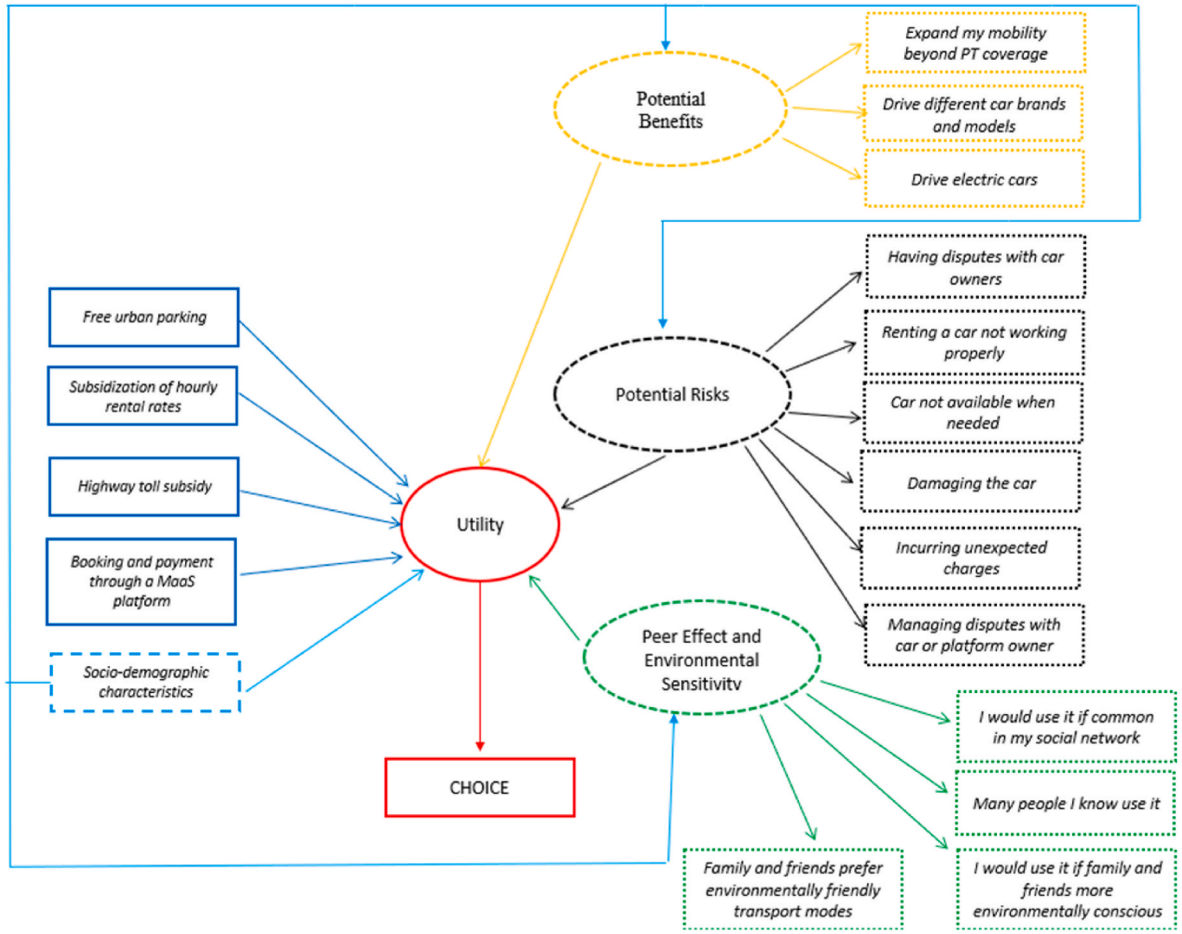

Fig. 4. Graphical representation of the econometric model designed for car renters.

All coefficients associated with the attributes of the hypothetical alternatives, as reported in Table 4, are statistically significant and exhibit the expected signs. These results highlight the considerable heterogeneity in respondents' preferences regarding the types of policies that local authorities or market regulators could implement to encourage participation in P2P car sharing. This heterogeneity is further confirmed by the fact that all coefficients were specified as random, and the estimated standard deviations of their distributions are statistically significant.

Sensitivity to the provision of free urban parking for those who rent out their vehicle, modeled as a positively constrained triangular random coefficient (spread = 0.76), is lower among employed individuals (−0.24) and residents of Southern Italy (−0.27). By contrast, individuals with a higher level of education exhibit greater sensitivity to this incentive (0.17). The significant role of free parking aligns with and reinforces the findings of Li and Kamargianni (2020), Monteiro et al. (2023), Shemesh and Parag (2024), and Zawieska et al. (2025), highlighting that this policy measure is consistently effective in promoting engagement in P2P car-sharing markets.

However, none of the other policies examined for the supply side of the market have been previously analyzed in the literature. These measures contribute to novel insights into the P2P car-sharing debate, particularly regarding their potential to encourage greater participation among car owners. More specifically, sensitivity to the option of accessing bus-only lanes and limited traffic zones, also modeled as a positively constrained triangular random coefficient (spread = 0.39), is lower among respondents residing in Southern Italy (−0.17).

According to our econometric model, the most impactful policy in increasing the likelihood of renting out one's car is the exemption from the annual vehicle ownership tax. This attribute is modeled as a positively constrained triangular random coefficient (spread = 1.51) and exhibits particularly strong effects among respondents residing in the *Italia di Mezzo* (0.16). Its effect is notably weaker among younger individuals (−0.56), employed respondents (−0.15), and residents of Southern Italy (−0.16), indicating variation in the policy's impact across different sociodemographic groups.

Exemption from income tax on earnings generated through car sharing emerges as the second most influential policy for encouraging market participation among car owners. This attribute was modeled using a positively constrained triangular distribution with a spread of 1.44. Similar to the vehicle ownership tax exemption, this policy is particularly valued by respondents residing in the *Italia di Mezzo* (0.14). However, its effect is less pronounced for younger individuals (−0.51), those with higher education levels (−0.16), and residents of Southern Italy (−0.32).

