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DETERMINANTS OF RENT PRICES: AN ANALYSIS OF EUROPEAN CITIES

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Abstract: Using the data of a sample consisting of 99 cities from 37 European countries (2024) this paper discusses the determinants of rent prices. The results indicate that rents are lower in areas with longer commute times and higher cost of living index, while high wages and high house price to income ratio (HPIR) lead to increase rent prices. In this paper, we constructed the Rent Index as average of four variables relating to the rents of one-room and three-room apartments in the city centre and in the suburbs. We identify the factors that explain the variation of the Rent Index using multiple linear regression. The overall conclusions of analysed models are mixed: salary is the strongest predictor in all models, if the city is a university one, we expect an average rent increase between 105.9 and 115.81 euro compared to non-university cities. If the city has a tourist attraction, the rent price will increase on average with a sum between 114.59 and 158.61 euro; the safety index and pollution index have significant effects on Rent Index; an increase of HPIR by one unit will lead to an increase in the Rent Index with 13.6 euros per month.

JEL classification: C13, C51, D60, E31, I31, R21, R31

Keywords: rent price; European cities; quality of life; housing supply, housing supply demand; Rent Index

1. Introduction

The literature shows that the differences between rich and poor people are becoming deeper (OECD, 2020), regardless of the major efforts (aid, compensation, exemptions, etc.) implemented by various governments. The World Bank Annual

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Report (2024, p.66) estimates that 314 million extremely poor people live in 39 countries classified as fragile or conflict affected. “Wealth inequality between countries across Europe is very strong. In the EU, the difference in wealth per adult between the countries with the highest and lowest levels exceeds a factor of ten” (Yanatma, 2024). Therefore, more and more people are forced to rent a house.

The relevance of this study is supported by recent statistics from numerous countries, which show that rental prices have increased in recent decades due to several factors. Renting has become a huge burden especially for the poor families that cannot afford to buy their own home, ending up living in indecent conditions.

Our study aims to identify various economic and social factors that influence rent prices in the most important European countries and which, therefore, affect the living conditions, especially of the poorest Europeans.

In Section 2 of the article (regarding the literature review), we include a literature review highlighting the following aspects: the housing supply, regulations of the private rental sector affecting the rent fluctuations and quality of life, the housing demand and the trends of rent prices.

We also reiterate the results of recent studies that highlight the possible causes of rent increases but also various negative aspects identified in many countries, affecting tenants’ quality of life and health; for example, rigidity of housing markets, unsafe and unhealthy housing, poor housing quality (including overcrowding, damp and insufficient housing facilities), precarious housing situations (such as unaffordability, evictions and displacement), the large number of minors living in overcrowded housing, additional costs related to additional monthly expenses and housing-costs-induced energy poverty, air pollution, etc.

In addition, in the 2nd Section we present the results of recent studies that highlight the possible causes of rent increases as well as various negative aspects identified in many countries, affecting tenants’ quality of life and health: for example, rigidity of housing markets, unsafe and unhealthy housing, poor housing quality (including overcrowding, damp and insufficient housing facilities), precarious housing situations (such as unaffordability, evictions and displacement), the large number of minors living in overcrowded housing, additional costs related to additional monthly expenses and housing-costs-induced energy poverty, air pollution, etc.

The data used in our study were collected from a sample of 99 cities from 37 European countries in relation to a series of variables that capture the quality of life. We constructed the Rent Index variable as an average of the four variables.

Thus, this present paper is the first in jointly exploring the effects of six explanatory variables: Salary, Pollution Index, Safety Index, House Price to Income Ratio (HPIR), Traffic Commute Time Index and Cost of Living Index. Other analysed predictor variables refer to three characteristics of European cities (i.e., university cities and tourist cities (i.e., university cities, tourist cities and capital or not). Obviously, the dependent variable is monthly rent price, more precisely Rent Index constructed as an average of the four variables.

Further, this paper is organized as follows: the data, the description of explanatory variables and the 6 research hypotheses are presented in the 3rd and 4th sections, then the empirical results of the models applied are analysed and discussed in the 5th section. Finally, short sections with discussion and conclusions, are provided.

2. Literature review

In the specialized literature, to explain the many reasons/causes/factors that generate very high rent prices in some cities, effects of housing supply and housing demand have been generally studied.

