



STATISTICAL IMPLICATIONS FOR RENT IN IRELAND

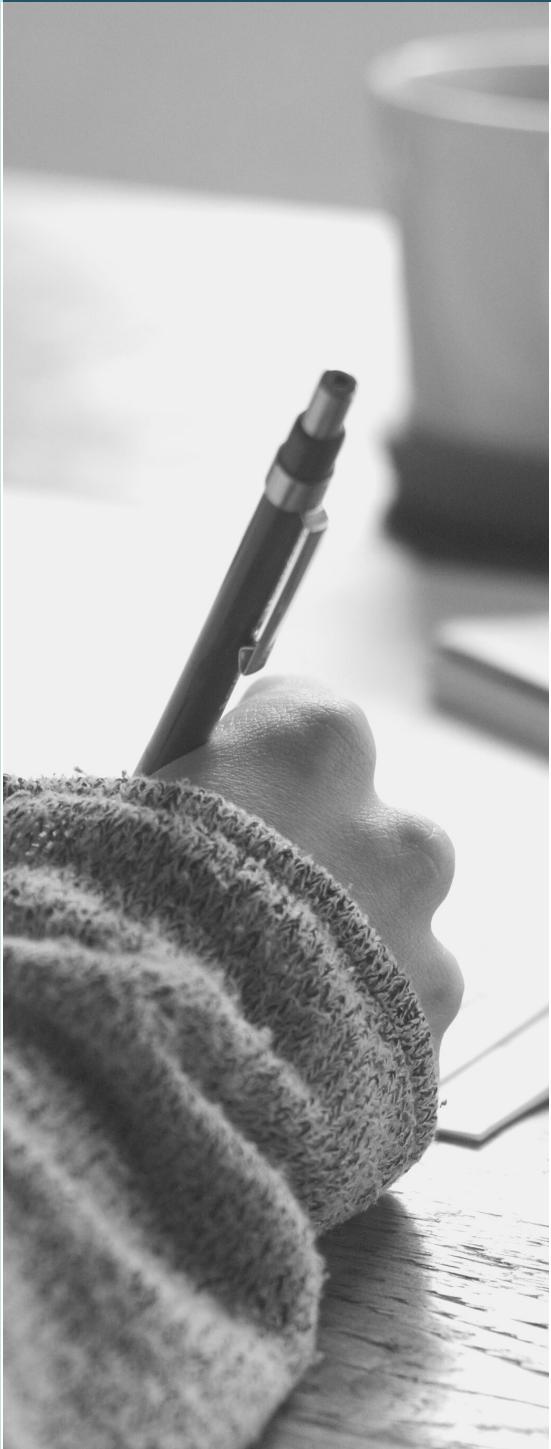
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1. ABSTRACT



Dublin, the capital of Ireland, is one of the most expensive cities to live in, in Europe. According to the website 'daft.ie', Dublin has faced inflation in the rental prices at the rate of 6.8% per Year, merely due to stagnant growth in the number of rental homes. The lease prices in Dublin for a 2 bedroom apartment have skyrocketed from 900 euros in the year 2008 to more than 2000 euros a month, as of 2021 (Ronan Lyons, 2020). While the rental prices have scaled up by 23% in the last 5 years, the minimum wage per hour stayed put which caused chaos in the student community of Ireland.

This report tests the affordability of listed properties across a time period and the fluctuations in the rental market of Ireland throughout a given period and across several locations, by crunching numbers and viewing the data through different lenses.

2. INTRODUCTION TO THE RENTAL CRISIS

A DECADE'S OVERVIEW

Supply & Demand

The standard mantra for property rentals in Dublin was 'supply-supply-and supply' during the 2010s. The growing demand for rental properties could not be fed by the prevalent listings, hence spawning a gap between the supply and demand for housing.

Thanks to Ireland's strong economic recovery, the city of Dublin was growing at a faster pace than its peers across Europe. The Irish capital witnessed a >1% growth in population every year since the 2010s, not sufficing the close to zero growth in the number of new rental properties. Despite an increase in the average household income, the cost of building homes in the country stayed high, hence marking a dry decade for rental supply in the country.