4.2. Renters' model

The main results from the estimated model for the car renters' sample are summarized in Tables 6 and 7. The model achieves an adjusted Rho-squared of 0.26. Estimation was based on a total of 13,248 choice observations, with 123 parameters estimated. By comparison, a multinomial logit model estimated on the same dataset but with fixed parameters and no latent variables yielded an adjusted Rho-squared value of 0.16.

Consistent with the findings from the model estimated for car owners, the results suggest that respondents are, on average, neutral toward participating in the P2P car-sharing market. Specifically, the

Table 4
Estimates of the car owners' model (Eq. (1) and Eq. (3)).

Parameters (measurement unit, type of parameter)	Estimate	t-ratio
Utility function of the no-choice alternative		
Female (dummy)	0.31*	1.90
Young (dummy, aged 18–24)	−1.11***	−3.82
Higher education level (dummy, Bachelor's degree or higher)	−0.29*	−1.72
Being employed (dummy)	−0.41**	−2.18
Living in Southern Italy (dummy)	−0.71***	−4.27
Living in the *Italia di Mezzo* (dummy)	−0.001	−0.01
Number of cars owned by household (cardinal)	0.01	0.06
Variance error component	2.46***	25.13
Latent Variable Perceived Potential Benefits	−0.17**	−2.21
Female (dummy, structural term)	0.22***	4.53
Young (dummy, aged 18–24, structural term)	−0.25***	−2.81
Higher education level (dummy, Bachelor's degree or higher, structural term)	0.16***	3.28
Being employed (dummy, structural term)	−0.09	−1.47
Living in Southern Italy (dummy, structural term)	0.07	1.36
Living in the *Italia di Mezzo* (dummy, structural term)	0.02	0.42
Number of cars owned by household (cardinal, structural term)	−0.03	−1.03
Latent Variable Perceived Potential Risks	0.06	0.68
Female (dummy, structural term)	0.33***	6.73
Young (dummy, aged 18–24, structural term)	−0.51***	−6.93
Higher education level (dummy, Bachelor's degree or higher, structural term)	−0.20***	−4.14
Being employed (dummy, structural term)	0.05	0.94
Living in Southern Italy (dummy, structural term)	0.06	1.28
Living in the *Italia di Mezzo* (dummy, structural term)	−0.02	−0.36
Number of cars owned by household (cardinal, structural term)	0.26***	7.19
Latent Variable Peer Effect And Environmental Sensitivity	0.05	0.66
Female (dummy, structural term)	0.04	0.85
Young (dummy, aged 18–24, structural term)	−0.41***	−4.23
Higher education level (dummy, Bachelor's degree or higher, structural term)	−0.03	−0.58
Being employed (dummy, structural term)	−0.01	−0.19
Living in Southern Italy (dummy, structural term)	−0.12**	−2.24
Living in the *Italia di Mezzo* (dummy, structural term)	0.16***	3.16
Number of cars owned by household (cardinal, structural term)	0.21***	5.96
Utility function of the hypothetical alternatives		
Alternative specific constant (hypothetical vs no-choice alternative, fixed)	0.31	1.09
Free urban parking (dummy, random-spread triangular distribution)	0.76***	8.03
Female (dummy, interaction term)	−0.06	−0.91
Young (dummy, aged 18–24, interaction term)	−0.04	−0.35
Higher education level (dummy, Bachelor's degree or higher, interaction term)	0.17***	2.65
Being employed (dummy, interaction term)	−0.24***	−3.20
Living in Southern Italy (dummy, interaction term)	−0.27***	−4.19
Living in the *Italia di Mezzo* (dummy, interaction term)	0.02	0.31
Number of cars owned by household (cardinal, interaction term)	0.04	1.03
Access to bus-only lanes and limited traffic zones (dummy, random-spread triangular distribution)	0.39***	4.50
Female (dummy, interaction term)	−0.03	−0.59
Young (dummy, aged 18–24, interaction term)	0.01	0.06
Higher education level (dummy, Bachelor's degree or higher, interaction term)	0.09	1.49
Being employed (dummy, interaction term)	−0.10	−1.56
Living in Southern Italy (dummy, interaction term)	−0.17***	−2.99
Living in the *Italia di Mezzo* (dummy, interaction term)	0.03	0.61
Number of cars owned by household (cardinal, interaction term)	−0.01	−0.31
Exemption from annual vehicle ownership tax (dummy, random-spread triangular distribution)	1.51***	16.89
Female (dummy, interaction term)	0.09	1.53
Young (dummy, aged 18–24, interaction term)	−0.56***	−5.39
Higher education level (dummy, Bachelor's degree or higher, interaction term)	−0.10	−1.52
Being employed (dummy, interaction term)	−0.15**	−1.98
Living in Southern Italy (dummy, interaction term)	−0.16***	−2.52
Living in the *Italia di Mezzo* (dummy, interaction term)	0.16***	2.48
Number of cars owned by household (cardinal, interaction term)	0.01	0.17
Exemption from income tax on carsharing earnings (dummy, random-spread triangular distribution)	1.44***	15.89
Female (dummy, interaction term)	−0.02	−0.24
Young (dummy, aged 18–24, interaction term)	−0.51***	−4.44
Higher education level (dummy, Bachelor's degree or higher, interaction term)	−0.16**	−2.19
Being employed (dummy, interaction term)	−0.09	−1.15
Living in Southern Italy (dummy, interaction term)	−0.32***	−4.50
Living in the *Italia di Mezzo* (dummy, interaction term)	0.14**	1.92
Number of cars owned by household (cardinal, interaction term)	−0.01	−0.12

Note: ***, **, * indicate statistical significance at the 1 %, 5 %, and 10 % levels, respectively.

alternative-specific constant associated with the hypothetical scenarios in which the respondent rents a car, compared to the opt-out scenario, is not statistically significant. This indicates the absence of a strong inherent preference either for or against participation in the market. However, substantial heterogeneity emerges in relation to this baseline preference. Women and individuals residing in the *Italia di Mezzo* (0.41), all else being equal, exhibit a lower willingness to rent a car (0.70). In contrast, younger respondents (−0.93) and those who are employed (−0.28) demonstrate a higher propensity to engage with the service. These findings regarding gender and age effects align with the literature, particularly Münzel et al. (2019) and Ballús-Armet (2014), suggesting that demographic characteristics continue to play a relevant role in mobility adoption decisions. The lower willingness among women and older residents could reflect concerns about convenience, safety, or familiarity with car-sharing services, as commonly observed in prior studies.

