



Peer-to-peer carsharing as a digital mobility innovation: Market potential and policy implications in Italy[☆]

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ABSTRACT

This study explores the potential demand and supply of peer-to-peer car sharing in Italy, focusing on the factors influencing individuals' willingness to rent out their vehicles or participate as renters. We collected stated preference data from two nationally representative samples, each consisting of approximately 4,000 individuals, and analyzed the data using discrete choice models with latent variables.

Our results reveal a significant asymmetry between supply and demand: car owners tend to be more skeptical and reluctant to engage in P2P car-sharing, primarily due to concerns about vehicle damage and disputes with renters, whereas renters are more motivated by perceived benefits, peer effects, and environmental sensitivity. The study also highlights that critical factors such as platform fees, insurance coverage, and the ease of vehicle access significantly shape users' decisions.

Crucially, the study underscores the enabling role of digitalization, without which the peer-to-peer car sharing model would not be feasible. Digital platforms serve as the foundation for matching supply and demand, managing transactions, and facilitating trust through transparent pricing, identity verification, and service quality assurances. According to our results, enhancing these digital features, such as clear tariff structures, reliable user verification, and guarantees of vehicle condition, is essential to reducing perceived risks and increasing user confidence.

Importantly, the analysis also reveals that socio-demographic, psychological, and attitudinal characteristics, such as age, gender, education level, place of residence, risk perception, and sense of control, are key determinants of individuals' willingness to participate, particularly under less favorable service conditions. These findings point to the importance of platform design and user segmentation in fostering wider participation in digitally enabled mobility solutions.

1. Introduction

Peer-to-peer (P2P) car sharing represents a significant component of the ongoing digital transformation in the transport sector, offering innovative solutions to enhance environmental sustainability and social equity in urban mobility (Hampshire & Gaites, 2011). Through digital platforms, private individuals can make their vehicles available for short-term rental to other users, thereby expanding transportation options beyond conventional public transit and private car ownership. These platforms increase flexibility and accessibility by enabling more diverse and efficient mobility choices, which can help mitigate traffic

congestion, reduce emissions (Vélez & Plepys, 2021; Vélez 2023), and promote inclusive access to transportation (Dill & McNeil, 2021).

The functionality of P2P car sharing is supported by a sophisticated digital infrastructure, including user-centric mobile applications, algorithmically driven pricing models, real-time availability mapping, and secure electronic payment systems. Cloud-based technologies facilitate real-time bookings, insurance processing, identity verification, and customer service support. Additionally, telematics and connected vehicle technologies enable features such as keyless access, automated mileage tracking, remote diagnostics, and theft prevention—streamlining the experience for both vehicle owners and renters (Daniele et al.,

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However, the success of P2P car sharing is determined not only by the technological robustness of these platforms but also by a nuanced understanding of users' psychological barriers and perceived benefits (Abouelela et al., 2024; Derikx & van Lierop, 2021). Examining both technological and behavioral factors is essential for supporting the digital transition of urban transport systems.

While P2P car sharing is well established in several Northern European countries, its adoption remains limited in Italy, primarily due to regulatory uncertainty and low public awareness. Valued at USD 3067 million in 2025, the global P2P car sharing market is projected to grow to USD 9600 million by 2032, reflecting a compound annual growth rate (CAGR) of 17.7 % (Coherent Market Insights, 2025). The model has gained particular traction in North America and Western Europe, where platforms such as Turo, Getaround, and SnappCar have expanded rapidly in metropolitan areas and tourist destinations.

Turo, one of the largest international operators, launched in the UK in 2018 and has since developed a rapidly growing user base, offering access to over 300 different makes and models. In Spain, approximately 10,000 vehicle owners have listed their cars on Amovens, a platform founded in 2009 and headquartered in Madrid. In the past year alone, Amovens distributed €4.0 million (approximately \$4.2 million USD) to car owners in Barcelona and €3.5 million to those in Madrid. Getaround, another key player, operates in seven countries with a user base of 1.6 million. According to company representatives, the highest levels of activity in Spain are concentrated in major cities like Barcelona and Madrid, followed by tourist hubs such as Mallorca, Málaga, Valencia, Seville, Alicante, and Menorca. In France, Drivy leads the market with 2 million users and a fleet of 50,000 vehicles across six countries.

By contrast, the Italian P2P carsharing market remains nascent, with only two active platforms, both operating in a limited number of large northern cities. This study aims to investigate the demand- and supply-side factors that could stimulate the growth of peer-to-peer (P2P) car sharing in the Italian context. Specifically, the objectives are threefold:

- (1) to identify the technical and operational features of P2P car-sharing services that can foster participation on both sides of the market;
- (2) to explore the socio-demographic characteristics of individuals who are more likely to engage as car owners or renters; and
- (3) to assess the psychological and attitudinal factors that most strongly influence the willingness to share or rent cars through P2P platforms.

By addressing these aspects jointly, the study provides an integrated understanding of the determinants that can support the wider adoption of P2P car sharing in Italy.

The paper is structured as follows: Section 2 reviews recent literature on P2P car sharing; Section 3 details the survey methodology used to assess potential demand and supply; Section 4 presents the analysis of collected data; and Section 5 discusses policy implications based on the findings.

