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DURATION OF THE RENTAL OFFER FOR RESIDENTIAL PROPERTY

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ABSTRACT

The rental market in Poland is underdeveloped, not subject to any statutory registers, and based primarily on small, private owners. The article estimates the duration of residential rental properties that have been reported to the listing exchange system using duration methods. Duration methods also allow the analysis to include those properties that were not rented at the time the analysis was completed, but their owners continued to report their willingness to rent. The article presents the results of the analysis of how long it takes to rent an apartment over the entire analysis period and in each year separately. The presented study is the first to examine the duration of residential real estate offerings for rent in the Polish market. Considering the entire analysis period, 25% of the reported apartments were rented in 7.3 weeks. The fastest 25% of rental offers were successful (rented) in 2019 – 4.86 weeks. The longest apartment owners waited for a tenant was in 2020 – more than 8 weeks, which was undoubtedly influenced by the lockdown of the entire country, and the change in the organization of work and study (remote work and studies, which did not require being in the city).

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1. Introduction

Housing has a dual role in the economy: on the one hand, it serves to meet the housing needs of the owner, and on the other, it is an object of investment (Kucharska-Stasiak et al., 2020). The rental market in Poland is undeveloped (although an offensive of foreign funds has been observed precisely in this sub-market in recent years) (Łaszek et al., 2021). Available apartments are either owned by communal legal entities (e.g., they are a resource of municipalities or TBS companies) or small private investors, often individuals. Rental of apartments by the first group is often associated with preferential fees, while rental by the second group of investors is understood to be free-market, at a price that is a product of the expectations of the property owner and the tenant. There are relatively few privately rented apartments in Poland. According to Eurostat (Housing in Europe, 2021), only 3.3% of residential units were tenant-occupied in 2020 (Fig. 1), and this rate declined by 1.2 percentage points compared to 2016. The low percentage of tenant-occupied housing units is characteristic of post-socialist countries with relatively low GDP (Łaszek et al., 2021).

Modeling the rental market is associated with several problems. The first and most important is the lack of reliable information. Renting is not covered by statutory reporting, there is no need to report the fact of renting a flat to the relevant register, except to the Tax Office to pay due taxes. The situation is changing very slowly, as some rental transactions are carried out with the involvement of a real estate agent, and thus the transaction is registered at least in the listing systems (MLS). However, the entries placed in the MLS by the real estate agents and their validity raise concerns. There is still a lot of resistance among Polish real estate agents to disclose the address of the property on offer, which is directly related to the type

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of agency contract signed with the client (open contract). Property descriptions are also sometimes not very precise. Another problem is updating the listing status. According to the MLS regulations, the broker responsible for the offer, at the moment of changes in the offer (e.g. signing of a lease agreement), should update it – status changed to complete. However, this does not happen. In the system, such an offer sometimes appears as withdrawn or blocked, although in reality it is rented. Despite the problems mentioned above, the database of rented residential properties created by real estate agents remains, for the time being, the best and most available. The undoubted advantage of this database is the recording of the moment when the offer was submitted to the system and when it ended (with all the limitations mentioned above). Such information makes it possible to determine the time a property has been on the market (TOM). TOM is defined as the period of exposure on the market: from the moment a property is declared available for rental until the time the offer is removed from the system for various reasons: rental transaction, withdrawal of the offer, or its blocking.