The perceived potential benefits of using the service as renters, captured by the latent variable Perceived Potential Benefits, are negatively and significantly associated with the intention of not adopting P2P car sharing. As shown in Table 6, this latent variable has a negative coefficient (−0.36), indicating that higher perceived benefits are linked to a lower likelihood of opting out of the market. Table 7 details the indicators contributing to this latent construct. The most relevant perceived benefits include the ability to try different car brands and models (2.24), as noted by Dill et al. (2017), and the opportunity to drive electric vehicles (2.23), followed by the chance to expand personal mobility beyond areas covered by public transport (1.17). These results suggest that experiential and practical benefits strongly motivate potential renters, supporting the idea that direct utility from service features can outweigh other considerations.

In contrast to the model estimating the preferences of car owners, social influence, which is captured by the latent variable Peer Effect and Environmental Sensitivity, significantly reinforces the willingness to use a P2P car-sharing service among potential renters, consistent with the findings of Münzel et al. (2019). As shown in Table 6, this latent variable has a negative coefficient (−0.32) in the utility function of the no-choice alternative, indicating a positive effect on the likelihood of adoption. This construct reflects the role of both peer behavior and environmental awareness in shaping individual preferences. As detailed in Table 7, the latent variable is informed by several indicators: the importance of having a social network that commonly uses P2P car sharing (2.36), the number of acquaintances currently using such services (2.09), the perceived concern for environmental sustainability among family and friends (2.70), and the extent to which environmental concerns influence their travel choices (2.00). These results highlight that, for potential renters, social and environmental motivations can complement practical benefits in influencing adoption decisions.

Conversely, and consistent with the findings for car owners, the

Table 5
Estimates of the measurement indicators and the respective thresholds (Eq. (2)).

Parameters	Estimate	t-ratio
Latent Variable Perceived Potential Benefits		
Indicator Possibility to offset fixed vehicle ownership costs	2.68***	16.78
Threshold_1	−6.35***	−16.84
Threshold _2	−3.82***	−12.76
Threshold _3	−0.75***	−2.94
Threshold _4	−2.35***	8.63
Indicator Possibility of getting additional income	2.27***	18.70
Threshold _1	−5.37***	−17.92
Threshold _2	−2.95***	−12.25
Threshold _3	−0.40***	−1.83
Threshold _4	2.14***	9.41
Indicator Possibility of fostering social inclusion	1.53***	18.44
Threshold _1	−5.15***	−20.13
Threshold _2	−3.27***	−18.31
Threshold _3	−1.13***	−7.39
Threshold _4	1.11***	7.22
Latent Variable Perceived Potential Risks		
Indicator Risk that the car is damaged	3.65***	20.37
Threshold _1	−5.23***	−12.06
Threshold _2	−3.07***	−7.86
Threshold _3	−0.35	−0.93
Threshold _4	2.49***	6.42
Indicator Risk of disputes with renters	3.54***	21.01
Threshold _1	−5.06***	−12.18
Threshold _2	−2.91***	−7.73
Threshold _3	−0.31	−0.84
Threshold _4	2.61***	6.87
Indicator Risk in renting to unfamiliar users	1.97***	22.84
Threshold _1	−2.93***	−12.87
Threshold _2	−1.25***	−5.97
Threshold _3	0.57***	2.71
Threshold _4	2.61***	11.88
Indicator Risk of the vehicle being taken too far from its origin	1.90***	23.23
Threshold _1	−2.93***	−13.15
Threshold _2	−1.20***	−5.91
Threshold _3	0.61***	3.03
Threshold _4	2.66***	12.58
Indicator Difficulties of managing disputes with renters	2.54***	22.93
Threshold _1	−3.56***	−12.13
Threshold _2	−1.89***	−6.99
Threshold _3	0.33	1.23
Threshold _4	2.69***	9.78
Indicator Risk of denied insurance coverage in the event of vehicle damage	2.34***	22.97
Threshold _1	−3.29***	−12.24
Threshold _2	−1.50***	−6.06
Threshold _3	0.49**	2.02
Threshold _4	2.79***	10.89
Latent Variable Peer Effect and Environmental Sensitivity		
Indicator Many people use P2P car sharing	2.40***	−17.54
Threshold _1	−0.89***	−3.76
Threshold _2	0.49**	2.08
Threshold _3	2.16***	8.78
Threshold_4	4.29***	14.88
Indicator I would share my car if my social circle were more environmentally conscious	1.39***	−18.64
Threshold _1	−2.84***	−17.39
Threshold _2	−1.22***	−8.36
Threshold _3	0.66***	4.67
Threshold _4	2.55***	16.08
Indicator My family and friends prefer environmentally friendly modes of transport	2.44***	−17.58
Threshold _1	−3.23***	−11.97
Threshold _2	−0.82***	−3.42
Threshold _3	1.42***	5.85
Threshold _4	3.66***	13.35

Note: ***, **, * indicate statistical significance at the 1 %, 5 %, and 10 % levels, respectively.

Table 6
Estimates of the car renters' model (Eq. (1) and Eq. (3)).