2. Literature review

Most studies find that P2P car sharing users tend to be younger (under 40), male (Barbour et al., 2020; Prieto et al., 2022; Shaheen et al., 2019), highly educated (at least a bachelor's degree) (Münzel et al., 2019; Shaheen et al., 2019), urban residents (Prieto et al., 2022), and have above-average incomes (Barbour et al., 2020; Rotaris, 2021; Shaheen et al., 2019). However, the role of household composition and the presence of children remains underexplored (Amirmazmiazfar & Diana, 2022).

Travel behavior is also relevant. Prieto et al. (2022) found that individuals who drive less are more likely to rent out their cars. Similarly, Rotaris (2021) noted that infrequent car use correlates with a higher

likelihood of being a renter. Public transport use also increases the probability of car renting, as reliance on private vehicles decreases (Münzel et al., 2019). Ramos et al. (2023) further observed that P2P car sharing is primarily used for short trips in their German survey of 1121 respondents.

Literature identifies various motivations and barriers influencing P2P car sharing adoption. For car owners, key incentives include earning extra income from underused vehicles (Dill et al., 2019; Li et al., 2024; Olaru et al., 2021), while concerns revolve around potential unavailability, vehicle damage, hygiene issues, and added insurance costs (Li & Feng, 2025; Rotaris, 2021). Renters are mainly motivated by not owning a car, the convenience and flexibility of P2P car sharing over public transport, and the lack of private parking (Ramos et al., 2023; Uteng et al., 2019). A general lack of awareness about how the service operates remains a key barrier (Rotaris, 2021). Adoption also varies by national context; for example, P2P car sharing has expanded more in France than in the UK, potentially due to stricter insurance regulations in the latter (Münzel et al., 2020).

Subjective perceptions and psychological attitudes significantly influence engagement in P2P car sharing. Environmental awareness is a key driver, with studies showing a positive link between eco-consciousness and the intention to use such services (Münzel et al., 2019; Prieto et al., 2022; Rotaris, 2021). Interestingly, Prieto et al. (2022) also found that strong attachment to personal ownership is more common among renters than providers. Emotions and political views also matter. In Spain, Valor (2020) found emotional barriers—such as fear, anxiety, and discomfort—among non-users. Additionally, those with liberal or green political leanings are more likely to use P2P car sharing (Shaheen et al., 2019; Münzel et al., 2019). Trust, altruism, and social values play a role too. Trust in the platform and other users (Neifer et al., 2024; Li & Feng, 2025), informal car lending to friends/family (Münzel et al., 2019), and peer influence (Jain et al., 2021; Li et al., 2024) all increase the likelihood of participation.

3. Data and Methods

3.1. The survey

To assess the potential demand and supply for P2P car sharing services, we developed two distinct questionnaires, one targeting potential renters and the other aimed at car owners interested in renting out their vehicles. Each questionnaire included the following sections:

- vehicle availability and mobility habits at the household level;
- perceived opportunities and risks associated with participating in P2P car sharing, either as a renter or a provider;
- eight stated preference (SP) choice tasks, and
- socio-demographic characteristics of the respondents.

The questionnaires were initially tested through two focus groups involving experts in transport economics and psychology. Following this, both instruments were pre-tested on two separate samples of 200 individuals each. Based on the feedback and results from the pre-test, modifications were made to the wording and order of some questions to improve clarity and response accuracy. To enhance the reliability of the collected data, three attention check questions were embedded in the questionnaire to identify inattentive respondents. The final, revised version of the questionnaires was administered online in March 2025 by a professional marketing research consultant to two nationally representative samples of about 4000 individuals living in Italy. Participants were selected based on the following eligibility criteria: they had to hold a valid driving license, be aged between 18 and 70 years, and collectively represent the Italian population with respect to age, gender and the macro-area of residence (North, Central, and Southern Italy). For the car owners' sample, respondents were additionally required to belong to a household owning at least one car.

We selected four attributes to define the stated preference (SP) choice tasks. Table 1 presents these attributes along with their corresponding levels. The selection was informed by the analysis of the pre-test data, which helped identify the factors respondents considered most relevant when evaluating P2P car sharing options. An efficient experimental design was used to generate the choice tasks, with priors derived from the pre-test results.

Each task presented respondents with two hypothetical alternatives and a no-choice option as described in Fig. 1.

3.2. The sample

The initial sample of car owners included 4072 individuals. However, we excluded those who stated that they would never, under any circumstances, and regardless of any economic or other conditions, rent out their car (1151 individuals), as well as those who failed to answer the attention check questions correctly (866 individuals). The initial sample of car renters consisted of 4011 individuals. We excluded 651 participants who reported that they would never rent a car under any circumstances. Additionally, 1126 individuals were removed from the sample due to incorrect responses to attention check questions. The decision to exclude these respondents was made to ensure the robustness of the stated preference data by focusing on individuals who expressed at least some interest in using the service and who were consistent in answering the attention check questions (as suggested by Hensher et al., 2005; Train, 2009). Those who indicated they would never participate were given a separate set of questions to explore the reasons behind their non-adoption. This allowed us to identify key barriers to adoption, which, however, is beyond the scope of this paper.

We also aimed to investigate whether respondents' preferences varied by place of residence. Specifically, we considered not only Southern Italy, often associated with distinct mobility and sharing behavior, but also the so-called *Italia di Mezzo* (represented in red in Fig. 2), a territorial category encompassing medium-sized cities, dispersed urban areas, and regions characterized by intensive agricultural activity. This classification moves beyond the traditional North–South or East–West dichotomy. Our interest in this territorial cluster stems from its transitional nature between metropolitan centers and inland regions. As demonstrated by Kercuku et al. (2023) and Lanzani (2024), these areas exhibit hybrid and sometimes divergent socio-economic dynamics that justify their treatment as a distinct territorial typology. Medium-sized cities, metropolitan fringes, and urban–rural continuums within the *Italia di Mezzo* account for a significant share of Italy's population and territory, making this area strategically relevant for assessing potential demand and supply for peer-to-peer car sharing, as well as for testing territorial differences in adoption rates.