The housing supply can be influenced by raising house prices, by over-regulated housing construction and rentals (legal rules on ownership and tenancy, fiscal policies, rent control, planning and building regulations, cost burden of energy retrofitting etc.), monetized power relations and housing insecurity, housing production more expensive, mortgage availability, the provision of social housing through the local authority system, homeownerships, etc.

"Monetized power relations involving landlords (public and private), creditors and multi-scalar state interventions (federal, municipal and district) play an integral, yet paradoxical, role in low-income rental housing insecurity" (Soederberg, 2018, p.114).

Even between EU countries, many differences can be identified regarding *regulations and rent control affecting the rental sector.*

For example, in Sweden the rent prices are not subject to market mechanisms but are rather strictly regulated, which entailed a smaller rent increase in the last decades due to inflation and rising prices of landlords' expenditures for waste management, energy, and water. "Although renovation costs can lead to rent increases in energy retrofitting, it is often assumed that reductions in energy costs will counterbalance the rent increase" (von Platten et al., 2022, p.1, 3).

Several studies found, for example, that the regulations had a negative impact on rental inflation, that rent control reduced prices, or removal of rent control had little effect on the level of rents, etc. (O'Toole et al., 2021, p.2)

Other studies have highlighted comparative analyses of national regulations of the private rental sector in EU countries. It seems that (a) if there are very strict regulations ('over-regulation') of rents (e.g. Denmark, the Netherlands, France) there are too high risks for private investors and, therefore, the private rental sector cannot be stable and effective; (b) if there are countries with minimal regulations of the private rental sector ('under-regulation'), e.g. Finland and the UK, the share of private rented housing increases, but the private rental sector cannot be stable in the long term (Lux and Sunega, 2010).

From our point of view, it is very important to avoid both 'over-regulation' and 'under-regulation' in the rental sector of the housing market.

An example of 'over-regulation' is the rent price freeze (setting a cap on rental prices), part of a rigorous rent-control policy in Berlin, introduced in 2020 and revoked 13 months later by the German Constitutional Court (Hahn et al., 2022, p.7).

Early' s study (2000, p. 185) estimates the net benefits of rent control to tenants in New York City and suggests that, by controlling for higher prices in the uncontrolled sector, the average benefit to tenants in regulated units is negative.

From our point of view, in each EU country the economic, social, political, cultural particularities, etc. can be analysed, and a middle ground specific to each context can be found, meant to implement a moderate system of regulation of rents, the duration of rental contracts, a balanced protection of tenants and landlords, etc.

In order to improve the standards in the rental sector and to provide a redress system on a par with that part enjoyed by tenants of social landlords, in UK

part of the existing regulations (for example, the Decent Homes Standard and 'Awaab's Law') will also be extended to the private rented sector and a private rented sector database will be created that will be used to provide information for landlords and tenants (Stephens et al., 2024, pp.9).

Kholodilin (2022, p.7) examined several empirical studies published between 1972-2022, studies focused on rent control, and concluded that rent control, although it helps lower rent prices for tenants, has many undesirable effects.

If we consider the state regulator for the Irish private rental sector, studies have found that "overall rent controls had a deflationary impact, with the rental inflation rate dropping by approximately 1–2 percentage points after the introduction of the regulations", but the regulations "have been effective in the areas of Ireland where rent controls were implemented" (O'Toole et al. 2021, p.3, p.14).

The housing demand can be influenced by changes in tenants' preferences, overcrowded households, raising rental prices, the socioeconomic consequences of the crisis, homelessness, immigration, the invasions/war conflicts from neighbouring countries (e.g., the Russian aggression against Ukraine), migration shocks and patterns, weakened rental protections, wage changes, mortgage availability, the quality of housing, unsafe and unhealthy housing, high maintenance costs and low energy efficiency of rented homes, loss of social housing, subsidised housing, mobility, search and moving costs etc.

It is known that rent controls impact tenants' mobility and increase rent prices in the long term (Diamond et al., 2019).

Gete and Reher (2018) show that a contraction of mortgage supply and tighter lending standards (over the 2010–2014 period) after the Great Recession has increased demand for rental housing, leading to higher rents and an increase in rental supply.