Parameters (measurement unit, type of parameter)	Estimate	t-ratio
Utility function of the no-choice alternative		
Female (dummy)	0.70***	4.55
Young (dummy, aged 18–24)	−0.93***	−3.54
Higher education level (dummy, Bachelor's degree or higher)	0.06	0.36
Being employed (dummy)	−0.28*	−1.64
Living in Southern Italy (dummy)	−0.19	1.18
Living in the *Italia di Mezzo* (dummy)	0.41***	2.72
Variance Error Component	1.96***	19.37
Latent Variable Perceived Potential Benefits	−0.36***	−4.56
Female (dummy, structural term)	−0.04	−0.76
Young (dummy, aged 18–24, structural term)	0.03	0.34
Higher education level (dummy, Bachelor's degree or higher, structural term)	0.05	0.92
Being employed (dummy, structural term)	0.05	0.87
Living in Southern Italy (dummy, structural term)	0.02	0.41
Living in the *Italia di Mezzo* (dummy, structural term)	−0.10**	−2.03
Latent Variable Perceived Potential Risks	−0.06	−0.92
Female (dummy, structural term)	0.25***	5.67
Young (dummy, aged 18–24, structural term)	−0.21***	−2.68
Higher education level (dummy, Bachelor's degree or higher, structural term)	−0.05	−1.05
Being employed (dummy, structural term)	−0.24***	−4.72
Living in Southern Italy (dummy, structural term)	−0.05	−1.15
Living in the *Italia di Mezzo* (dummy, structural term)	0.11***	2.64
Latent Variable Peer Effect and Environmental Sensitivity	−0.32***	−4.24
Female (dummy, structural term)	−0.04	−0.85
Young (dummy, aged 18–24, structural term)	0.24***	3.17
Higher education level (dummy, Bachelor's degree or higher, structural term)	0.05	1.10
Being employed (dummy, structural term)	0.19***	3.62
Living in Southern Italy (dummy, structural term)	0.38***	8.49
Living in the *Italia di Mezzo* (dummy, structural term)	−0.16***	−3.61
Utility function of the hypothetical alternatives		
Alternative specific constant (hypothetical vs no-choice alternative, fixed)	1.13***	4.61
Free urban parking (dummy, random-spread triangular distribution)	1.26***	16.95
Female (dummy, interaction term)	0.15***	2.94
Young (dummy, aged 18–24, interaction term)	−0.16***	−1.94
Higher education level (dummy, Bachelor's degree or higher, interaction term)	−0.22***	−4.05
Being employed (dummy, interaction term)	−0.13***	−2.32
Living in Southern Italy (dummy, interaction term)	−0.22***	−4.21
Living in the *Italia di Mezzo* (dummy, interaction term)	0.06	1.14
Subsidization of hourly rental rates (100 %, random-spread triangular distribution)	3.60***	18.57
Female (dummy, interaction term)	−0.01	−0.10
Young (dummy, aged 18–24, interaction term)	−0.30	−1.37
Higher education level (dummy, Bachelor's degree or higher, interaction term)	−0.30**	−2.12
Being employed (dummy, interaction term)	−0.41***	−2.83
Living in Southern Italy (dummy, interaction term)	−0.49***	−3.51
Living in the *Italia di Mezzo* (dummy, interaction term)	0.49***	3.66
Highway toll subsidy (100 %, random-spread triangular distribution)	1.58***	10.30
Female (dummy, interaction term)	0.27***	2.46
Young (dummy, aged 18–24, interaction term)	−0.12	−0.67
Higher education level (dummy, Bachelor's degree or higher, interaction term)	0.05	0.39
Being employed (dummy, interaction term)	−0.4	−0.30
Living in Southern Italy (dummy, interaction term)	−0.32***	−2.74
Living in the *Italia di Mezzo* (dummy, interaction term)	0.38***	3.37
Booking and payment through a MaaS platform (dummy, random-spread triangular distribution)	0.22***	6.47
Female (dummy, interaction term)	0.06**	1.97
Young (dummy, aged 18–24, interaction term)	−0.03	−0.73
Higher education level (dummy, Bachelor's degree or higher, interaction term)	−0.03	−1.11
Being employed (dummy, interaction term)	0.05*	1.70
Living in Southern Italy (dummy, interaction term)	−0.04	1.46
Living in the *Italia di Mezzo* (dummy, interaction term)	−0.01	−0.19

Note: ***, **, * indicate statistical significance at the 1 %, 5 %, and 10 % levels, respectively.

Table 7
Estimates of the measurement indicators and the respective thresholds (Eq. (2)).