As shown in Table 2, our samples align also with the national distribution of areas of *Italia di Mezzo*. However, some significant

differences are observed in educational attainment, which is notably higher in our samples compared to the general Italian population.

Interestingly, the majority of both car owners (68 %) and car renters (63 %) in the sample reported being familiar with the concept of peer-to-peer car sharing. These figures are notably higher than those reported in previous studies by Rotaris (2022) and Rotaris and Scorrano (2023).

Fig. 3 reports the percentage of car owners and potential car renters whose minimum willingness to accept and maximum willingness to pay, respectively, are lower (car owners) and higher (car renters) than the values shown on the horizontal axis. The point at which the two curves intersect, representing a potential market equilibrium, corresponds to an hourly rental price of €5, with approximately 60 % of respondents willing to participate in the market.

3.3. The econometric model

To analyze the data, we employed a discrete choice model with latent variables (Hess and Daly, 2024), as our goal was to assess the impact of attitudes and perceptions on the decision-making process. The model assumes that an individual n considers the full set of J proposed alternatives in each choice situation $t \in T$ and selects the alternative j with the highest utility. The utility of each alternative j in choice task t is defined as a function of the X characteristics of the alternatives, the Z socio-demographic characteristics and mobility habits of the individual and the LV latent variables (1).

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

The Alternative Specific Constant ASC_j represents the inherent utility of the j alternative that is not explained by the other variables in the model. The vector β'_n captures individual preference heterogeneity across N respondents, in fact they are specified as triangular random parameters, all constrained to be positive except for the parameter related to the vehicle access method. The probability of individual n choosing alternative j is a weighted average of the logit formula at different β values, with weights drawn from the density function $f(\beta|\varphi)$. The vector φ defines the probability density function of β' , while α'_j reflects the influence of socio-demographic characteristics on the preferences for alternative j . The vector λ' accounts for the impact of the latent variables. The error terms consist of ε_{nj} (i.i.d. extreme value) and μ' , an error component with mean zero and variance to be estimated that accounts for the model's nested structure implied by the no-choice option. C_{nj} is a dummy equal to one for the choice alternatives and zero for the no-choice option.

Socio-demographic characteristics were included in the utility function of the no-choice option and as interaction terms with the attributes of the choice alternatives. This approach aimed to identify how different socio-demographic factors influenced preference variability for the attributes being studied.





We conducted an exploratory factor analysis to determine the number of latent variables to include and to identify the appropriate measurement indicators (I_{LV}) for each latent construct. We specified the measurement equations as depicted in Eq. (2) and the structural equations incorporating the socio-demographic characteristics of the sample as described in Eq. (3). We retained only the parameters that were statistically significant where γ represent the relationship between the indicator i and the latent variable l and ζ represent the relationship between the latent variable l and the z socio-demographic characteristics of the sample.

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

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

Table 1
Attributes and their levels.

Car owners (potential supply side of the market)	Levels
Hourly rent earned	€4; €8; €12
Platform fee	0 %; 15 %; 30 %
Maximum insurance compensation	€15,000; €20,000; €25,000
Vehicle access method	using a physical key (to be handed over to the renter) or remotely via a smartphone app
Car renters (potential demand side of the market)	Levels
Hourly rent to be paid	€4; €8; €12
Platform fee	0 %; 15 %; 30 %
Deductible	€200; €500; €800
Distance to reach the vehicle	0.2 km, 2 km, and 4 km

	Choice A	Choice B
hourly rent earned 	€ 4	€ 12
platform fee 	€ 1.20	none
max insurance compensation 	€ 25,000	€ 25,000
car access method 	key (to be handed over to renter)	remotely (via smartphone + app)





	Choice A	Choice B
hourly rent 	€ 8	€ 4
platform fee 	none	€ 2.40
deductible 	€ 200	€ 800
distance to reach the car 	4 km	2 km

Fig. 1. Example of choice task presented to car owners (a) and to car renters (b).

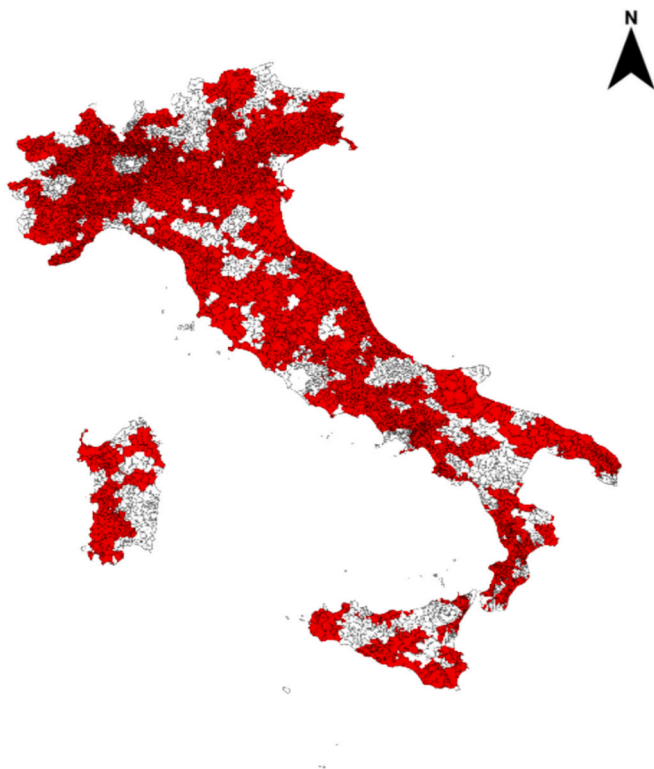


Fig. 2. Map of the area referred to as Italia di Mezzo.