The role of growing demand to live in housing-supply U.S. cities was studied by Howard and Liebersohn (2021) and they showed that rents increase in the aggregate, even if a person leaves an elastic city (where rent price will fall only a little) for an inelastic city (where rent price will rise much more). "The location demand channel explains 54% of the rent increase in all U.S. cities and 75% of the rent increase where the consumer price index rents data exists" (Howard and Liebersohn, 2021, pp.1, 13).

Spectacular *increases in rent prices* were observed in two cities in Poland, Krakow and Warsaw, where rent prices increased by 16.5%, respectively 14% in a very short period of time (March and April of 2022), mainly due to the influx of Ukrainian refugees fleeing the war, the refugee shock being caused by the Russian invasion against Ukraine in February 2022 (Trojanek and Gluszak, 2022, p. 4).

In the decade 2013-2023, on average, the share of European renters (paying rent) did not increase significantly (+5.1%). However, the largest increases, in the same period, were in countries such as Lithuania (+43.6%), Malta (+29.7%), Greece (+25.6%) and the Czech Republic (+20.6%) (Horvat and Coupechoux, coord., 2024, p.76).

Studying the issue of apartment rental in some cities in Poland during the COVID-19 pandemic, Źróbek-Różańska (2022) observed a 10-20% decrease in rental prices and noted a marked decline in interest in student housing. The author showed that only the owners of 1–2 room flats in a good location found a tenant quite quickly (in Warsaw, Cracow, Poznań).

The empirical results (after interviewing students from a university city in Poland) show that students do not remain attached to rented apartments and are not willing to pay to reserve an apartment during the COVID-19 pandemic, leading to the negotiation of lower prices and more favourable rental conditions (Źróbek-Różańska, 2022).

Saiz (2007) shows that an immigration flows equal to 1% of the population of a U.S. city is associated with an increase of approximately 1% in average rents and housing prices.

In just 9 years house prices in the EU increased significantly (by 48.5%) while rental prices in the EU increased by 14.6% in 2023 compared to 2015. With the exception of Greece where a small decrease (-2.1%) in rental prices was observed (in the 2015-2023 period), in all other EU countries increases in rental prices were observed (since 2015, the reference year), the largest increases being in Lithuania (68.2%), in Hungary (66.5%) and in Slovenia (60.4%) (Horvat and Coupechoux, ed., 2024, p.72).

European statistics show that in 2023 more renters (24.6% on the private market and 24.4% in subsidised housing) were affected by overcrowding than homeowners: 16.4% of non-mortgaged homeowners and 8.2% of mortgaged homeowners (Horvat and Coupechoux, coord., 2024, p.75).

One issue facing providers forced to increase rent prices is the levels of inflation and other financial aspects related to the tenants' social circumstances and cost of living.

To identify vulnerability factors related to housing-costs-induced energy poverty Karpinska and Śmiech (2023) focus on the profile of energy-poor households in 11 Central and Eastern Europe countries (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia). The authors explain that renters are usually more vulnerable because tenants do not have the resources to implement thermal-modernization solutions and rigidity of housing markets make renting even less affordable than before (Karpinska and Śmiech, 2023, p.5).

Under these conditions, reviewing energy efficiency policies to reduce rent prices and maintenance costs of apartments, urgent measures and regulations are required.

Despite the existence of regulations designed to protect tenants from the risks of unsafe and unhealthy housing, the private rental sector in several countries requires more attention because in many countries countless complaints and claims from tenants have been registered and have remained unresolved.

Many studies in the specialized literature show that there is a correlation between poor housing quality (including overcrowding, damp and insufficient housing facilities) or precarious housing situations (such as unaffordability, evictions and displacement) and increased anxiety, depression, stress, insomnia and panic attacks, respectively emotional distress (Newton et al., 2022, p.1).

Other studies in the literature have also found that depression in older adults is significantly influenced by the residential environment and residential experience, but the impact may vary by country. For example, the area (rural non-rural) or regional disparities in development do not have a significant impact on the levels of depression of European residents (Kou et al., 2024, p. 6).

In the Ninth Overview of Housing Exclusion in Europe (2024), a Joint Publication by FEANTSA and the Foundation Abbé Pierre, alarming statistics are presented. For example, it was found that "one in four minors in the European Union - and over one in five children under the age of six - were living in overcrowded conditions (Horvat and Coupechoux, coord., 2024, p.41).