Parameters	Estimate	t-ratio
Latent Variable Perceived Potential Benefits		
Indicator Possibility to expand mobility options beyond public transport coverage	1.17***	18.36
Threshold _1	−3.39***	−23.72
Threshold _2	−2.26***	−10.06
Threshold _3	−0.64***	−6.15
Threshold _4	1.06***	10.10
Indicator Possibility to drive different car brands and models	2.24***	17.63
Threshold _1	−4.47***	−18.94
Threshold _2	−2.93***	−14.42
Threshold _3	−0.83***	−4.84
Threshold _4	1.62***	0.03
Indicator Possibility to drive electric cars	2.23***	18.29
Threshold _1	−4.28***	−18.73
Threshold _2	−2.98***	−15.04
Threshold _3	−0.91***	−5.33
Threshold _4	1.46***	8.30
Latent Variable Perceived Potential Risks		
Indicator Risk of disputes with owners	3.85***	23.28
Threshold _1	−7.85***	−20.16
Threshold _2	−5.50***	−17.18
Threshold _3	−2.57***	−9.42
Threshold _4	1.09***	4.19
Indicator Risk that the car is not working properly	2.28***	26.11
Threshold _1	−4.92***	−23.19
Threshold _2	−2.96***	−17.00
Threshold _3	−0.81***	−5.10
Threshold _4	1.79***	10.91
Indicator Risk that the car is not available when needed	2.21***	25.14
Threshold _1	−5.17***	−23.54
Threshold _2	−3.57***	−19.82
Threshold _3	−1.42***	−9.02
Threshold _4	0.97***	6.24
Indicator Risk of damaging the car	3.53***	23.57
Threshold _1	−7.13***	−20.79
Threshold _2	−5.08***	−17.72
Threshold _3	−2.3***	−10.13
Threshold _4	0.63***	2.65
Indicator Risk of incurring unexpected charges	2.46***	25.83
Threshold _1	−5.52***	−23.20
Threshold _2	−3.55***	−18.44
Threshold _3	−1.15***	−6.72
Threshold _4	1.53***	8.82
Indicator Difficulty of managing disputes with the car or the platform owner	1.53***	23.06
Threshold _1	−4.05***	−25.60
Threshold _2	−2.54***	−20.22
Threshold _3	−0.65***	−5.82
Threshold _4	1.40***	12.10
Latent Variable Peer Effect and Environmental Sensitivity		
Indicator I would consider car sharing if it were common in my social network	2.36***	22.93
Threshold _1	−1.96***	−10.59
Threshold _2	0.16	0.95
Threshold _3	2.37***	12.80
Threshold _4	4.79***	21.49
Indicator Many people I know use P2P car sharing	2.09***	21.01
Threshold _1	0.53***	3.29
Threshold _2	1.70***	9.99
Threshold _3	3.19***	16.55
Threshold _4	5.13***	21.70
Indicator I would rent a car if my social circle were more environmentally conscious	2.70***	21.80
Threshold _1	−1.93***	−9.22
Threshold _2	0.37**	1.88
Threshold _3	2.90***	13.50
Threshold _4	5.42***	20.79
Indicator My family and friends prefer environmentally friendly modes of transport	2.00***	22.61
Threshold _1	−1.19***	−7.85
Threshold _2	0.74***	4.86
Threshold _3	2.54***	14.85
Threshold _4	4.64***	22.22

Note: ***, **, * indicate statistical significance at the 1 %, 5 %, and 10 % levels, respectively.

perceived risks associated with renting a privately owned vehicle, captured by the latent variable Perceived Potential Risks, are not statistically significant in explaining the intention to participate in the P2P car-sharing market. Specifically, the coefficient associated with this construct in the utility function of the opt-out alternative is not statistically different from zero. This suggests that such concerns are not systematically associated with reluctance to engage with the service. As shown in Table 7, the risks encompassed by this construct include the possibility of disputes with car owners (3.85), the risk of damaging the vehicle (3.35), concerns about the car not functioning properly (2.28), the potential for unexpected charges (2.26), unavailability of the car when needed (2.21), and the perceived difficulty of managing conflicts with either the car owner or the platform (1.53). Our results differ from those reported by Dill et al. (2017), Shaheen and Cohen (2018), and Valor (2020). A plausible explanation is that our sample, drawn from the Italian context, may perceive these risks as less important due to cultural attitudes toward trust and sharing, higher familiarity with digital platforms, or the growing normalization of sharing economy services. Differences in socio-demographic composition, geographic area, and the timing of data collection compared to prior studies conducted over ten years ago may also account for this contrast. These factors suggest that risk perception in P2P car sharing is context- and time-dependent, highlighting the importance of updating evidence to reflect current user behavior.

It is noteworthy that, among potential car renters, the influence of perceived benefits, peer effects, and environmental sensitivity varies across respondent subgroups. Perceived Potential Benefits are statistically significant only for individuals who do not reside in the *Italia di Mezzo* (−0.10, Table 6). By contrast, the effect of Peer Effect and Environmental Sensitivity is stronger among specific demographic groups: it is positively associated with younger respondents (0.24), residents of Southern Italy (0.38), and employed individuals (0.19), and negatively associated with residents of the *Italia di Mezzo* (−0.16). These results highlight the importance of socio-demographic and geographic heterogeneity in shaping attitudes toward P2P car sharing.

All parameters associated with the policy attributes designed to support the uptake of P2P car sharing on the demand side are statistically significant and exhibit the expected signs. Respondents show a comparable level of sensitivity to the availability of free urban parking (1.26, Table 6) and to the exemption from highway tolls (1.58), suggesting that, if appropriately subsidized by public authorities, the service could be attractive for both urban and interurban use cases. The importance of parking policies in fostering car-sharing systems aligns with the results observed for car owners and with prior evidence reported by Li and Kamargianni (2020), Monteiro et al. (2023), Shemesh and Parag (2024), and Zawieska et al. (2025). The importance of free urban parking is particularly pronounced among female respondents (0.15), whereas it is perceived as less relevant by younger individuals (−0.16), respondents residing in Southern Italy (−0.22), those with higher education levels (−0.22), and employed respondents (−0.13). Conversely, the value placed on toll-free highway use is higher among women (0.27) and residents of the *Italia di Mezzo* (0.38) but lower among individuals living in Southern Italy (−0.32). These patterns likely reflect differing mobility needs: women and residents of northern and central regions may place greater value on flexible and predictable travel conditions such as guaranteed free parking for personal and work-related trips. By contrast, younger and highly educated individuals may have broader access to alternative transport modes, including public transport, cycling, or shared mobility services, reducing their reliance on parking-related incentives. They may also exhibit a lower marginal utility of income, making monetary or convenience-related incentives less salient in their travel decisions.

Among the policy measures included in the experiment, providing a

direct subsidy to reduce the cost of the service has the strongest effect on willingness to rent a car (3.60, Table 6). The importance of cost savings, although not necessarily in the form of highway toll exemptions or reduced hourly fares, has been highlighted in previous studies by Ballús-Armet et al. (2014), Dill et al. (2017), Münzel et al. (2019), Shaheen and Cohen (2018), Valor (2020), and Wilhelms et al. (2017). However, this effect is not uniform across all respondent groups: it is less pronounced among individuals residing in Southern Italy (−0.49), those with higher education levels (−0.30), and employed respondents (−0.41). However, it is significantly stronger for residents of the *Italia di Mezzo* (0.49). These differences likely reflect regional variations in disposable income, travel habits, and exposure to shared mobility options.