Table 2

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

Characteristics	Car owners' sample	Car renters' sample	Italian population
Gender	Female 50 %; Male 50 %	Female 49 %; Male 51 %	Female 51 %; Male 49 %
Age	18–24 11 %; 25–44 35 %; 45–64 45 %; 65–70 9 %	18–24 10 %; 25–44 32 %; 45–64 48 %; 65–70 10 %	18–24 15 %; 25–44 33 %; 45–64 36 %; 65–75 16 %
Education level	Bachelor degree or higher 52 %	Bachelor degree or higher 51 %	Bachelor degree or higher 22 %
Residential area	North 46 %; Centre 20 %; South 34 %	North 46 %; Centre 20 %; South 34 %	North 46 %; Centre 20 %; South 34 %
Living in the Italia di Mezzo	61 %	63 %	62 %

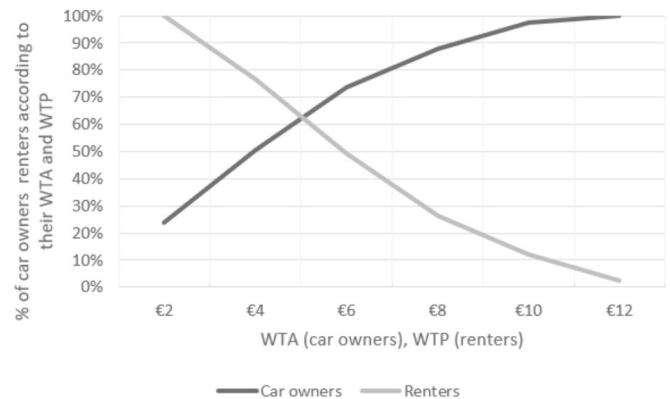


Fig. 3. Direct demand (renters) and supply (car owners) function of P2P car sharing.

4. Results

4.1. The car owners' model

The main results of the model estimated for the car owners' sample and the estimates of the structural equations are presented in Table 3, while the estimates of the measurement indicator equations are reported in Table 4. The model's adjusted Rho-squared is 0.33. We used 16,440 choice observations and estimated 63 parameters.

The results reported in Table 3 indicate that, overall, car owners are hesitant to engage in the P2P car sharing market, in fact the alternative specific constant of choosing one of the two hypothetical peer-to-peer car sharing services vs versus none of the two is negative and statistically significant (−85.34). However, younger (−0.55) individuals with higher education (−1.24), living in the South of Italy (−1.36) but not in

the Italia di Mezzo areas (0–89) are more willing to rent out their cars. The latent variable Perceived Potential Risks (0.43), along with the latent variable Perceived Lack of Control (0.32) further reduce the willingness to rent out the car. However, it is notable that the latent variable Perceived Potential Benefits (−0.90) largely outweigh both latent psychological barriers.

More specifically, and as reported in Table 4, the perceived risks of car damage (3.39), involvement in disputes with renters (2.61), and the unavailability of the car when needed (1.75) are all positively related to the latent variable Perceived Potential Risks, while concerns about

Table 3
Estimates of the car owners' model.

Parameters (measurement unit, type of parameter)	Estimate	t-ratio
Utility function of the no-choice alternative		
Female (dummy)	-0.004	-0.02
Young (dummy, aged 18–24)	-0.55*	-1.90
High education level (dummy, Bachelor degree or higher)	-1.24***	-3.92
Living in Southern Italy (dummy, vs. Northern or Central Italy)	-1.36***	-4.20
Living in the <i>Italia di Mezzo</i> (dummy, vs rest of Italy)	0.89**	2.80
Variance Error Component	8.19***	14.47
Latent Variable Perceived Potential Benefits		
Living in the <i>Italia di Mezzo</i> (dummy, structural term)	-0.07	-1.36
Latent Variable Perceived Potential Risks		
Young (dummy, aged 18–24, structural term)	-0.24***	-3.04
High education level (dummy, Bachelor degree or higher, structural term)	-0.16***	-3.07
Latent Variable Perceived Lack of Control		
Female (dummy, structural term)	0.32***	2.61
Young (dummy, aged 18–24, structural term)	0.26***	5.01
High education level (dummy, Bachelor degree or higher, structural term)	-0.17**	-1.93
Living in the <i>Italia di Mezzo</i> (dummy, structural term)	-0.19***	-3.77
Living in the <i>Italia di Mezzo</i> (dummy, structural term)	-0.12**	-2.18
Utility function of the hypothetical alternatives		
Alternative specific constant (hypothetical vs no-choice alternative, fixed)	-5.34***	-19.49
Hourly rent earned (€, random – spread triangular distribution)	0.36***	30.77
Female (dummy, interaction term)	-0.06***	-5.79
Young (dummy, aged 18–24, interaction term)	-0.03**	-1.86
High education level (dummy, Bachelor degree or higher, interaction term)	-0.06***	-4.99
Living in Southern Italy (dummy, interaction term)	-0.05***	-4.10
Living in the <i>Italia di Mezzo</i> (dummy, interaction term)	0.05***	4.27
Platform fee (€, random – spread triangular distribution)	-0.41***	-30.27
Young (dummy, aged 18–24, interaction term)	0.06*	1.71
Maximum insurance compensation (k€, random – spread triangular distribution)	1.55***	13.27
High education level (dummy, Bachelor degree or higher, interaction term)	-0.52***	-4.46
Living in Southern Italy (dummy, interaction term)	-0.43***	-3.37
Living in the <i>Italia di Mezzo</i> (dummy, interaction term)	0.42***	3.40
Vehicle access method (dummy, app vs keys, random – triangular lower bound)	-3.72***	-27.60
Vehicle access method (dummy, app vs keys, random – triangular upper bound)	3.31***	28.47
High education level (dummy, Bachelor degree or higher, interaction term)	0.50***	5.70
Living in the <i>Italia di Mezzo</i> (dummy, interaction term)	-0.21***	-2.36