The problem of urban renting did not restrict itself to Dublin, and expanded to the surrounding counties, owing to the to and for commutation from the city to the suburbs. By the year 2020, the four larger counties of Cork, Galway, Limerick and Waterford encountered a parallel crisis. Furthermore, even the remote counties saw a steep incline in the rent, hence making housing in Ireland a subject of concern over the last decade. (Ronan Lyons, 2020)



Dataset

Every quarter, the residential tenancy board (RTB) releases the data for their own register of tenancies, revealing the actual rent being paid for the properties in the state of Ireland. In the report, we have sourced the data provided by RTB to perform statistical analysis and identify the bias in the leasing cost. (Residential Tenancies Board (RTB), 2020). The dataset taken under observation for statistical reporting lies between the time frame of 2016 to 2020, for rent across all property types and limiting the number of bedrooms to three.

The dataset describes the cost of renting properties in Ireland, in Euros. Each data point is defined by its size, indicated by the number of bedrooms, and its location in the given county. For further analysis, we classified the rental locations based on affordability, which is divided the monthly income is divided into 4 caps of - "900 euros", "1700 euros", "2500 euros" and "3500 euros". 900 and 1700 euro caps indicate the affordability in terms of part-time and full-time employment as per the minimum wage and 2500 to 3500 euros indicate the non-standardized income criterion in the data table.



5 year's

3. NUMBERS & STATISTICS

"Data can lie but the numbers don't"

In the year 2016, the mean cost to rent a property was €945.99, which escalated to €1,229.55 euros in the year 2020.

Measure	Year				
	2020	2019	2018	2017	2016
Mean	1,230	1,175	1,105	1,030	946
Standard Error	18	17	16	15	14
Median	1,174	1,115	1,049	968	871
Mode	459	764	539	416	435
Standard Deviation	521	512	485	456	424
Sample Variance	271,592	261,855	235,081	208,334	179,772
Range	2,793	2,911	2,760	2,509	2,322
Minimum	458	404	381	339	332
Maximum	3,250	3,316	3,141	2,848	2,653
Sum	1,066,023	1,054,204	1,012,173	952,640	875,046
Count	867	897	916	925	925
1st Quartile	775	736	690	642	579
2nd Quartile	1,174	1,115	1,049	968	871
3rd Quartile	1,601	1,529	1,449	1,341	1,243
IQR	826	793	759	699	664

Table 1: Descriptive Analysis

2016

Average monthly rent = €946.00
 Minimum monthly rent = €426.00
 Maximum monthly rent = € 1,345

2020

Average monthly rent = €1,229.55
 Minimum monthly rent = €538.00
 Maximum monthly rent = € 1,710

Year-wise average rent

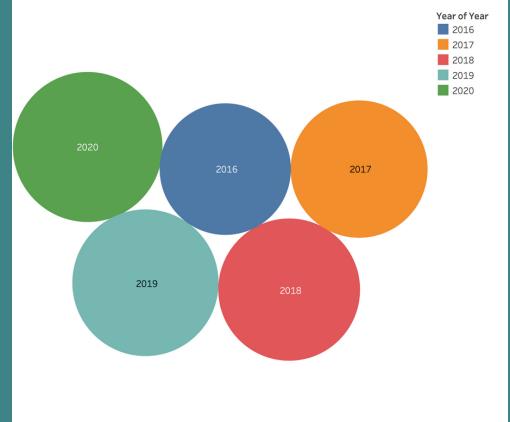


Figure 1: Year Wise Average Rent

Measures of Centrality

The average cost of rent in Ireland escalated from €946 to €1,230 from the year 2016 to 2020. While the most frequent rental value rose from €435 to €459 through the stipulated time period, the number of locations declined from 925 to 867. The Minimum observed Rent was in 2016 in Ballaghaderreen, Roscommon., whereas the highest observed rent was in Ballsbridge, Dublin in 2020.

Measures of Variability

Throughout the observational time frame, the standard deviation was much lesser than the mean value of rent, which indicates that the data is evenly spread out. For the year 2020, the First Quartile indicates that 25% of the rental prices lies below €775. Similarly, the Third Quartile indicates that 25% of the rental prices lie above €1,601, with an IQR of €826.