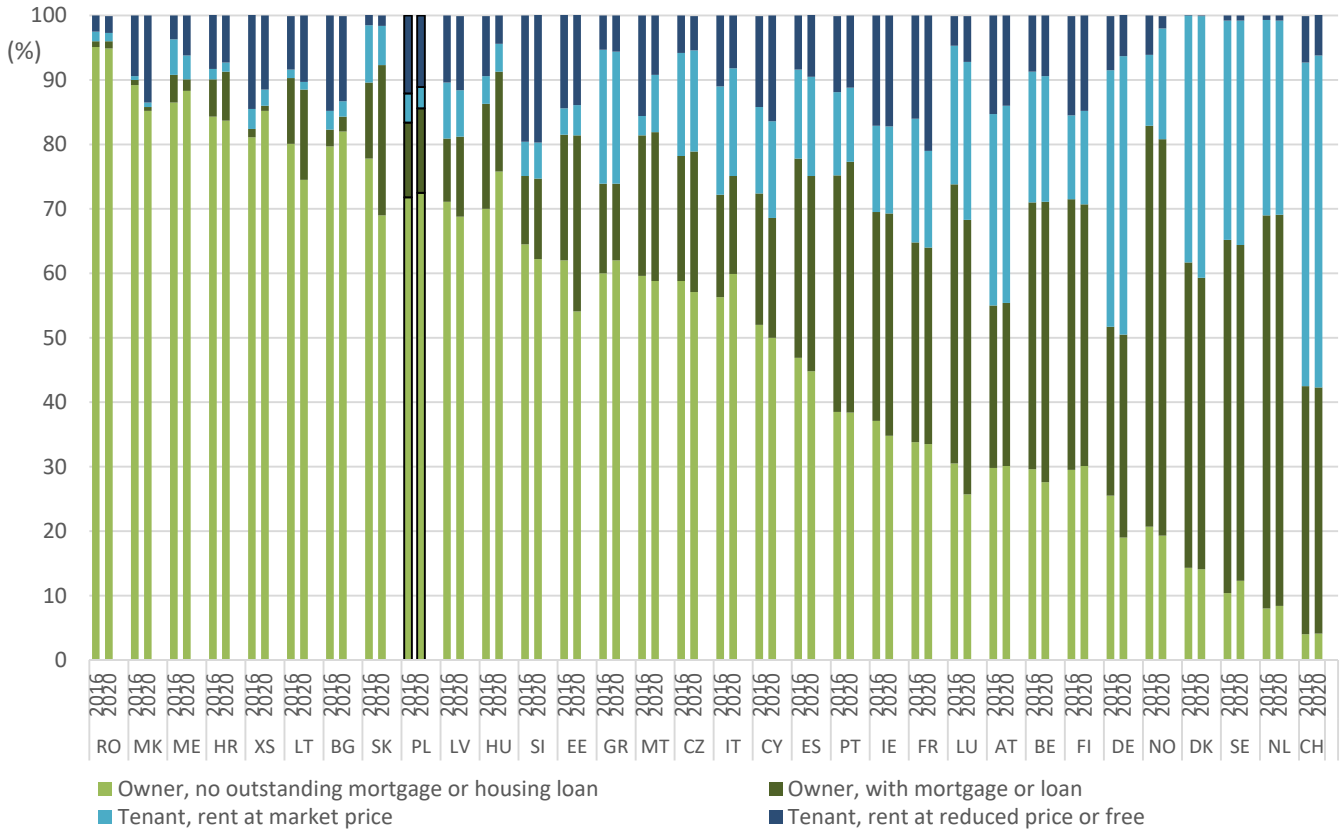


Fig.1. Distribution of population by tenure status (%) in selected countries in 2016 and 2020. *Source:* Housing in Europe(2021).

The fluidity of the rental market (tenure) has been analyzed in a few academic publications. Allen et al. (2009) analyzed the rental market for residential properties in Dallas and found that the TOM depended on the amount of asking annuities (the lower the number, the shorter the TOM; but also higher asking annuities and then lowering them resulted in a longer TOM and often a lower rental price). They also analyzed the length of stay on the market depending on the quarter the property was put on the market - properties offered for rent in the second half of the year had a longer TOM. Properties that had a long wait for tenants were: larger, newer, single-story, without a fireplace, multi-story, and had: a fireplace, security system, and fencing, as well as those with no pets.

In 2016 and 2019, a study was conducted on the impact of energy consumption on the TOM of rental flats in the seven largest cities in Germany (Cajias et al., 2016, 2019). The authors found that dwellings with relatively low energy efficiency stayed on the market longer. The well-developed German rental market (cf. Fig. 1) has also been the subject of subsequent studies related to the exposure time of dwellings (Cajias et al., 2020; Cajias & Freudenreich, 2018). TOM was negatively influenced by a higher asking rent and a

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larger dwelling size, while it was positively influenced by the age of the building, the number of rooms, and the distance from the city center (the rental time was shortened).

The dependence of TOM on the distance of rental properties from the agglomeration center was also studied by Ruf in the Swiss market (2017). He confirmed that the greater the distance, the lower the fluidity of rental properties.

Reasons for the variability in the exposure time of residential rental properties were also sought by Yilmaz et al. (2022) in selected cities in England. According to their findings, the TOM of rental properties depends on the timing of the offer of the rental property (in summer the TOM is shortest) and the start of the academic year (faster rental time), which particularly affects properties located close to academic centers.