losing control over the booking process (2.74), the platform's ability to verify renter identities (1.74), and the fear of not being reimbursed for damages (3.02) are positively related to the latent variable Perceived Lack of Control. Indicators such as covering fixed car ownership costs (2.81), generating additional income (2.07), reducing the environmental impact of traffic (1.10), and providing access to cars for those without (1.68), trace the Latent Variable Potential Benefits.

All the coefficients of the attributes describing the hypothetical alternatives, reported in Table 3, are statistically significant and exhibit the expected signs. These results highlight the high degree of heterogeneity in respondents' preferences regarding the technical features of the service. This is further confirmed by the fact that all coefficients were specified as random and the estimated parameters of their distributions are statistically significant.

Sensitivity to earnings from renting out the vehicle, modelled as a positively constrained triangular random coefficient, is lower among female respondents (-0.06), younger individuals (-0.03), those residing in Southern Italy (-0.05), and participants with higher education (-0.06). Conversely, respondents living in the *Italia di Mezzo* exhibit higher sensitivity to potential earnings (0.05).

Sensitivity to the platform fee, specified as a negatively constrained

Table 4
Estimates of the measurement indicators and the respective thresholds of the car owners' model (Eq. (2)).

Parameters	Estimate	t-ratio
Latent Variable Perceived Potential Benefits		
Indicator Possibility of covering fixed car ownership costs	2.81***	13.31
Threshold_1	-3.61***	-16.71
Threshold_2	-1.01***	-8.33
Indicator Possibility of getting additional income	2.07***	15.38
Threshold_1	-2.52***	-19.95
Threshold_2	-0.53***	-6.09
Indicator Possibility of reducing environmental impact	1.10***	14.27
Threshold_1	-1.90***	-24.25
Threshold_2	-0.47***	-7.71
Indicator Possibility of fostering social inclusion	1.68***	15.10
Threshold_1	-3.37***	-24.51
Threshold_2	-1.37***	-15.33
Latent Variable Perceived Potential Risks		
Indicator Possibility that the car is damaged	3.39***	11.97
Threshold_1	-5.41***	-14.81
Threshold_2	-3.01***	-12.37
Indicator Possibility of disputes with renters	2.61***	14.27
Threshold_1	-4.41***	-18.47
Threshold_2	-2.30***	-13.89
Indicator Possibility of not having the car when needed	1.75***	15.15
Threshold_1	-3.02***	-21.73
Threshold_2	-1.33***	-13.20
Latent Variable Perceived Lack of Control		
Indicator Concern of not having control over the booking process	2.74***	14.25
Threshold_1	-3.39***	-15.91
Threshold_2	-1.21***	-7.48
Indicator Not being able to check the identity of the renter	1.74***	17.05
Threshold_1	-2.09***	-17.37
Threshold_2	-0.17*	-1.68
Indicator Not being not being reimbursed for damages	3.02***	13.47
Threshold_1	-3.30***	-13.61
Threshold_2	-0.89***	-5.12

triangular random coefficient, is lower among younger individuals (0.06), indicating a reduced aversion to the cost of using the marketplace in this demographic group.

Respondents with higher education (-0.52) and those living in the South (-0.43), but not those residing in the *Italia di Mezzo* (0.42), show reduced sensitivity to the maximum reimbursement in case of damages. This attribute was also modelled as a positively constrained triangular random coefficient.

Finally, there is significant heterogeneity in preferences related to the vehicle access method. Specifically, the distribution of this coefficient is not sign-constrained, with approximately half of the distribution taking on positive values and the other half negative values. Individuals with higher education (0.50) and those not residing in the *Italia di Mezzo* (-0.21) show a greater preference for app-based access over traditional key handover.

4.2. The renters' model

The main results of the model estimated for the car renters' sample are presented in Table 5. The model's adjusted Rho-squared is 0.26. We used 17,832 choice observations and estimated 76 parameters.

The results indicate that respondents are generally willing to participate in the peer-to-peer car sharing market as renters. This is evidenced by the positive and statistically significant alternative-specific constant associated with choosing one of the two hypothetical car-sharing options (1.34). This willingness is especially strong among male respondents, as indicated by the positive and significant coefficient for the dummy variable identifying female participants (1.16), implying lower willingness among women. Moreover, younger respondents, specifically those under the age of 25, appear less inclined to participate, as shown by the negative and significant coefficient for the corresponding age dummy variable (-1.00).