4. Descriptive Analytics

4.1 Average rent across all counties

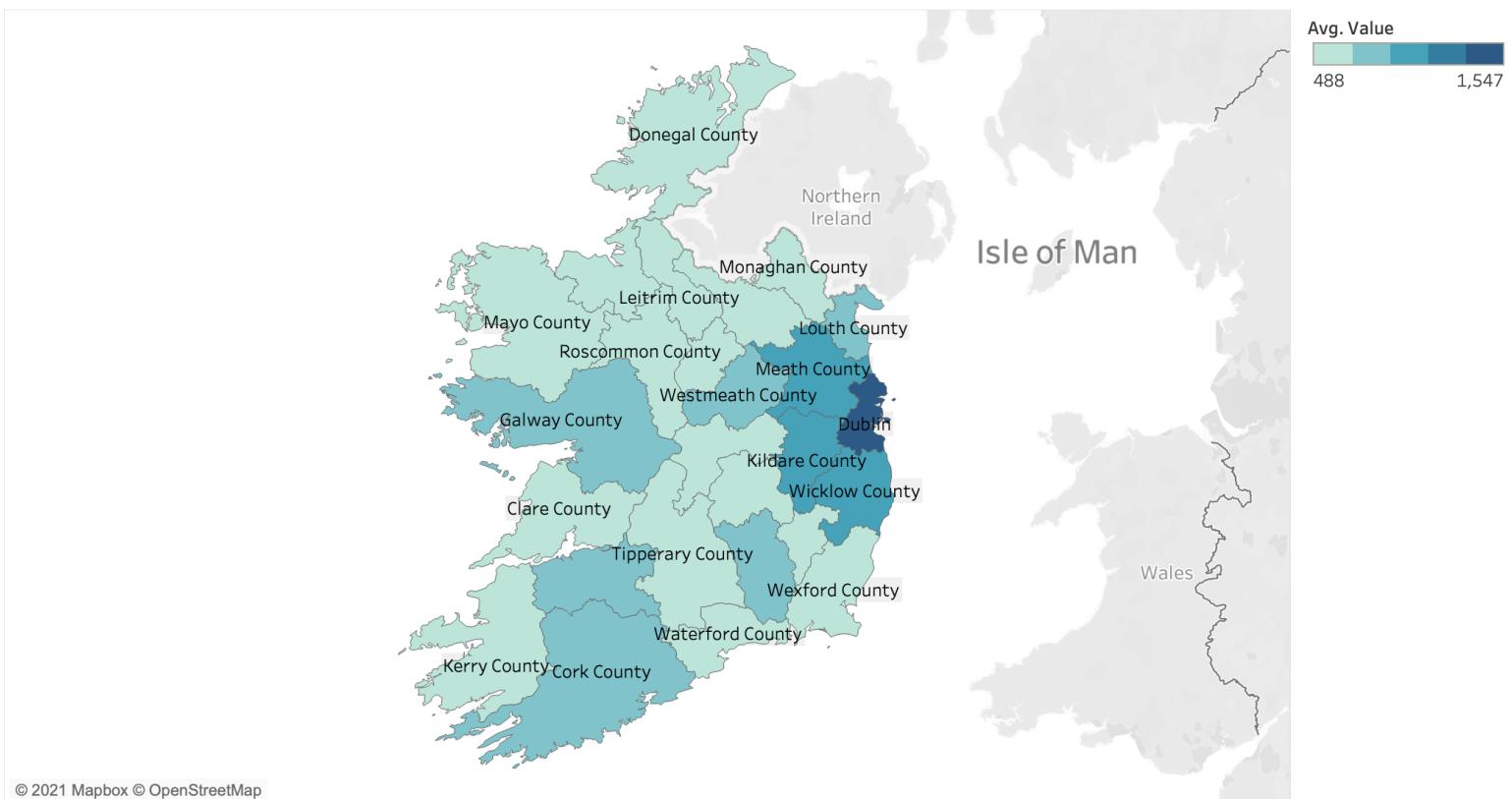


Figure 2: Average rent across Ireland

The four urban-largest counties - **Dublin, Galway, Cork, Wexford** - have the highest average rental values across all property types, followed by the suburban counties of Dublin.

COUNTRY WIDE OVERVIEW

The total average increase in rent across Ireland was 23% from the year **2016-2020**.

The county of **Louth** witnessed a maximum of 23% increase in rent.

The county of **Sligo** witnessed a minimum of 12% increase in rent.