Research on the exposure time of rental properties on the Polish market has not been conducted to date (research on the duration of residential property has only been conducted on the sales market (Gwiazda, 2006; Putek-Szeląg & Gdakowicz, 2021)). This article is the first to present the issues of the exposure time of residential rental property on the Polish market. The main objective of the presented research is to determine how much exposure time a residential property has for rent (how long the property owner waits for a tenant) and whether the year of launching the offer on the market influences the rental time. The analysis was carried out based on duration analysis methods, which take into account not only rented properties, but also those offers that were not successful, i.e. not rented, for various reasons. A comparison was also made between the average rental time of a residential property calculated based on rented properties and the rental time estimated based on duration analysis methods. The above study was preceded by an analysis of the structure of the flats submitted for rental. The study was conducted in Szczecin between 1.01.2016 and 31.12.2021.

2. Analysis of the duration of the residential real estate rental offer

Event history analysis, also known as survival analysis or duration analysis, is a set of statistical methods that are used in various scientific disciplines. Originally, these methods were used in actuarial statistics and demography. Subsequently, they have been developed and introduced by various researchers into other scientific disciplines, hence the name of the same methods in different disciplines may differ: in medicine, demography, and biology, it is referred to as survival analysis; in economics and social sciences, it is referred to as duration analysis or transition analysis; and in engineering, technology and industry, it is referred to as reliability analysis or failure time analysis.

In duration analysis, the object of study is time. The time that elapses from the beginning of an observation to the occurrence of a specific event that ends the observation on a given unit –i.e. the duration in a given state. Time can be observed: from birth to death, from birth to cancer diagnosis, from the onset of illness to death, from marriage to divorce, and from the start of a business to its bankruptcy (Bieszk-Stolorz & Markowicz, 2019; Markowicz, 2012), from losing a job to starting it again(Bieszk-Stolorz, 2013; Bieszk-Stolorz & Dmytrów, 2019; Landmesser, 2013), from entering a property listing into the MLS system to selling it (BuHamdan et al., 2021; Cirman et al., 2015; Gwiazda, 2006; Putek-Szeląg & Gdakowicz, 2021) or it is rental (Allen et al., 2009; Cajias & Freudenreich, 2018; Ruf, 2017; Yilmaz et al., 2022).

Time is a random variable *T*. The duration function (survival function) can be defined as:

$$S(t) = P(t < T) = 1 - F(t) \quad (1)$$

where:

T – duration of the phenomenon,

F(*t*) – cumulative distribution of a random variable *T*.

Function (1) determines the probability that the duration (bid validity time) for a given unit (property) will be longer than *t*. A second function that is very important in duration analysis is the hazard function describing the intensity of an event occurring at time t under the condition of survival to time *t*. The hazard function is given by the formula (Kleinbaum & Klein, 2012):

$$h(t) = \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t | T \geq t)}{\Delta t} \quad (2)$$

One of the more commonly used estimators of function (2) is the Kaplan-Meier estimator (Kaplan & Meier, 1958):

$$\hat{S}(t) = \prod_{j:tj \leq t} \left(1 - \frac{d_j}{n_j}\right) \quad (3)$$

where:

d_j – number of incidents at time t_j,

n_j – number of units at risk up to time t_j.

The duration function (1) reports the probability of

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an event not occurring at least until time *t*. The distribution *F*(*t*) expresses the probability that the event will occur at the latest by time *t*. In the study conducted, the event is the rental of a property (and its removal from the MLS database), the estimator of the duration function (3) informs what is the probability of the property remaining in the listing database – not being rented out, and the estimator of the distribution allows us to determine what is the probability of the property being rented out (removed from the database). In the study, d_j is the number of deletions of properties from the database for a given reason at the time i.e. (rental of the property or change in the owner's decision to rent the property).

3. Database

The estimation of the duration of the offer of residential property for rent was carried out on unit data obtained from the West Pomeranian Association of Real Estate Agents (ZSPON). The information concerned residential rental offers located in the Szczecin area. ZSPON is an organization bringing together almost all real estate agents operating in Szczecin. The association is the administrator of the West Pomeranian System of Offer Exchange (ZSWO), a local multiple listing system (MLS) format.

Dwellings listings that were submitted for rent (to the ZSWO system) by real estate agents between 1.01.2016 and 31.12.2021 were analyzed. The database consisted of 6,019 observations. The properties were described by a set of variables: offer number, date of the offer, date of transaction, district, street name, current offer status, offer price, last current offer price, rental price, area, number of rooms, number of the floor on which the flat in the building is located, type of kitchen, the standard of finish, year of construction of the building, number of floors in the building, whether there is monitoring, whether there is a lift and in which internet portal/press the realtor places the advertisements.