Table 5
Estimates of the car renters' model.

Parameters (measurement unit, type of parameter)	Estimate	t-ratio
Utility function of the no-choice alternative		
Female (dummy)	1.16***	6.51
Young (dummy, aged 18–24)	−1.00***	−4.62
Variance Error Component	8.39***	31.61
Latent Variable Perceived Potential Benefits		
High education level (dummy, Bachelor degree or higher, structural term)	−0.28***	−3.68
High education level (dummy, Bachelor degree or higher, structural term)	0.06	1.14
Latent Variable Perceived Potential Risks		
Female (dummy, structural term)	0.12**	1.87
Female (dummy, structural term)	0.20***	4.54
Young (dummy, aged 18–24, structural term)	−0.16***	−2.13
High education level (dummy, Bachelor degree or higher, structural term)	−0.18***	−4.09
Living in the <i>Italia di Mezzo</i> (dummy, structural term)	0.22***	−5.00
Latent Variable Peer Effect and Environmental Sensitivity		
Young (dummy, aged 18–24, structural term)	−0.35***	−5.42
Young (dummy, aged 18–24, structural term)	0.21***	2.78
High education level (dummy, Bachelor degree or higher, structural term)	0.12***	2.47
Living in Southern Italy (dummy, structural term)	0.21***	4.13
Living in the <i>Italia di Mezzo</i> (dummy, structural term)	−0.23***	4.73
Utility function of the hypothetical alternatives		
Alternative specific constant (hypothetical vs no-choice alternative, fixed)	1.34***	8.85
Hourly rent to be paid (€, random – spread triangular distribution)		
Female (dummy, interaction term)	−0.23***	28.52
Female (dummy, interaction term)	0.07***	7.98
Young (dummy, aged 18–24, interaction term)	0.06***	4.04
Platform fee (€, random – spread triangular distribution)		
High education level (dummy, Bachelor degree or higher, interaction term)	−0.35***	−20.56
High education level (dummy, Bachelor degree or higher, interaction term)	−0.03**	−1.53
Deductible (100€, random – spread triangular distribution)		
Female (dummy, interaction term)	−1.60***	−12.94
Female (dummy, interaction term)	0.64***	4.72
High education level (dummy, Bachelor degree or higher, interaction term)	0.35***	3.36
Living in the <i>Italia di Mezzo</i> (dummy, interaction term)	−0.09	−0.83
Distance to reach the vehicle (km, random – spread triangular distribution)		
Female (dummy, interaction term)	−0.32***	−13.10
Female (dummy, interaction term)	0.09***	3.69
Young (dummy, aged 18–24, interaction term)	−0.01	−0.43
High education level (dummy, Bachelor degree or higher, interaction term)	0.01	0.56
Living in Southern Italy (dummy, structural term)	0.04***	2.08
Living in the <i>Italia di Mezzo</i> (dummy, interaction term)	0.04***	2.17

The perceived potential benefits associated with using the service as renters, captured by the Latent Variable Perceived Potential Benefits, is positively and significantly correlated to the intention to adopt peer-to-peer car sharing (−0.28 in Table 5). As shown in Table 6, these perceived benefits include the ability to reach destinations not served by public buses (2.07), a potential reduction in the environmental impact of urban traffic due to less frequent car use (1.28), lower costs compared to taxis (1.36), faster travel times than buses (1.47), and the possibility of renting an electric vehicle (1.54).

Furthermore, social influence, captured by the Latent Variable Peer Effect and Environmental Sensitivity, also significantly reinforces the willingness to use the peer-to-peer car sharing service (−0.35 in Table 5). This latent construct is associated with indicators (Table 6) reflecting the importance of support and encouragement from family and friends (2.29), and from the broader society (2.40), in the decision to adopt the service. It also includes the perceived concern for environmental sustainability among family and friends (2.59), particularly when they choose how to travel (2.15), and more generally, when sustainability is discussed with people the respondent knows (1.53).

Conversely, the perceived risks associated with renting a privately owned vehicle, captured by the Latent Variable Perceived Potential Risks, negatively affect the willingness to engage in peer-to-peer car sharing as a renter, as indicated by the coefficient of 0.12 reported in Table 5. These risks, detailed in Table 6, include the possibility of disputes with car owners (3.12), unavailability of the vehicle when needed

Table 6
Estimates of the measurement indicators and the respective thresholds of the car renters' model (Eq. (2)).