Dublin has the highest average housing rent at €1,710 and the county of **Donegal** has the lowest average housing rent at €538.

4.2 Rent across number of bedrooms

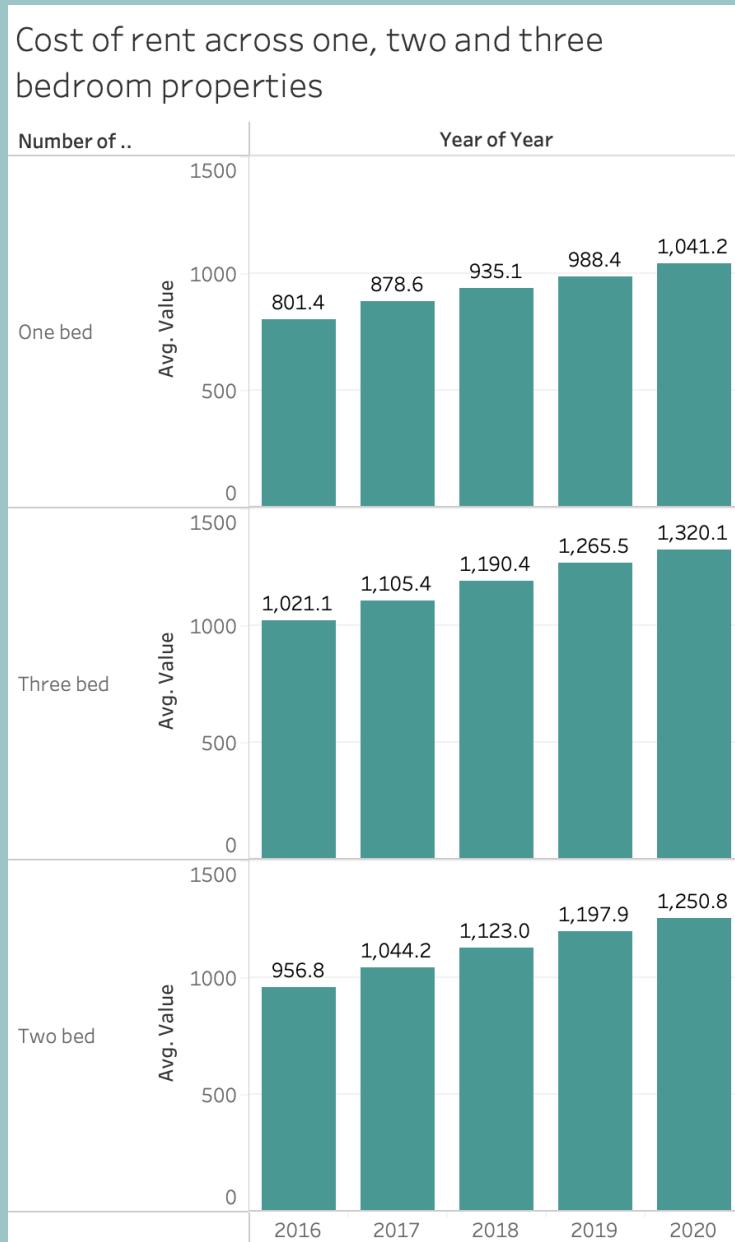


Figure 3: Average rent across different property types



From the year 2016 through the year 2020, the overall increase in the rental values rose by **23%**.

The year 2016-2017 witnessed inflation of 9% in the rental prices for one-bedroom properties. The inflation rate then dropped to 6% and 5% for the next consecutive years.

On one hand, where the cost of renting a property in Dublin kept on rising over the years, there was a 3% decrement in property prices of Ireland.



To buy or to lease?

The inequitable nature of Irish property market raise the comparison between the cost of buying and the cost of renting a property in Ireland. When leasing an apartment, the tenants not only have to incur the cost of steady inflation but also have to counter the short-notice eviction tendencies. A homeowner in Ireland is not only financially stronger than a tenant but they also enjoy the security of shelter.

Mortgage v/s Rent

RTB states that the tenant pays 40% more rent than the mortgage required to be paid by the owner. Owing to the low interest rates that the Irish banks have to offer, a resident buying a three bedroom house is required to pay a monthly mortgage return of €1,375 as compared to €1,952 that a tenant would have to pay to lease the same property.