In the surveyed period, 922 properties were rented (about 15.32%), 213 were still current (as of 31.12.2021), and 1,561 were blocked, which means that, for various reasons, the real estate agent blocked the offer, e.g. reserving it for a potential tenant (Table 1). The last category (the most numerous, over 55% of all offers) were properties that were withdrawn (removed) from the system. The reasons for their removal varied from a change of mind about the property owner's desire to rent to the owner renting the property himself. The latter cases are common, as many estate agents enter into open-type agency agreements with the landlord, so the property owner can rent the property himself or with the assistance of another agent. When a transaction takes place, the property owner may (but does not have to) inform the other offices of the withdrawal of the offer, without giving a reason.

Table 1

Structure of residential property offers submitted for rent between 1.01.2016 and 31.12.2021

The current status of the offer	Number of offers
Current	213
Blocked	1,561
Withdrawn	3,323
Closed	922
Total	6,019

Source: own study.

Finally, further analysis was conducted based on current, blocked, and closed offers, or 2,696 offers. Between 2016 and 2021, an average of 450 landlords registered their residential properties for rent. The highest number of offers was registered in 2017 with 513, and the lowest was in 2016 with 416 (Fig. 2). In the years under study, an average of 154 flats were rented (approximately 36.7% of those reported). The highest number of leases was signed in 2017 and 2020 – 190, and the lowest was in 2021 – 143. The best year for flat owners and the highest efficiency of real estate agents (the highest percentage of rented properties) was 2019 – more than 43% of reported residential properties were rented.

The specific economic situation in 2020 (pandemic COVID19), resulted in the early expiry of some leases and the release of flats by existing tenants, which influenced the higher number of rental property offers reported to the ZSWO system. The year also saw a high number of leases concluded, indicating a positive response of the rental property market to the difficult pandemic situation.

Basic statistical characteristics were calculated for the properties submitted for lease in the following years, and the results were presented in the form of distributions in the analyzed years. The dwellings are described in terms of their area and the rental price of 1 m^2. The analysis was carried out for properties offered for rent and rented properties (Figs. 3–6).

The median area of flats offered for rent in the years under study remained at a similar level of 45-48 m^2 (Fig. 3). Rented dwellings were characterized by a median area at a slightly lower level: 41.5-44 m^2 (Fig. 4). Most flats offered for rent and rented were between 40 m^2 and 60 m^2 in size, indicating 2, 3

bedroom flats. Despite the many rental offers for properties with very large floor areas of more than 100 m^2, few of them find tenants. Only single rental transactions of large flats are observed in the following years, e.g. in 2017 only one rental flat had an area of 100 m^2 and in 2020, at least 100 m^2 – 3 flats. One of the reasons for the weak interest in such large flats is that at a slightly higher price, but with a similar surface area, it is possible to rent a house surrounded by a green area which proved very important during the pandemic.

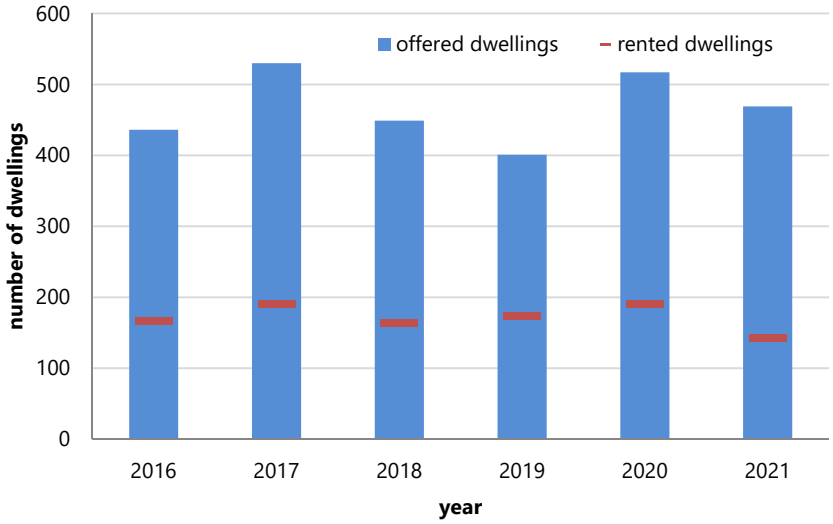


Fig 2. Residential property rental offers were reported to the ZSWO system and rented in the years 2016-2021. *Source*: own study.