Table 1. Minors living in overcrowded housing (2023)

Countries		Countries		Countries	
Malta	1.9%	France	15.8%	Italy	40.9%
Cyprus	3.7%	Slovenia	15.8%	Lithuania	41.1%
Netherlands	4.6%	Germany	18.7%	Greece	41.5%
Ireland	6.3%	Portugal	21.8%	Slovakia	42.3%
Finland	9.3%	Sweden	23.3%	Poland	43.7%
Belgium	9.4%	Austria	23.9%	Croatia	44.4%
Denmark	9.7%	Estonia	25.0%	Latvia	55.6%
Luxembourg	9.9%	Czechia	26.6%	Bulgaria	56.5%
Spain	11.3%	Hungary	28.8%	Romania	61.1%

Source: EUROSTAT (from Horvat and Coupechoux, coord., 2024, p.42).

As it can be seen from Table 1, only in Malta (1.9%), Cyprus (3.7%) and the Netherlands (4.6%) were less than 5% of minors living in overcrowded housing (in 2023). At the opposite pole, over 55% of minors faced poor housing conditions in Romania (61.1%), Bulgaria (56.5%) and Latvia (55.6%).

Under these circumstances, structural changes (i.e. preventive practices and policies, the impact of the short-term rentals, housing innovations, debts advice and legal assistance for tenants, assess the vulnerabilities in the housing and rental market etc.) and regulating the housing market that affect the rental sector, including regulating short-term rentals to prevent rent price increases and urban overcrowding, are important in EU.

Other problems (especially for poor people) are vulnerability, factors related to rental-costs, additional costs related to additional monthly expenses and housing-costs-induced energy poverty, etc.

More than 20% of UK private renters have lost at least £100 income per month during the COVID-19 pandemic (Perry et al., 2021, p. 5). More than that, the Covid-19 pandemic highlighted the impact of poor housing conditions on physical and mental health (Cromarty, 2022. p.9).

"The social and material vulnerabilities associated with poor quality and precarious conditions which, underpinned by powerlessness, resulted in threats that contributed to and exacerbated the mental-ill health of renters at a time of broader structural fragility" (Newton et al., 2022, p.7). Key issues identified for improving housing fitness in the England private rented sector are reform of the Housing, Health and Safety Rating System, ineffective local authority enforcement, power imbalance between tenants and landlords, complex and piecemeal legislation and insufficient data on the private rented sector (Cromarty, 2022, pp. 27-34).

Although many national and international institutions make consistent continuous investments to reduce inequalities and reduce poverty, in 2023, on average half of European households who lived below the poverty threshold were

tenants (49.2%); the highest percentages of tenants in the poor category were in Denmark (70.0%), Austria (75.1%), and Germany (75.3%). In addition, statistics show that many Europeans cannot afford to live in decent conditions.

If we refer to EU citizens in 2023, 16% of them lived in overcrowded households, the highest percentages being in Latvia (40.9%), Romania (40.0%) and Bulgaria (34.9%), and the lowest in Cyprus (2.2%), Malta (2.4%) and the Netherlands (3.8%).

Behera et al. (2024) analysed the factors that contribute to people's happiness or life satisfaction (between 2005 – 2020, in 166 countries) and showed, among other important factors that per capita income positively impacts happiness, while air pollution exposure has a negative impact.

The literature shows that increased air pollution can cause mental health issues (Muresan et al., 2023) and continuous exposure to air pollution can reduce people's happiness or life satisfaction (Behera et al., 2024 p.10).

3. Data

The data refer to a sample of European cities analysed in relation to a series of variables that capture the quality of life. Variables Indices are based on data and use surveys collected by Numbeo. The surveys capture the perceptions and experiences of site visitors on various aspects of quality of life. Each survey entry is assigned a number in the range of -2 to +2, where -2 represents a strongly negative perception and +2 represents a strongly positive perception. Based on these responses, score variables with values between 0 and 100 are constructed.

The sample consists of 99 cities from 37 European countries. Out of these, 36.4% are capital cities, 37.4% are tourist cities and 57.5% are university cities. In terms of geographical distribution of 99 cities in European countries (from our sample), 21.2% are in the north, 21.2% are in the south, 31.3% are in the east and 26.3% are in the west. The data refer to the year 2024.