(Conor Pope, 2019)

4.3 Year Over Year Availability



Figure 4: The number of locations available to rent across all Dublin from the year 2016 to the year 2020

In the year 2016, the maximum number of 22 properties available for rental in Dublin lied in the price bracket of €1,000 to €1,100. Over the years, the rental price observed an increment and the number of available locations declined. By the year 2020, the maximum number of properties lied under the bracket of €1,200 to €1,300 but the availability came down to 18.

In the year 2016, the total number of locations having properties available to rent across Ireland were 925, which stayed the same for 2017 and fell down to 867 by the year 2020.

The county of **Waterford** witnessed a gradual downfall of **37.93%** from 29 available locations to 18 from 2016 through 2020, followed by **Sligo** and **Galway**.

YEAR OVER YEAR AVAILABILITY

5. Correlation Between Student Wages And Rental Prices In Ireland

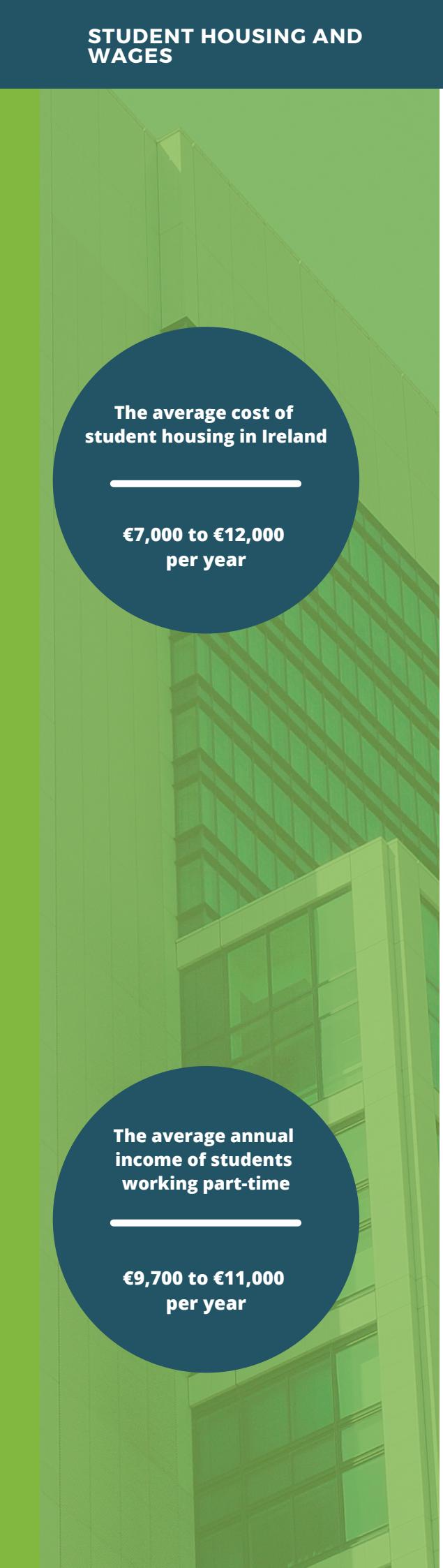
5.1 STUDENT HOUSING CRISIS

The student housing crisis in Ireland is not unheard of. For years now, university students have raised concerns regarding the limited number of housing provisions and the steep rise in rental prices. To overcome the low availability of off-campus housing, the universities made on-campus housing available to their students. These provisions only made up for the lack of listed rental properties but did not resolve the problem of rising rents as the on-campus accommodations were still highly-priced. Despite the overpriced facilitations made by the third-level institutions in Ireland, the on-campus housing became the preferred choice by the students as they did not have to go through the hassle of dealing with the letting agents and landlords, and were promised a roof throughout the duration of their course.