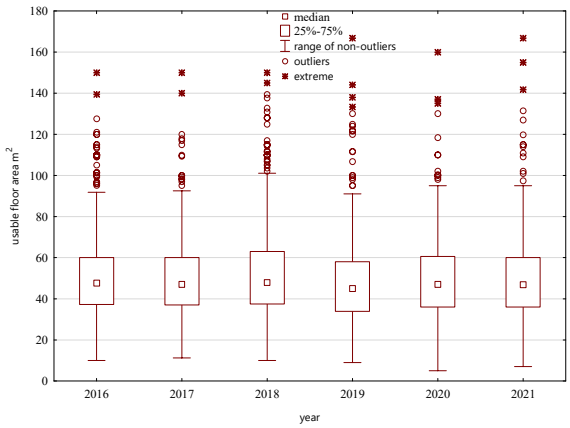


Fig 3. Descriptive statistics of usable floor space of dwellings in Szczecin in 2016-2021 (m^2). *Source*: own study.

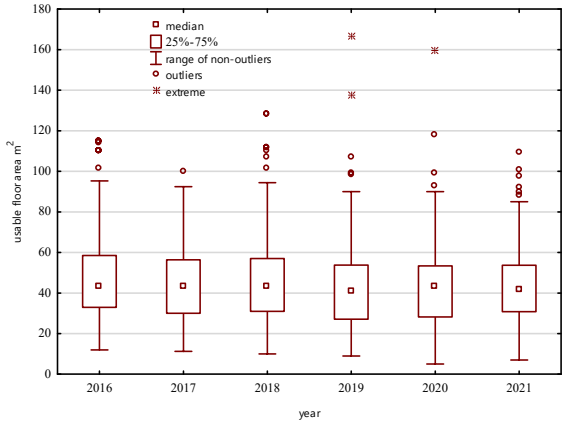


Fig 4. Descriptive statistics of usable floor space of dwellings rented in Szczecin in 2016-2021 (m^2). *Source*: own study.

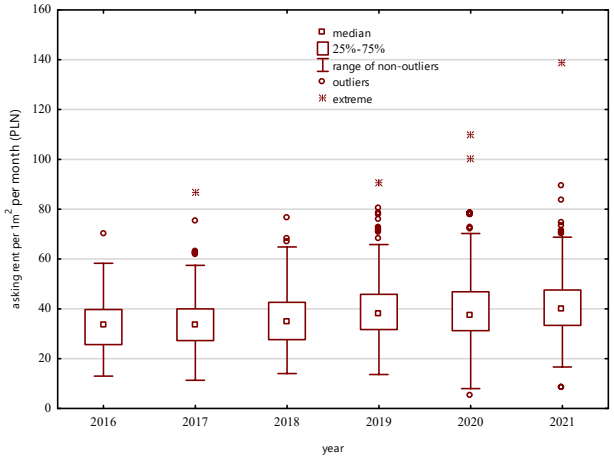


Fig 5. Descriptive statistics of asking rents of dwellings offered in Szczecin in 2016-2021. *Source*: own study.

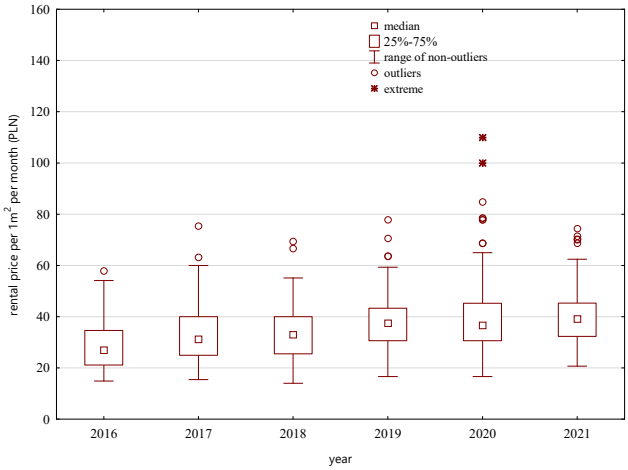


Fig 6. Descriptive statistics of rental prices of dwellings rented in Szczecin in 2016-2021. *Source*: own study.

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The median rent per m^2 of units offered and rented increased throughout the analysis period. The exception was in 2020 when a small decrease was observed (around 2%). On average, the median expected rent increased by 3.7% and rented flats by 7.7%. The distribution of offered dwellings rents is a more mixed distribution, with more outliers visible in Figure 5. The price distribution of rented flats is less diverse, with the number of outliers being lower (Fig. 6). This means that either the properties with high asking rents did not find buyers or the rental transaction was completed, but with a lower price. In each year of the analysis, property owners' rent expectations were higher than real estate leases; although in 2016 the median rent of leased flats constituted 81% of the median rent of offered flats, in 2021 this disproportion was only 2%.