By contrast, the policy with the least impact on respondents' willingness to rent a car is the promotion of the service through MaaS platforms. Although the estimated coefficient is statistically significant, its magnitude is relatively small (0.22), indicating a limited influence on adoption. This policy appears slightly more valued by female respondents (0.06) and employed individuals (0.05), suggesting that awareness campaigns alone may be insufficient to drive adoption without accompanying practical incentives, such as cost reductions or convenient parking options.

4.3. Simulation analysis

To assess how the uptake of the P2P car-sharing market in Italy could be influenced by policies targeting either the supply or demand side, we conducted a scenario analysis combining the various policy measures tested in the survey with different population segments. It is important to note that both the econometric models and the sensitivity analysis are based exclusively on the subset of respondents who indicated a willingness to participate in the P2P car-sharing market at least once.

Additionally, no information was provided in the experiment regarding the technical characteristics of the service. This was a deliberate choice: incorporating preferences for both service features and policy interventions would have substantially increased the complexity of the choice tasks, potentially compromising data quality. An alternative approach would have been to fix a specific service scenario. However, in that case, the results regarding preferred policy measures would have been tightly linked to the particular service configuration presented. By abstracting from service-specific attributes, we aimed instead to derive more generalizable insights into the most effective policies for fostering participation on both the supply and demand sides of the market.

To estimate the probability changes generated by each policy using the hybrid choice models, we followed this procedure. First, we identified the segments of the population that were, respectively, most and least willing to engage in the P2P car-sharing system. For each of these representative segments, both on the supply side (car owners) and on the demand side (car renters), we computed the baseline probability of choosing the service by setting all policy-related attributes in the utility specification to their reference level (i.e., no policy). We then simulated the effect of each policy independently by modifying the value of the corresponding policy attribute in the utility function while keeping all other policy attributes at their baseline level. For each simulation, we recalculated the resulting choice probability using the estimated model parameters. Finally, we computed the percentage change in the baseline probability of choosing the service generated by each policy as:

$$\%\Delta Prob = \frac{P_{policy} - P_{baseline}}{P_{baseline}} \quad (4)$$

where $P_{baseline}$ is the predicted probability under the no-policy scenario and P_{policy} is the predicted probability after implementing the specific policy. The reported percentage variations thus represent the relative increase in the likelihood of choosing the service attributable to each individual policy, according to the segment type.

For car owners (Table A.1 in the Appendix), the baseline probability of willingness to participate in the P2P car-sharing market is 43 % for individuals who are female, aged 25 or older, not employed, have a lower level of education, and do not reside in Southern Italy or the *Italia di Mezzo*. Participation likelihood increases under the following policy scenarios: by 22 % if free urban parking is provided; by 11 % if car owners are allowed access to bus-only lanes and limited traffic zones; by 35 % if they are exempt from the annual vehicle ownership tax; and by 34 % if income earned through car sharing is tax-exempt. The combined implementation of all these policy measures nearly doubles the probability of participation for this segment, raising it from 43 % to 81 %.

Conversely, the impact of policy measures is negligible for the segment of the population already most inclined to participate as car owners in the P2P car-sharing market. This group includes respondents who are male, aged 24 or younger, highly educated, not employed, and living in Southern Italy and the *Italia di Mezzo*. For these individuals, baseline willingness to participate is already very high (91 %) and is only marginally affected by policy measures, with the largest observed increase amounting to just 0.3 %.

Regarding respondents surveyed for their willingness to participate as car renters (Table A.2 in the Appendix), the segment least inclined to engage in the P2P car-sharing market comprises women aged 25 or older, those who have a higher level of education, are not employed, and are living in the *Italia di Mezzo* but not in Southern Italy. Even in the absence of policy intervention, the baseline willingness to participate for this group is relatively high, at 61 %, representing a considerable potential market. Among the policies tested, the most effective for this segment is full subsidization of the car-sharing service, which increases the probability of participation by 44 %. The second most impactful measure is full subsidization of highway tolls, leading to a 34 % increase. Free urban parking also proves effective, raising participation probability by 20 %. Conversely, offering the service through a MaaS platform has the least effect, increasing willingness to participate by only 6 %. If all policies were implemented simultaneously, the probability of participation for this segment would increase by 61 %.

As with the supply side, there is a segment of the potential demand-side population that demonstrates a strong willingness to participate in the P2P car-sharing market regardless of any supporting policy. According to our econometric results, this group includes men aged 24 or younger, those without a higher level of education, who are employed, and who are living in Southern Italy but not in the *Italia di Mezzo*. For this segment, the estimated baseline willingness to participate is 96 %, and none of the policy measures under study significantly influence this value. The most effective intervention, full subsidization of the rental fee, yields only a marginal increase of 1.5 % relative to the baseline.

These results suggest that while transport-related, regulatory, and fiscal policies are important levers for fostering both the supply and demand sides of the P2P car-sharing market, sociodemographic and territorial characteristics, particularly place of residence, can be equally, if not more, influential. Psychological and attitudinal factors also play a crucial role, especially for certain population segments. These findings highlight the importance of designing targeted strategies that account not only for user profiles and territorial context (including public transport availability) but also for cultural and attitudinal dimensions.

5. Conclusion

This study addresses a central gap in the P2P car-sharing literature, which remains fragmented and predominantly focuses either on renter behavior or on owners' motivations. Only a handful of contributions adopt a two-sided approach, and, to the best of our knowledge, this is the first study to focus exclusively on identifying and evaluating policy measures that could effectively support the development of P2P car-sharing markets. By jointly modelling supply- and demand-side decisions and integrating psychological constructs through a hybrid choice

modelling framework, our work offers a more comprehensive behavioral perspective while providing policy-oriented insights that have been largely overlooked in previous research. This dual-perspective, policy-centered contribution is particularly novel in the Italian context, where empirical evidence on P2P car-sharing adoption remains limited.