(CAITLÍN GRIFFIN, ELAINE LOUGHLIN, AND SHAUNA BOWERS, 2021)

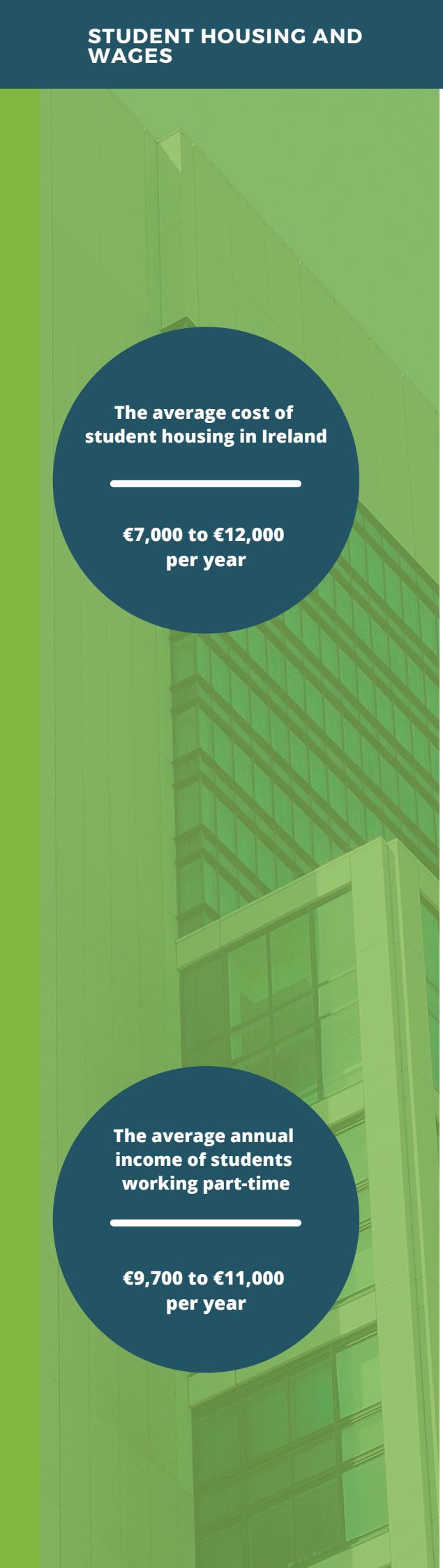
5.2 STUDENT WAGES

Most Non EU students enrolled for a degree, are only allowed to work for 20 hours a week. Because of this limitation, students opt for odd jobs that merely pay a minimum wage. Although the cost of renting an apartment kept rising through the years, the minimum wage stayed put at 10.2 euros for an hour's work. The monthly income for students comes out to be around 820 euros. On deducting the taxes, monthly bills, only a little room is left for the students to be able to pay their rent, let alone bear the cost of rental inflation.



**The average cost of
student housing in Ireland**

**€7,000 to €12,000
per year**



**The average annual
income of students
working part-time**

**€9,700 to €11,000
per year**

5.3 Student Rental Statistics



Figure 5: The number of locations available to rent across all Dublin from the year 2016 to the year 2020

STATISTICAL REPORTING

- On aggregating the dataset for the number of properties available for rent through all the years, the data is further analyzed to check affordability for students working part-time across all counties.
- In the year 2016, 52% of the listed properties could be afforded by part-time minimum wage workers, which declined to 34% in the year 2020.
- The counties of Louth, Mayo and Roscommon saw no change in the number of affordable locations.
- Considering the minimum wage for full-time workers, the analysis reported that the availability of properties dropped from 95% to 80% from the year 2016 to the year 2020.
- While Dublin has the most number of affordable one-bedroom properties available in this price range, the urban counties of Galway, Cork and Limerick have fewer affordable locations.

6. Inferential Analytics

6.1 ONE-TAILED T-TESTING

Upon observing the time series data for rents across Ireland throughout the year, we observed the average rent of Dublin to be €1,708 for 2020. It becomes infeasible for students who work part-time to afford the rent on a minimum wage. We then analyzed, the average prices of one bedroom accommodations for the year 2020 to statistically check whether the average price of one bedroom apartments was less than the average mean of all bed room apartments. We assumed that the population standard deviation was unknown, thus we deployed the use of one Tail - T testing to check our hypothesis, at 5% level of significance.