The next chart shows the basic rental time characteristics of residential properties in Szczecin between 2016 and 2021, but only for properties that were rented out during the period under study (Fig. 7). The range of rental time in the years studied was very wide, from a few days (2017 and 2019) to even 21 weeks (2018). 25% of reported rental properties were rented for up to two weeks (in 2017 and 2021 even a few days shorter). Half of the reported flats found a tenant in approximately 3.5 weeks. A longer time was needed in 2020 – 5 weeks – influenced by the pandemic and the temporary freeze of the rental market. 75% of the flats submitted for rental were rented in about 8 weeks, except for two years: 2018 and 2021 – 7 weeks.

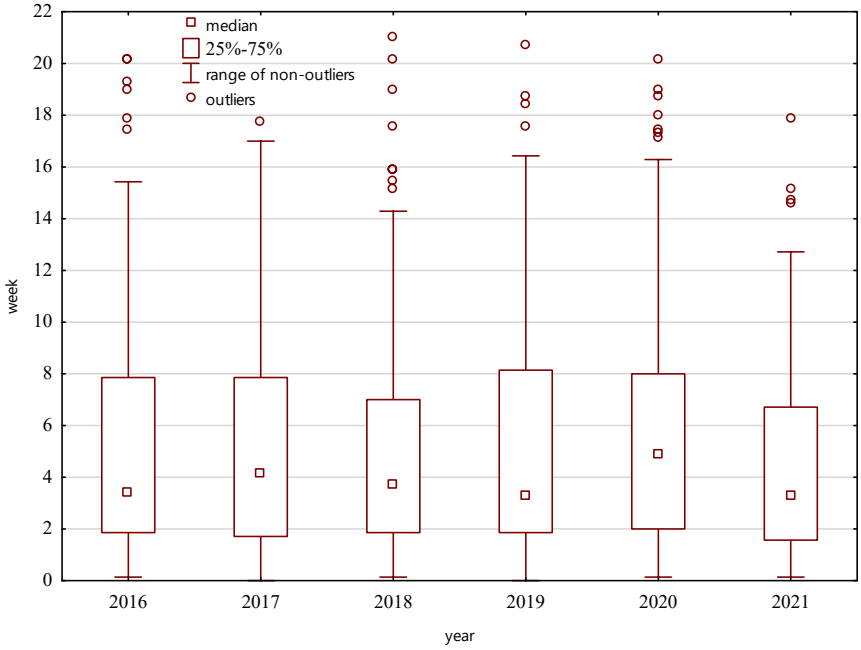


Fig 7. Descriptive statistics of the time on the market rented dwellings in Szczecin in 2016-2021. *Source*: own study.

The rental time shown in Fig.7 was calculated based on only properties that were rented out. However, properties that were still on offer from estate agents and for which the final event, the letting, had not taken place, were not included. Such cases are referred to as incomplete, censored observations (Watt et al., 1996). In the case of a censored observation, it is not possible to determine the duration of the phenomenon because information on the beginning, end, or beginning, and end of the event for the unit is missing. Such data is called left-, right- or both-censored, respectively. Random censoring occurs when individual units enter the observation field at different calendar times and the observation ends on a specific date (31.12.2021 in our case).

4. Empirical study time on market rented dwellings

Table 2 shows data concerning rental dwellings reported to the offer exchange system and leased, as well as properties that, as of 31.12.2021, had not been rented but the owners still expressed their willingness to rent them. The latter are referred to as censored observations, as the final event – rental – was not recorded for them.

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Table 2

Flats reported, rented and observations censored in 2016-2021

Year	Flats reported	Flats rented	Censored observations	
			number	share (%)
2016	416	147	269	64.7
2017	513	173	340	66.3
2018	430	145	285	66.3
2019	390	163	227	58.2
2020	487	160	327	67.1
2021	460	134	326	70.9
Total	2696	922	1774	65.8

Source: ownstudy.