Table 2. Descriptive statistics for rent prices (euro)

Variables	*Mean*	*Median*	*Std. Deviation*	*Minimum*	*Maximum*
rent_1B_CityCentre	903.62	895.00	428.290	216.81	2033.45
rent_1B_OutsideCentre	681.73	689.32	344.709	142.48	1717.41
rent_3B_CityCentre	1577.19	1519.84	739.436	470.94	3749.64
rent_3B_OutsideCentre	1155.71	1119.57	580.721	282.48	2821.96

Source: authors' own calculations

We collected data related to the rent price for Apartment (1 bedroom) in the City Centre and the rent price for Apartment (3 bedroom) in the City Centre, respectively, the rent price for Apartment (1 bedroom) Outside of Centre and the rent price for Apartment (3 bedroom) Outside of Centre (see Table 2).

Starting from these data we constructed the Rent Index as an average of the four variables. The descriptive statistics related to the Rent Index variable are the following: mean is 1079.56 euro/month, median is 1049.39 euro/month, standard

deviation is 516.19 euro/month, Skewness = 0.41, Kurtosis = -0.26, which allows us to confirm that we have a distribution that can be assimilated to the normal one, the Lilliefors test indicating a p-value = 0.2. The lowest values are found in cities from Ukraine, Russia, Bosnia and Herzegovina, North Macedonia, and the highest values are in cities for Switzerland, United Kingdom, Ireland and Netherlands.

4. Description of explanatory variables and the research hypotheses

This paper focuses on the impact of six explanatory variables (salary, house price to income ratio, pollution index, safety index, traffic commute time index and cost of living index) on monthly rent. The descriptive statistics for these explanatory variables (predictors) are presented in Table 3.

Salary refers to Average Monthly Net Salary.

House Price to Income Ratio (HPIR) is a fundamental measure for apartment purchase affordability, where a lower ratio indicates better affordability. It is typically calculated as the ratio of median apartment prices to median family disposable income, expressed as years of income (numbeo.com).

Pollution Index provides an estimate of overall pollution levels in cities worldwide. Factors such as air and water pollution, garbage disposal, cleanliness, noise and light pollution, green spaces, and comfort in relation to pollution are considered in the calculation of the Pollution Index (numbeo.com).

The safety index measures residents' and visitors' feelings of safety while walking during the day and at night.

Traffic Commute Time Index is a composite measure that considers factors such as commute time, dissatisfaction with time spent in traffic, CO2 emissions, and overall traffic system inefficiencies. It provides insights into the overall traffic conditions in a city (numbeo.com). The lower the value, the better.

Cost of Living Index indicates the relative prices of consumer goods like groceries, restaurants, transportation, and utilities. It excludes accommodation expenses such as rent price or mortgage (numbeo.com).

Table 3. Descriptive statistics for explanatory variables (predictors)

Predictors	*Mean*	*Median*	*Std. Deviation*	*Minimum*	*Maximum*
Salary	2063.36	1706.51	1292.92	347.13	7019.34
House Price to Income Ratio (HPIR)	67.90	70.80	9.96	47.10	80.70
Pollution Index (Pollution)	63.20	64.90	11.31	35.80	79.50
Safety Index (Safety)	11.26	10.80	3.56	4.70	21.40
Traffic Commute Time Index (Traffic)	43.45	39.20	18.74	12.40	87.00
Cost of Living Index (Cost)	51.20	51.10	16.14	25.50	99.30

Source: authors' own calculations

Research hypotheses

In our study, we employ validation of the following six research hypotheses: (1) higher wages lead to higher rents, (2), there is no direct, immediate link between urban pollution and rent prices, (3) higher safety leads to higher rents, (4) a high House Price to Income Ratio (HPIR) is associated with higher rents, (5) rents are lower in areas with longer commute times, (6) there is a direct link between cost of living and rent price.

H1: Higher wages lead to higher rent prices

In general, there is a direct relationship between wages and housing rent. Higher wages allow people to pay higher rents, which often leads to higher rent prices in cities with developed economies. Conversely, low wages limit access to quality housing and influence the increase in demand for renting the smaller or cheaper housing. Hypothesis H1 is validated, meaning that there is a direct and strong relationship (0.863) between wages and rent prices (see Table 4).