Hypothesis Testing		
Null Hypothesis (H0)	$u_0 = 1708$	The Average price of one bed room accomodations for all property types for the year 2020 to be equal to 1708
Alternative Hypothesis (Ha)	$u_a < 1708$	The Average price of one bed room accomodations for all property types for the year 2020 to be less than 1708

Population Data - All Bedrooms	
Mean	1,708
Standard Error	19
Median	1,667
Standard Deviation	371
Sample Variance	137,310
Range	1,943
Minimum	994
Maximum	2,937
Count	365

Sample Data - One Bedroom	
Mean	1,336
Standard Error	17
Median	1,293
Standard Deviation	178
Sample Variance	31,526
Range	930
Minimum	904
Maximum	1,834
Count	105

Critical Value Approach	
Sample Mean	1,336
Pop. Mean	1,708
Sample St. Dev	178
Sample Size	105
Alpha	5%
T-Statistic	-21.47
Degrees Of Freedom	104
P-value	-1.66
Reject H0?	Yes

P-Value Approach	
Sample Mean	1,336
Pop. Mean	1,708
Sample St. Dev	178
Sample Size	105
Alpha	0.05
T-Statistic	-21.47
Degrees Of Freedom	104
P-value	0
Reject H0?	Yes

1-tailed test is used to verify if rent for one bedroom apartments in Dublin is less than the mean rent for all property types in the city, in accordance with the alternate hypothesis made.

Table 2: One Tailed T-Test

Null hypothesis: The average price of one-bedroom properties for all property types for the year 2020 to be equal to €1,708.

Alternate Hypothesis: The average price of one-bedroom properties for all property types for the year 2020 to be less than €1,708.

Based on the hypothesis test result, we have strong evidence against the null hypothesis. Therefore, at a 95% confidence level, the sample data provides enough evidence to reject the Null Hypothesis that the average price to rent a one-bedroom apartment in Dublin is €1,708. This behavior is justified by the rate of inflation lowering down to 3% in Dublin. Therefore, our hypothesis test results statistically support that the rent for one-bedroom apartments in Dublin is less than the rent for renting properties with any number of apartments, for the year 2020.

6.2 NON POOLED T-TEST

Upon performing descriptive analysis, the county of Dublin was found to be the most expensive in terms of rent. After Dublin and its suburban regions, Cork was found to be the second most expensive place to rent. Hence, statistical tools are implied to test whether rental prices in Dublin are more than Cork. We deployed the use of **simple random sampling** to acquire a sample of 30 from both counties and analyzed if the average price of three bedroom apartments of Cork is equal to or less than Dublin. Since the standard deviation of the population is unknown and variances are unequal, we performed the use of Non-Pooled - T Testing to check our hypothesis at 5% level of significance:

Cork Sample		Dublin Sample	
1	771.15	30	1502.91
6	859.28	13	1551.29
15	859.28	10	1581.21
20	859.28	21	1642.01
22	859.28	8	1642.89
13	877.97	12	1700.57
18	896.59	16	1733.81
25	896.59	3	1750.94
26	928.71	4	1750.94
17	986.37	28	1765.08
24	986.37	11	1794.15
10	993.88	17	1805.57
2	1040.3	22	1808.94
4	1040.3	20	1826.06
5	1040.3	6	1874.45
7	1056.25	23	1887.98
12	1056.25	26	1927.67
16	1056.25	7	1937.78
11	1115.72	14	1971.27
21	1144.6	25	1984.93
27	1156.84	15	2009.52
23	1193.57	27	2021.5
14	1209.95	9	2213.74
28	1209.95	29	2260.31
3	1212.65	19	2271.58
9	1232.25	2	2292.53
30	1232.25	24	2319.73
19	1240.14	1	2448.17
29	1355.61	5	2457.73
8	1388.42	18	2893.86

Null Hypothesis (H_0)	$u_1 = u_2$	The Average price of three bedroom accomodations in cork is equal to dublin for the year 2020
Alternative Hypothesis (H_a)	$u_1 < u_2$	The Average price of three bedroom accomodations in cork is less than dublin for the year 2020.

Sample Cork	
Mean	1,059
Standard Error	30
Median	1,048
Mode	859
Standard Deviation	162
Sample Variance	26,121
Range	617
Minimum	771
Maximum	1,388
Sum	31,756
Count	30

Sample Dublin	
Mean	1,954
Standard Error	58
Median	1,881
Mode	1,751
Standard Deviation	318
Sample Variance	100,929
Range	1,391
Minimum	1,503
Maximum	2,894
Sum	58,629
Count	30

Table 3: Non Pooled T-Test

Non-pooled T-test			
	Population 1	Population 2	
Population mean (μ)	μ_1	μ_2	
Sample size (n)	30	30	
Sample mean ($x_{\bar{}}$)	1058.55	1954.30	
Sample st dev (s)	161.620	317.694	
Degrees of freedom	29	29	
Level of significance	0.05		
t-statistic	-13.765		
t-critical	-1.681		p-value 0.00
degrees of freedom	43		
Reject H0?	Yes	Reject Ho?	Yes

Non pooled T-test is used to compare the sample mean rent for Cork and Dublin, having different variances.