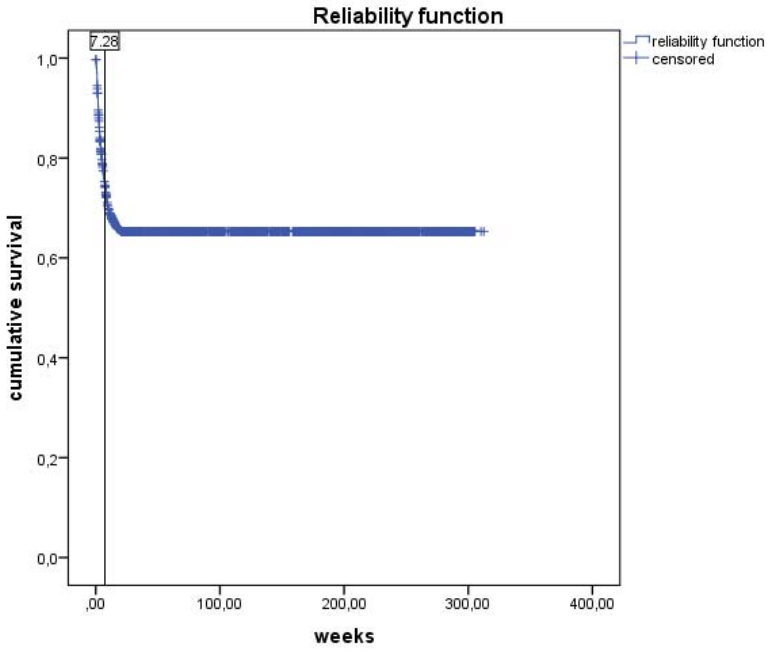


Fig 8. Survival curve of flats submitted for rent in the MLS in Szczecin system in 2016-2021. *Source*: own study.

The percentage of censored observations (active rental offers as of 31.12.2021) in the following years ranged from 58.2% in 2019 to 70.9% in 2021. In 2019, the year with the lowest number of censored observations, the fewest new residential rental offers were also reported, but the efficiency of intermediaries was higher than in the other years. The last two years of the analysis were years with a high percentage of censored observations, but also years in which lettings were restricted by the COVID-19 pandemic. Throughout the analysis period, 2,696 rental offers were submitted to the system, and 65.8% of the offers by 31.12.2021 appeared in the system as active, i.e. the owners of these properties were still reporting their willingness to rent them.

Using Formula 1, a cumulative survival curve (reliability function) was estimated for all residential rental properties reported to the MLS system throughout the analysis period, the results are shown in Fig. 8.

The survival function (Fig. 8), indicates that, in the first 7 weeks (about 2 months) after a property was listed by the real estate agency in the MLS system, there was a rapid decrease in the probability of the listing staying in the system, i.e. the owner rented the flat. If the property was not rented within two months of listing, the rate of the likelihood of letting it strongly declined in the following months – the probability of being rented in the following months diminished.

In the next stage of the research, an analogous analysis of the survival of a rental listing was carried out, but broken down for each year the listing was entered into the MLS system. A graphical presentation of the calculated survival curves (reliability functions) broken down by year is provided in Fig. 9.

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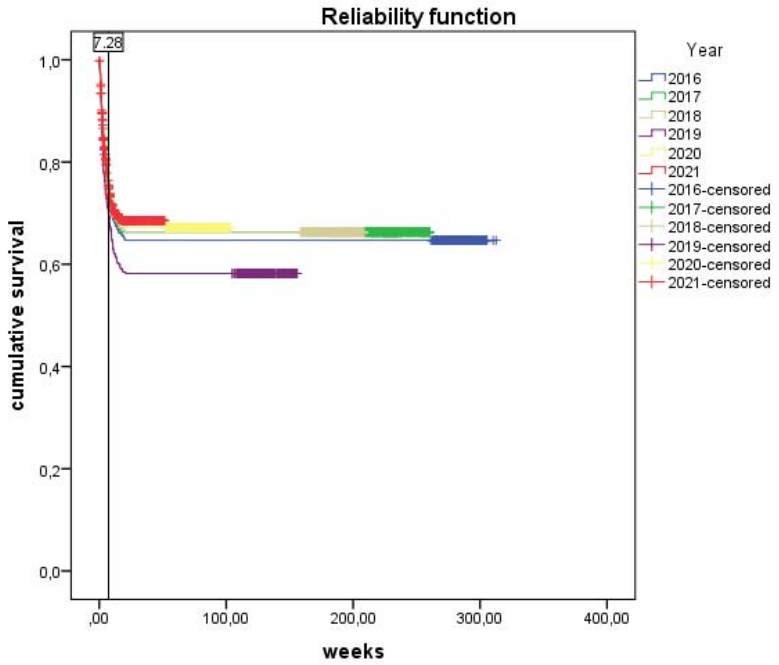


Fig 9. Survival curves of residential rental offers submitted to the MLS system in Szczecin in the following years 2016-2021. *Source*: own study.