H2: There is no direct, immediate link between urban pollution and rent prices

The link between pollution and rent prices is influenced by housing preferences, environmental conditions, and the costs associated with pollution levels. As environmental quality affects housing decisions, demand for housing in polluted areas may decrease and demand for housing in less polluted areas may increase, which will lead to a direct influence on rent prices. In addition, investments in green infrastructure and environmental policies can contribute to increasing rent prices in cleaner and more sustainable areas. The data from our sample (99 cities from 37 European countries) do not support a direct and significant link (0.085) between pollution and rent prices. Air pollution and urban noise can lead to a decrease in quality of life, and some residents may choose to pay less for rent to live in a cleaner area, away from the city centre, even if this means a longer commute or a compromise in terms of accessibility to amenities. In our study we demonstrate the link between Pollution Index and Traffic Commute Time Index to be quite strong (-0.505) (see Table 4).

Table 4. Pearson Correlation

	Salary	*Pollution*	*Safety*	*HPIR*	*Traffic*	*Cost*
Rent Index	0.863***	0.085	-0.342***	0.524***	-0.549***	0.856***
Salary	1	0.202**	-0.531***	0.615***	-0.644***	0.927***
Pollution		1	-0.022	0.254**	-0.505***	0.135
Safety			1	-0.349***	0.34***	-0.433***
HPIR				1	-0.638***	0.597***
Traffic					1	-0.595***

*Note: *Indicates significance at 1% level or less, **significance at 5% level, ***significance at 10% level*
Source: authors' own calculations

H3: Higher safety leads to higher rent prices

The safety of an area/city is an essential factor influencing rent prices. Safe areas are usually more attractive to residents, which leads to a higher housing demand and, implicitly, higher rents. Conversely, in less safe areas, demand decreases and rents can be lower. Thus, the Safety Index has a significant impact on the real estate market, influencing both the housing demand and the rent prices. In our study, hypothesis H3 was not validated because the link between Safety and Rent Index is inversely (-0.342) (see Table 4).

H4: A high House Price to Income Ratio (HPIR) is associated with higher rent prices

The relationship between HPIR and rent prices can be understood in the context of the housing market and housing affordability. The higher the ratio, the more difficult it is to buy a house relative to one's income. In many housing markets, the rent for an apartment is related to the selling house price. In general, rent tends to be lower than the mortgage rate for the same type of apartments, but this difference can vary depending on location and general economic conditions. If the HPIR is high (i.e. house prices are very high relative to income), people may prefer to rent because buying a house becomes unaffordable. In conclusion, if housing prices are too high relative to income, this can increase the demand for renting apartments, thus increasing rents, in parallel with increasing HPIR. Thus, our study shows that the relationship is direct and quite intense (0.524), meaning that increase HPIR will lead to an increase rent price, which is in line with economic theory, meaning that hypothesis H4 is validated (see Table 4).

H5: Rent prices are lower in areas with longer commute times

People who work in urban centres or areas where jobs are concentrated are often willing to pay higher rents to live nearby, saving time and energy without commuting. Thus, housing located close to commercial, or business centres will usually have higher rents. Housing offers that are more affordable in terms of rent price, but located further from the city centre, are attractive to those who are willing to accept a longer commute to save money. So, we find a strong inverse relationship (-0.549) between Traffic Commute Time Index and Rent Index, and Hypothesis H5 is validated (see Table 4)

H6: There is a direct link between Cost of Living and rent price

Areas with high rent prices are often areas with high population density (e.g., in urban centres), which can lead to increase prices for goods and services due to high demand. For example, prices from restaurants, public transportation, and other services may be higher in large cities or in areas with high population density, which affects the overall cost of living. On the other hand, in areas with lower rent prices (e.g., in suburbs or smaller cities), goods and different services' prices may be smaller, which can contribute to a lower cost of living, even if rent price is not directly considered. Our study confirms hypothesis H6, meaning that there is a direct and strong link (0.856) between cost of living and rent price (0.856) (see Table 4).

5. Results of the applied models

Further, we identify the factors that explain the variation of the Rent Index variable using multiple linear regression (MRA). Considering the predictor variables and the correlations between them, we created six models.

The standardized Beta coefficient in a regression model measures the relative impact of each independent variable on the dependent variable, in terms of standard deviations. This helps to compare variables that are measured in different units more easily and allows for a clearer understanding of the influence of each variable in the regression model. A higher standardized Beta coefficient indicates a more significant impact on the dependent variable.