Parameters	Estimate	t-ratio
Latent Variable Perceived Potential Benefits		
Indicator Possibility of reaching destinations not served by public buses	2.07***	15.29
Threshold_1	−2.77***	−20.20
Threshold_2	−0.87***	−9.13
Indicator Possibility of reducing use of car and environmental impact	1.28***	15.64
Threshold_1	−1.78***	−22.16
Threshold_2	−0.14***	−2.21
Indicator Perceived lower costs compared to taxis	1.36***	15.44
Threshold_1	−2.52***	−25.50
Threshold_2	−0.47***	−7.01
Indicator Perceived faster travel times than buses	1.47***	15.58
Threshold_1	−2.36	−23.79
Threshold_2	−0.61	−8.53
Indicator Possibility of renting an electric vehicle	1.54***	15.64
Threshold_1	−2.49***	−23.96
Threshold_2	−0.80***	−10.58
Latent Variable Peer Effect and Environmental Sensitivity		
Indicator More in favor if family and friends supportive of P2PCS	2.29***	19.26
Threshold_1	−0.20**	−1.71
Threshold_2	2.17***	15.55
Indicator More in favor if P2PCS popular transport mode	2.40***	16.84
Threshold_1	1.91***	12.56
Threshold_2	3.61***	18.81
Indicator More in favor if family and friends more sensitive to environmental sustainability	2.59***	18.63
Threshold_1	−0.13	−1.00
Threshold_2	2.56***	16.13
Indicator Family and friends prioritize environmental impact when choosing transport mode	2.15***	18.96
Threshold_1	0.67	5.75
Threshold_2	2.73	18.88
Indicator I often discuss of environmental sustainability with family and friends	1.53***	19.78
Threshold_1	−0.16**	−1.85
Threshold_2	1.60***	−16.53
Latent Variable Perceived Potential Risks		
Indicator Possibility of disputes with car owner	3.12***	17.90
Threshold_1	−4.20***	−18.85
Threshold_2	−1.65***	−10.04
Indicator Possibility of car malfunction	1.90***	20.21
Threshold_1	−2.35***	−20.37
Threshold_2	−0.17***	−1.83
Indicator Possibility of not having the car when needed	2.08***	19.65
Threshold_1	−3.31***	−22.84
Threshold_2	−1.03***	−9.58
Indicator Risk of damaging the car	3.28***	17.44
Threshold_1	−4.63***	−18.96
Threshold_2	−1.91***	−11.01
Indicator Risk of hidden costs	2.14***	19.99
Threshold_1	−3.08***	−21.81
Threshold_2	−0.58***	−5.44

(2.09), vehicle malfunctions (1.90), concerns about causing damage to the car (3.28), and unexpected costs (2.14).

It is noteworthy that, for potential car renters, the impact of perceived benefits, peer effects, and environmental sensitivity is substantially greater than that of perceived risks. This stronger influence is particularly pronounced among younger respondents (0.21 in Table 5), residents of Southern Italy (0.21), those living outside the *Italia di Mezzo* areas (−0.23), and individuals with higher educational levels (0.12). Conversely, the impact of perceived risks is more important among female respondents (0.20), individuals over 24 years old (−0.16), those with lower educational levels (−0.18), and residents of the *Italia di Mezzo* areas (0.22).

All parameters associated with the attributes describing the hypothetical alternatives are statistically significant and exhibit the expected

signs. Notably, sensitivity to the platform fee (-0.35 in Table 5) is greater than sensitivity to the service cost (-0.23). This may reflect the perception among renters that platform fees represent an additional cost, separate from the value of the service itself. Renters might view the platform as an intermediary adding costs without directly contributing to the service they value. While the platform is essential to enabling the car-sharing market, this result suggests that renters could be more sensitive to fees than to the service cost. This finding aligns with the literature on two-sided markets (e.g., Eisenmann et al., 2006), where users may undervalue the platform's role and perceive its fees as 'hidden' costs. It is especially pronounced among more educated respondents (-0.03), while sensitivity to the service cost is lower among female (0.07) and younger respondents (0.06). The deductible plays a particularly important role for the overall sample (-1.60), with an even stronger effect observed among men, as indicated by the positive coefficient for the female dummy variable (0.64), and among respondents with lower educational levels, shown by the coefficient for the more educated dummy variable (0.35). Additionally, the distance to reach the car significantly influences the decision to use the service (-0.32), especially for men (female dummy = 0.09), residents of Northern or Central Italy (Southern Italy dummy = 0.04), and individuals living in the *Italia di Mezzo* area (0.04).

4.3. Simulation analysis

To assess the potential uptake of the peer-to-peer (P2P) car sharing market in Italy, we conducted a scenario analysis based on four combinations of favorable and unfavorable service features and population segments.

Regarding potential supply from car owners, the best-case scenario assumes an hourly rental income of €12, no platform fee, a maximum insurance compensation of €25,000, and remote access to the vehicle. In this scenario, the most responsive segment in our sample consists of young, highly educated women living in Southern Italy, excluding the *Italia di Mezzo* area. For this group, the probability of being willing to rent out their car reaches 100 %.

Interestingly, this probability remains nearly unchanged even in the worst-case scenario, which involves an hourly rental income of €4, a platform fee of 30 %, a maximum insurance compensation of €15,000, and the use of a physical key that must be handed over to the renter.

In contrast, when focusing on the least favorable population segment, middle-aged, less-educated men residing in the *Italia di Mezzo* (excluding Southern Italy), the willingness to rent out a car drops significantly. For this group, the probability is 62 % under the best-case scenario, and only 5 % under the worst-case scenario.

With reference to the potential demand of people willing to rent a car, in the best-case scenario, the service is characterized by an hourly rental tariff of €4, no platform fee, a deductible of €200, and a maximum walking distance to the car of 200 m. The most promising segment in our sample consists of young, highly educated women living in the South of Italy, excluding the *Italia di Mezzo* areas. For this group, the probability of being willing to rent a car is 91 %.

By contrast, under the same favorable service conditions, the least promising segment, older, less-educated men living in the *Italia di Mezzo* and not living in the South of Italy, shows a willingness to rent of 80 %. This indicates that when service features are highly attractive (low price, low deductible, easy access), sociodemographic differences do impact willingness to rent, but not dramatically. However, in the worst-case scenario, where the hourly tariff rises to €12, platform fees reach 30 %, the deductible increases to €800, and the car may be up to 4 km away, the picture changes substantially. In this context, the willingness to rent among the most favorable segment falls to 81 %, while in the least favorable segment, it drops sharply to 22 %.