Depending on the year in which the offer was listed on the market (rental application), the time it took to rent the property varied. Properties submitted to the system in 2019 were rented out the fastest. In 2016-2018 and 2021, the waiting time for renting a flat was up to 8 weeks. Only in 2020 was it over 8 weeks. To confirm the differences in the probability of survival curves for offers submitted in successive years, a Log-rank Test was carried out (Mantel, 1966). It confirmed that the survival curves calculated for residential rental offers appearing on the market in successive years differed significantly (χ^2 = 11895; p = 0.036). Structural parameters were determined for the estimated survival functions (Table 3).

Table 3

Structural parameters of the survival function in the following years 2016-2021

Year	Quartile1
2016	6.86
2017	7.71
2018	6.86
2019	4.86
2020	8.14
2021	7.71
2016-2021	7.29

Source: own study.

In the analyzed period, open offers (censored observations) constituted, on average, 65.80% of all offers. This has its consequences as it is impossible to determine the value of quartiles as a function of survival for the analyzed years. In the analyzed years, 25% of residential premises were rented in approximately 7 weeks. Apartments were rented the fastest in 2019, in less than 5 weeks, and the longest in 2020 – over 8 weeks. The extension of the rental period in 2020 was influenced by the lockdown period of the entire country in the spring and changes in the work and study system (work and distance learning, which resulted, among others, in the lack of students in the city who generate demand for apartments for rent) in the autumn and winter period.

The duration of apartment rentals calculated based only on properties that have found tenants (Fig. 7) is significantly underestimated about the duration of properties calculated based on duration methods (Table 3) that take into account all properties submitted for rent. Thus, using the duration of sales calculated based only on rental properties is misleading and does not take into account market conditions.

5. Discussion and conclusions

The residential rental market in Poland is poorly researched. It is a small market - it is estimated that only 3.3% of the housing stock in Poland in 2020 was leased on the open market, and in addition, there are limited opportunities to obtain information on concluded rental transactions, since there is no statutory obligation to report them, and many of them are concluded by private individuals. Opportunities to analyze this market occurred when real estate agents

became active participants. This is the only source of information where, in addition to data on the rental price and attributes of the property, it is possible to obtain knowledge about the time of exposure of the offer on the market - from the moment it is reported for lease to the conclusion of the transaction. This data is essential to correctly estimate the time required to rent a property. The duration of an offer should be estimated based on duration analysis methods since they take into account not only rented properties, but also those that were still active listings when the observation was completed.

This article presents a study using duration methods in the residential rental market in Poland and is the first study of its kind for the Polish market. The analysis used duration methods and the Kaplan-Meier estimator for residential properties reported for rent in Szczecin in the period from 01.01.2016 to 31.12.2021, through the multiple listing system. The reported listings were analyzed in two ways: collectively over the entire analysis period, and accordingly to the year, the listing was entered into the system.

The analysis of all listings combined showed that the chances of renting a property declined sharply after the listing remained in the MLS system for approximately two months. It was proven that the year a listing was placed on the market influenced the time it was exposed. In 2019, the time of stay on the market was less than 5 weeks, while in 2020 it was more than 7 weeks. Such disparities were influenced by COVID-19, as a result of which the interest and demand for rental housing decreased in 2020, as potential customers, e.g. students, gave up renting due to online teaching being widely introduced. Interesting might be the next research, in which 2022 – the year of the war in Ukraine – will be taken into account, and the answer to the question of whether the surge in interest in residential space for rent, has reduced the exposure time of a residential property.

The length of time a rental property remains on the market is also indicative of the market situation: shorter indicates higher demand for this type of property and prosperity, while longer indicates a lack of interest, which may be due to economic stagnation. The observed different rental times depending on the year the offer was launched on the market will be confronted with the economic situation.

The analyses carried out have a practical aspect - they can be of help to real estate agents - indicating that, for properties remaining in the system for more than 2 months, the probability of renting them decreases significantly. Such an "overdue" offer requires additional efforts, e.g. lowering the asking rents or changing the prepared marketing offer.

Another direction of research is to identify the factors affecting the exposure time of a residential property: its standard, area, number of rooms, and price. It will be interesting to confront the correlations occurring in the Polish rental market with those observed in other, foreign markets (Allen et al., 2009; Cajias et al., 2020; Cajias & Freudenreich, 2018). In Polish conditions, it is difficult to identify the spatial relationships they wrote about (Ruf, 2017; Yilmaz et al., 2022). This is a direct result of the unwillingness of realtors to provide information about the address of the properties in question, which, in turn, is related to the type of contracts they enter into with property owners - they are largely so-called open contracts.

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