Salary is the strongest predictor in all models, with large Beta standardized coefficients, suggesting a strong, direct and significant relationship between Salary and Rent Index (1st model).

Tourist cities and university cities also have a significant impact on Rent Index, in 2nd and 3rd models. Respectively, if the city is a university city we expect an average rent price increase between 105.9 and 115.81 euro compared to non-university cities. Similarly, if the city has a tourist attraction, the rent price will increase on average with a sum of between 114.59 and 158.61 euro. The Safety Index and Pollution Index have significant effects on Rent Index in models 2 and 3, but with smaller effects compared to Salary.

Overall, the models are statistically significant and explain a large part of the variability of Rent Index, with R^2s between 0.744 and 0.80 (see Table 5).

4th Model: House Price to Income Ratio (HPIR) is significant (p = 0.017) and positive, suggesting that an increase in this indicator by one unit will lead to an increase in the Rent Index with an average of 13.6 euro per month. Safety Index is not significant (p = 0.124), meaning that safety does not have a significant impact on Rent Index in this model. The Traffic Commute Time Index has a significant negative coefficient (p = 0.002), indicating that an increase in traffic will reduce the Rent Index by 9.23 euro per month on average (see Table 6).

Table 5. Summary of estimated linear models 1, 2 and 3 for Rent Index

Predictors variables	*Model 1 Rent Index*		*Model 2 Rent Index*		*Model 3 Rent Index*	
	Coeff. B (p value)	*Coeff. Beta*	*Coeff. B (p value)*	*Coeff. Beta*	*Coeff. B (p value)*	*Coeff. Beta*
Salary	0.344*** (0.000)	0.863	0.323*** (0.000)	0.809	0.36*** (0.000)	0.903
Safety Index	-	-	-	-	19.02** (0.027)	0.131
Pollution Index	-	-	-	-	-4.78** (0.031)	-0.105
University city or not	-	-	105.9* (0.053)	0.102	115.81** (0.029)	0.111
Tourist city or not	-	-	158.61*** (0.003)	0.149	114.59** (0.036)	0.108
Constant	369.02*** (0.000)		292.66*** (0.000)		314.48* (0.068)	
R Square	0.744		0.781		0.80	
F	281.89***		113.5***		74.43***	

*Note: *Indicates significance at 1% level or less, **significance at 5% level, ***significance at 10% level*
Source: authors' own calculations

5th Model: HPIR is significant (p = 0.000), suggesting that it has a strong effect on Rent Index. The Safety Index is significantly negative (p = 0.044), indicating that lower safety leads to a lower Rent Index. The Traffic Commute Time Index also has a significant negative coefficient, like 4th Model. It is significant (p = 0.01) if a city is a university one, indicating that university cities have a higher Rent Index, meaning that rent prices will increase on average by 230.76 euros per month. Tourist cities have a less significant effect (p = 0.065) but still indicate an increase in rent (see Table 6).

6th Model: HPIR and Traffic Commute Time Index remain significant variables (p < 0.05), and Traffic Commute Time Index has a significant negative effect on Rent Index. Safety Index is significantly negative (p = 0.016), suggesting that lower safety reduces Rent Index. Capital has a significant positive effect (p = 0.039), indicating that capital cities have a Rent Index higher by 197.5 euro on average. Tourist city is not significant in this model (p = 0.31), suggesting that it is not an important predictor of Rent Index (see Table 6).

Table 6. Summary of estimated linear models 4, 5 and 6 for Rent Index

Predictors variables	*Model 4 Rent Index*		*Model 5 Rent Index*		*Model 6 Rent Index*	
	Coeff. B (p value)	*Coeff. Beta*	*Coeff. B (p value)*	*Coeff. Beta*	*Coeff. B (p value)*	*Coeff. Beta*
HPIR	13.6 ** (0.017)	0.262	8.03 *** (0.000)	0.155	10.45* (0.062)	0.202
Safety	-19.85 (0.124)	-0.137	-26.26** (0.044)	-0.181	-31.68 ** (0.016)	-0.218
Traffic	-9.23*** (0.002)	-0.335	-8.48*** (0.004)	-0.308	-7.59 *** (0.009)	-0.275
University city or not	-	-	230.76 ** (0.01)	0.222	254.12 *** (0.004)	0.245
Tourist city or not	-	-	170.26 * (0.065)	0.160	97.40 (0.31)	0.092
Capital or not	-	-	-	-	197.45** (0.039)	0.184
Constant	780.68 (0.125)		1002.4 ** (0.04)		801.7 * (0.088)	
R Square	0.368		0.447		0.472	
F	18.47***		15.02***		13..71***	