These results suggest that while technical service features are key aspects, sociodemographic, psychological, and attitudinal factors, including perceived benefits, risks, and sense of control, can be equally

or even more influential especially when the service becomes less attractive. These findings highlight the need for targeted strategies that jointly consider user profiles and service configurations.

5. Conclusions

This study examined both the supply and demand sides of the peer-to-peer car sharing market in Italy, offering insights into the psychological, socio-demographic, and behavioral factors that influence potential participation. The findings reveal a highly heterogeneous structure in the preferences of car owners and potential renters. Notably, potential renters exhibit a higher willingness to use the service even when the technical characteristics, such as rental tariff, platform fee, deductible, and walking distance to the vehicle, are less favorable. However, this result is strongly influenced by the socio-demographic, psychological, and attitudinal characteristics of individuals.

On the supply side, as expected, reluctance is driven primarily by perceived risks, including potential vehicle damage, disputes, loss of vehicle availability, and concerns about the platform's control over the rental process. These are captured by the latent constructs Perceived Potential Risks and Perceived Lack of Control. Nevertheless, Perceived Potential Benefits, such as offsetting fixed ownership costs, generating extra income, and supporting environmentally sustainable transportation, emerge as stronger drivers of participation, particularly among younger, highly educated individuals residing in Southern Italy and the "Italia di Mezzo."

Behavioral sensitivity analysis further reveals that younger and more educated individuals are less responsive to potential earnings and reimbursement guarantees but more sensitive to platform fees, underscoring the importance of minimizing these costs for potential car providers. Additionally, technological preferences, such as app-based vehicle access, play a notable role, especially among more educated users.

On the demand side, interest in using peer-to-peer car sharing appears strong, particularly among young men under the age of 25 and among residents of Southern Italy, excluding those living in the *Italia di Mezzo*. Their engagement is driven by the perceived advantages of the service, such as reaching areas underserved by public transit, environmental benefits, cost savings compared to taxis, and the ability to rent electric vehicles. These positive perceptions are reinforced by both social and environmental influences, similarly to the evidence reported by Gong et al. (2023) and Vătămănescu et al., 2025. However, perceived risks, such as unexpected costs, vehicle malfunctions, and the inconvenience of locating or accessing a car, continue to pose significant barriers. These concerns are particularly pronounced among women, older adults, and individuals with lower levels of education. Additionally, residents of the *Italia di Mezzo* are notably affected by these perceived risks, indicating a region-specific sensitivity that may hinder adoption. Notably, the deductible cost is a significant deterrent across the sample, particularly among men and individuals with lower educational attainment, while proximity to the vehicle also plays a decisive role in adoption.

Based on these findings, several recommendations can be made for stakeholders aiming to foster the growth of peer-to-peer car sharing in Italy. Digitalization plays a central role in enabling this system, which relies entirely on digital platforms for its operation. As such, the role of platform managers is equally critical. Platform providers should consider reducing or eliminating usage fees for car owners to stimulate supply-side participation. In parallel, strengthening trust mechanisms, such as transparent booking systems, robust identity verification, and guaranteed reimbursement processes, will be essential to reduce perceived risks and enhance user confidence.

In addition, targeted promotional campaigns should emphasize the benefits of the service while addressing concerns related to risk and loss of control. These efforts should focus particularly on the more sceptical segments of the population, namely older, less-educated men residing in

the *Italia di Mezzo* (excluding Southern Italy), who tend to be more resistant to adopting this new form of shared mobility.

Insurance companies should develop customized and affordable insurance products tailored specifically to peer-to-peer car sharing, as current offerings are often inadequate or too costly.

Local governments need to recognize peer-to-peer car sharing as a complement to public transportation, actively promoting it through urban mobility plans, visibility campaigns, and logistical support (e.g., designated parking or integration with public transit hubs).

National policy-makers should consider subsidizing the peer-to-peer car sharing sector on both the demand and supply sides, similarly to how public transport is subsidized, to support the development of inclusive, sustainable mobility systems.

In sum, by addressing the asymmetries in the market and enhancing the perceived value and trust in the system, peer-to-peer car sharing can become a viable, efficient, and sustainable component of urban transportation in Italy.

One key limitation of this study is the reliance on stated preference data, which, while necessary given the early stage of the peer-to-peer car sharing market in Italy, may not fully capture real-world behavior. As the market evolves, future research should aim to monitor its actual adoption over time through panel data or case studies. Complementary qualitative research (e.g., interviews with early adopters or platform operators) could offer deeper insights into user motivations, perceived barriers, and the role of trust in shaping participation.

A second limitation of our study concerns the educational composition of the sample, which includes a higher proportion of individuals with tertiary education (51–52 %) compared to the general Italian population (22 %). Since education is a key determinant of P2P car-sharing adoption, influencing both the demand and supply sides of the market, this discrepancy may result in an overestimation of the potential uptake among the broader population.

A third caveat is the exclusion of 1151 respondents as car owners and 651 as car renters who declared they would never use P2P car-sharing. This restriction was adopted to focus the stated preference analysis on individuals showing at least some willingness to try the service, thereby improving the internal validity of the results. However, it also implies that the estimated market potential refers to potential adopters only, rather than to the population as a whole, which may again lead to an upward bias in uptake estimates.

CRedit authorship contribution statement

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. **Chiara Ricchetti:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Lucia Rotaris:** Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Mariangela Scorrano:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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