Against this backdrop, the study investigates both the supply and demand sides of the P2P car-sharing market in Italy, with a particular focus on identifying policies that could incentivize participation. The econometric analysis highlights substantial heterogeneity in preferences among both car owners and potential renters. Consistent with our expectations and with the limited existing literature that jointly examines both sides of the market in Italy (Beria et al., 2017; Mariotti et al., 2013; Rotaris, 2022; Rotaris and Scorrano, 2023), potential renters exhibit a relatively high propensity to adopt P2P car sharing even in the absence of policy incentives, such as free urban parking, integration with MaaS platforms for booking and payment, or subsidies for hourly rental rates and highway tolls. However, this propensity is significantly moderated by individuals' socio-demographic and psychological attributes, as well as by regional and territorial characteristics.

On the supply side, as expected, reluctance to participate is more pronounced and is primarily influenced by socio-demographic characteristics such as gender, age, and occupational status, which likely affect individual mobility patterns and time constraints, as well as by place of residence, reflecting differences in the availability and quality of public transport services in Southern Italy and the *Italia di Mezzo* (Donadoni and Beria, 2024).

The results of our experiment indicate that fiscal measures, specifically exemptions from the annual vehicle ownership tax and from income taxation on car sharing earnings, are the most effective policies for stimulating participation on the supply side of the P2P car sharing market. Likewise, on the demand side, fiscal incentives such as full subsidization of rental fees or highway tolls emerge as the most impactful tools for encouraging user engagement. However, the implementation of such measures should be preceded by a careful assessment of the financial resources required, as well as a comprehensive evaluation of their associated social benefits. These benefits may include reductions in environmental impacts and urban congestion, along with improvements in social inclusion, particularly in peripheral areas underserved by public transport.

Beyond aggregate effectiveness, these fiscal measures raise important distributional considerations. Our results indicate that tax exemptions for car owners disproportionately benefit individuals with a lower baseline willingness to participate (typically older women, respondents with lower levels of education, and those living in areas with fewer mobility alternatives) while offering comparatively smaller gains for individuals who are already structurally predisposed to sharing their vehicles. Similarly, on the demand side, incentives such as full subsidization of rental fees or highway tolls appear particularly valuable for individuals in peripheral or underserved regions (such as the *Italia di Mezzo* in our case study). For these users, P2P car sharing may represent a more affordable and accessible alternative to private vehicle ownership. These results underscore that the equity implications of fiscal incentives are heterogeneous and may contribute to reducing territorial and social disparities in access to mobility.

Given the budget constraints typically faced by policymakers at both local and national levels, and the challenges associated with quantifying the monetary value of the social benefits generated by P2P car sharing, it may be more feasible to begin with policies that, while potentially less effective, are more politically acceptable and financially sustainable. On the supply side, these may include allowing car owners access to bus-only lanes or limited traffic zones. On the demand side, integrating P2P car-sharing services within MaaS platforms for booking and payment may serve as a similarly viable and cost-effective starting point.

A further consideration concerns the potential market distortions that fiscal incentives may generate. Exempting private car owners from tax obligations could be perceived as anti-competitive, favoring P2P services over traditional car rental companies. In Italy, regulatory authorities have yet to take a clear position on whether income generated from renting out private vehicles should be subject to taxation. This regulatory ambiguity represents a pivotal issue with both advantages and drawbacks, warranting careful ex-ante evaluation.

Because psychological factors also play a crucial role in shaping participation, information campaigns that emphasize the environmental and social benefits of shifting from traditional car ownership to prosumer-based mobility models can strengthen both supply- and demand-side participation. However, our results indicate that such initiatives should be targeted rather than generic. Social norm-based messaging, awareness campaigns, and publicly supported promotional events may be effective tools for reaching specific population groups and encouraging broader participation in the P2P car-sharing market.

Beyond the policy implications directly supported by our empirical findings, our results highlight several broader issues that merit attention in future research. While this study focuses on the behavioral and policy determinants of participation, the long-term development of the P2P car-sharing market also depends on structural factors that fall outside the scope of the present analysis. First, our survey indicates significant latent demand and supply for P2P car sharing, yet the number of operating platforms in Italy remains very limited. This suggests that future research should investigate the business and technological barriers faced by entrepreneurs seeking to establish P2P platforms, including the substantial investments required, the time needed to build user trust, and the Information and Communication Technology and marketing expertise necessary to operate effectively in this sector.

Second, insurance-related issues, particularly the difficulty of pricing risk in a nascent market, constitute a key dimension deserving deeper investigation. High insurance premiums currently represent a major barrier for platform operators, largely because the absence of historical data complicates accurate risk assessment. Although P2P car sharing is not fundamentally different from traditional car rental services, further research is needed to understand how insurers can leverage existing datasets to design appropriate coverage for P2P transactions.

Overall, these considerations highlight that the successful development of P2P car sharing depends not only on public policy but also on the coordinated involvement of platform operators and insurance providers. While these issues extend beyond the analytical scope of this study, they represent promising avenues for research aimed at understanding the conditions under which P2P car sharing can achieve long-term viability and deliver inclusive, environmentally sustainable mobility solutions. Our findings can also be situated within a broader perspective of open innovation and service ecosystem development. As highlighted in the literature on shared mobility transformation (Ma et al., 2018; Turoń, 2025), the growth of P2P car sharing depends not only on policy incentives but also on collaborative innovation and coordinated action among multiple actors, including platform operators, insurers, technology providers, and municipalities. Policies that stimulate participation should therefore be complemented by measures that foster ecosystem-building, such as partnerships, service integration, and innovation networks. Evidence from international contexts, such as Shanghai (Ma et al., 2018), indicates that the co-evolution of urban sustainability objectives and business ecosystem innovation can accelerate the adoption of shared mobility services. In the Italian context, aligning fiscal incentives with efforts to strengthen collaborative networks and platform capabilities could enhance both the effectiveness of interventions and the overall sustainability of urban mobility. This perspective emphasizes that successful P2P car-sharing deployment requires coordinated action across public, private, and social actors, enabling policies to reinforce ecosystem innovation while supporting social inclusion and environmental objectives.