*Note: *Indicates significance at 1% level or less, **significance at 5% level, ***significance at 10% level*
Source: authors' own calculations

6. Discussion

This paper discusses the impact on monthly rent prices (i.e. Rent Index) of six explanatory variables (Salary, Pollution Index, Safety Index, House Price to Income Ratio (HPIR), Traffic Commute Time Index and Cost of Living Index) and of three dummy variables referring to characteristics of European cities (i.e., university cities, tourist cities and capital or not). The data refer to a sample of 99 European cities analysed in relation to a series of variables that capture the quality of life.

In the last two decades, the role and expansion of the private rented sector have experienced important changes for both landlords and tenants. For example, in 2022, 4.6 million households in England rented their home from a private landlord, representing 19% of all households that have more than doubled since 1997 (Cromarty, 2022. p.8).

The results of our study are relevant because statistics show that in 2023 a significant proportion of European households lived in overcrowded conditions (16.8%) or in housing situated in a particularly polluted area with smoke, dust, unpleasant odours or water pollution on a regular basis (12.2%) (Horvat and Coupechoux, coord., 2024, p.76, p.112). Moreover, the English Housing Survey (2021) estimated that 23% of homes in the private rented sector in England did not provide decent living conditions (Cromarty, 2022. p.8).

Salary is the strongest predictor in 1st, 2nd and 3rd models, suggesting a strong, direct and significant relationship between it and the Rent Index. The 4th, 5th and 6th models show that variables such as HPIR, Safety, Traffic Commute Time Index, university city, and capital have significant effects on Rent Index.

5th and 6th models (with higher R^2) are more strongly explanatory than 4th model, suggesting that adding variables such as university city and capital improves model performance. Traffic Commute Time Index and Safety Index are important variables that negatively influence Rent Index, while HPIR, university city, and capital have positive effects.

This paper's results are consistent with others, for example, Papantonis et al. (2022) state that, on average, across the EU, private rental of a home consumes up to 35% of the disposable income of lower-income households and tenants must bear the constant increase of market-rate rent prices (13% between 2010 and 2019).

The limitations of our study are multiple, as both qualitative and quantitative methods are needed to understand how rental supply and rental demand affect all aspects of the local housing market and the quality of Europeans life and health. In addition, special attention should be paid to exploring and understanding rental market dynamics and the influence of these dynamics on the labour market and local economic, social and cultural development. Another limitation of our study is that we were unable to obtain real data from many other European cities for 2024.

7. Conclusion

The housing rental sector may become a very risky business in the future for various reasons: increasing costs related to the construction and maintenance of apartments, increasingly congested traffic in big cities, increasing inflation at a faster pace than wage growth, acceptance of remote work in more and more fields and very diverse jobs, expansion of online university courses (so that students can work part-time), trend towards reducing globalization, etc.

An efficient and effective rental sector of the housing market can provide numerous benefits at the individual (as tenants and landlords), social (as public socio-legal institutions) and local levels (citizenship and administrative actors), starting from balanced and fair competition (social rental versus private rental), well-being for everyone by assuring housing availability and affordability, reducing the risks of home ownership for those employed on a fixed-term basis, promoting residential mobility, workforce mobility and increasing demand, encouraging the supply of competitive housing and affordable rental prices, transparent taxation, etc.

The results of this study may be useful not only to current and potential landlords and tenants but also to persons who own several homes and need to decide whether it is better to sell them or keep them for rental. The conclusions of this study may also be useful to businesspeople involved in the real estate market, city authorities, urban planners, etc., and finally, to researchers concerned with economic development, the labour market, migration and mobility, etc.

Future research may consider using more predictor variables in order to capture more accurately the determinants of rent prices in many other European cities. A comparative analysis of cities from other continents, separately for developed economies and for developing economies, with very different national regulations of the private rental sector should not be neglected.

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