Null hypothesis: The cost of renting a 3 bedroom accommodation in Cork (μ_1) equals the cost of a three bedroom accommodation in Dublin (μ_2) in the year 2020.

Alternate Hypothesis: The cost of renting a 3 bedroom accommodation in Cork (μ_1) is less than the cost of a three bedroom accommodation in Dublin (μ_2) in the year 2020.

The degree of freedom is 43 and the test statistic is -13.765 for the left tailed test, the P-value is the probability of getting a value at t value of -13.765 or less is approximately 0. This value is less than the specified significance level of 0.05 and so the null hypothesis is rejected. The critical value approach provides evidence to reject the null hypothesis as the value of the test statistic is in the rejection region of the curve. This means that the test results are statistically significant at the 5% significance level and provide strong evidence against the null hypothesis. The result of the hypothesis testing states that it is more expensive to pay for rent in Dublin than in Cork. The plausible support to the result could be that Dublin being a larger county than Cork has more area for development, more diverse and has more economic opportunities that make it a city smaller in size but having a larger stance, leading to elevated rental prices.

6.3 CONFIDENCE INTERVAL

Confidence Intervals			
Cork		Dublin	
Sample Mean	1,059	Sample Mean	1,954
Sample Size	30	Sample Size	30
Sample St. dev	161.62	Sample St. dev	317.69
Confidence Interval on Cork	0.95	Confidence Interval on Dublin	0.95
t	2.05	t	2.05
LL(Confidence interval Lower Limit)	998.20	LL(Confidence interval Lower Limit)	1835.68
UL(Confidence interval on Upper Limit)	1118.89	UL(Confidence interval on Upper Limit)	2072.93

Table 4: Confidence Interval

The confidence interval of Cork sample is between 998.20 and 1118.89, which indicates that at 95% confidence the mean Cork Rent(μ) of 2020 lies between 998.66 and 1119.34. Similarly for Dublin, at 95% confidence the mean Dublin Rent(μ) of 2020 lies between 1835.39 and 2072.61.

7. CONCLUSION

The key insight gained on performing statistical analysis on Ireland's rental database is that the stagnancy of the rental market is a result of the slower rate of development under the housing sector, compared to the economical development of the country. With Dublin being the capital city, the city itself is bottlenecked and the urbanization has encroached on the surrounding counties of Dublin, resulting in the downfall of the rental market in the suburbs as well. On overlooking the futuristic data, it has been noted that the inflation of rental prices in Dublin will soon fall to a lower percentage due to the newer residential opportunities being built in the city and the metropolitan region of Dublin. While Dublin will soon experience a calm after the storm, the other larger cities of Cork, Galway, Limerick and Waterford will stay under the shadows of the escalating housing crisis while the inflation stays put in the cities.

The other pain point under observation was the student housing crisis. Not long back, volunteers from several other universities in Ireland protested against the sky-rocketing leasing prices and the scarcity of available properties for rent in the cities. The student accommodations, both on and off campus do not provide much financial relief. This will create a biased demand and supply link and intensify the prevalent student housing "disaster".

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TEAM REFLECTIONS



Arnab Das

- Exploring and finalizing the topic and it's dataset.
- Descriptive Analysis of Bedrooms.
- Confidence Interval
- Referencing and Citation.

Irtaza Tariq

- Finalizing The Dataset.
- Performing Exploratory Data Analysis, including additions of wage clauses.
- Preparation of Excel Sheet, Conducting All Descriptive and Inferential Statistics.
- Checking Normality of Dataset
- Data Visualization through Tableau.
- Report Finalization and Conclusions.

Prachi Mate

- Exploring and concluding the dataset
- Concluding key questions for statistical analytics
- Visualising dataset using Tableau
- Reading news articles and journals for conclusive research and reasoning the results
- Creating, drafting and formatting the report
- Referencing and citing resources