Our study presents several limitations that should be considered when interpreting the results. First, the econometric analysis relies on SP data, which may be subject to the well-known issue of hypothetical bias. Although we designed the choice experiment to be as realistic as

possible, incorporated attention checks, and filtered out responses exhibiting lexicographic preferences, there remains a risk that the data may partially over- or under-represent behaviors and preferences observed in real-world conditions.

Second, the online administration of the survey may introduce additional biases. The sample could be affected by self-selection, as individuals more familiar with digital platforms or more interested in shared mobility may have been more likely to participate. Similarly, the digital divide may lead to under-representation of groups with limited internet access or lower digital literacy, potentially limiting the generalizability of the results to the broader population.

Third, our analysis focused exclusively on respondents who expressed at least some willingness to participate in P2P car sharing, either as renters or as owners. Although data were collected from the remaining respondents, their answers were not included in the current analysis due to space constraints. Future research should investigate this segment in greater depth to better understand the barriers preventing engagement with this form of shared mobility.

Overall, the results reflect stated intentions rather than revealed behavior and should be interpreted as indicative of potential uptake under hypothetical scenarios rather than as precise predictions of actual market behavior. Despite these limitations, the study provides valuable insights into behavioral heterogeneity and the effects of policy interventions in the Italian P2P car sharing market.

CRediT authorship contribution statement

Lucia Rotaris: Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Angela Stefania Bergantino:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization. **Romeo Danielis:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization. **Mario Intini:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization. **Mariangela Scorrano:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization.

Declaration of generative AI in scientific writing

During the preparation of this work, the authors used ChatGPT to improve readability and language. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Appendix

Measurement Indicators for the Car Owners' Sample

To what extent do you agree with the following statement? Please respond using a Likert scale, where 1 means “Strongly Disagree” and 5 means “Strongly Agree”.

1) I believe that car-sharing would help me offset the fixed costs of vehicle ownership.
2) I think that sharing my car through a P2P platform could provide me with additional income.
3) I believe that car-sharing could increase social inclusion in my community.
4) I am concerned about the possibility of my car being damaged when shared with others.
5) I worry about the possibility of having disputes with renters when sharing my car.
6) I perceive a high level of risk in renting my car to users I am not familiar with.
7) I am concerned that my vehicle could be taken too far from its original location when shared.
8) I think managing disputes with renters would be difficult if issues arose.
9) I am worried that my insurance coverage may be denied in the event of vehicle damage during a car-sharing rental.
10) I believe that many people currently use P2P car-sharing services.
11) I would be more likely to share my car if my social circle were more environmentally conscious.
12) My family and friends prefer using environmentally friendly modes of transport.

Measurement Indicators for the Renters' Sample

To what extent do you agree with the following statement? Please respond using a Likert scale, where 1 means “Strongly Disagree” and 5 means “Strongly Agree”.

1) I believe that car sharing would allow me to expand my mobility beyond the coverage of public transport.
2) I would enjoy the opportunity to drive different car brands and models through car sharing services.
3) I think that car sharing provides an opportunity to drive electric cars.
4) I am concerned about the possibility of having disputes with car owners when using car sharing services.
5) I worry that the car I rent may not be working properly.
6) I am concerned that the car I would rent may not be available when I need it.
7) I am concerned about the risk of damaging the car when using the service.
8) I worry about incurring unexpected charges when using a car sharing service.
9) I think it would be difficult to manage disputes with the car owner or platform provider.
10) I would be more likely to consider car sharing if it were more common in my social network.

11) Many people I know currently use P2P car-sharing services.
12) I would be more likely to rent a car through a P2P platform if my social circle were more environmentally conscious.
13) My family and friends prefer using environmentally friendly modes of transport.

Table A.1
Summary of Baseline Probabilities and Policy Effects for Key Car Owners' Segments

Baseline probability of participation	Policy type	% of baseline probability increase by policy type
Female, ≥25 years, lower education, not employed, not residing in Southern Italy or *Italia di Mezzo*		
43 %	Exemption from income tax earned from car sharing	+34 %
	Exemption from vehicle ownership tax	+35 %
	Free parking in urban areas	+22 %
	Access to bus-only lanes and limited traffic zones	+11 %
Male, ≤24 years, higher education, not employed, residing in Southern Italy and in *Italia di Mezzo*		
91 %	Free parking in urban areas	+0.3 %
	Access to bus-only lanes and limited traffic zones	+0.2 %
	Exemption from vehicle ownership tax	+0.0 %
	Exemption from income tax earned from car sharing	+0.0 %

Table A.2
Summary of Baseline Probabilities and Policy Effects for Key Car Renters' Segments

Baseline probability of participation	Policy type	% of baseline probability increase by policy type
Female, ≥25 years, higher education, not employed, residing in *Italia di Mezzo* (but not Southern Italy)		
61 %	Full subsidy of the car sharing service	+44 %
	Full subsidization of highway tolls	+34 %
	Free urban parking	+20 %
	MaaS platform	+6 %
Male, ≤24 years, lower education, employed, residing in Southern Italy (but not *Italia di Mezzo*)		
96 %	Full subsidy of the car sharing service	+1.5 %
	Full subsidization of highway tolls	+0.4 %
	Free urban parking	+0.5 %
	MaaS platform	+0.6 %

Data availability

Data will be made available on request.

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