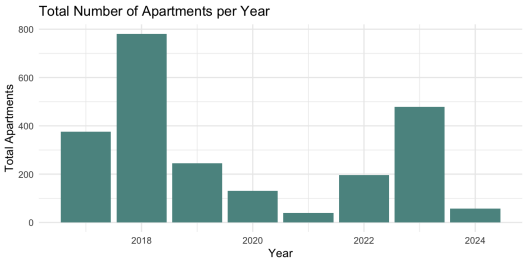
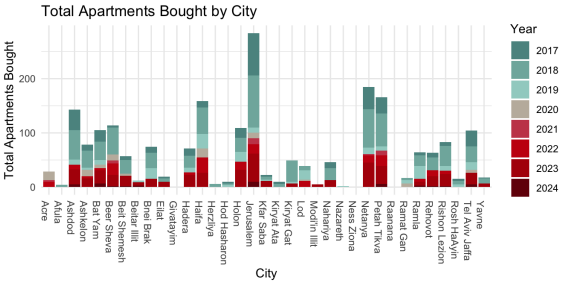
Coalition Support and Public Housing Purchases: A City-Level Analysis

Group #4: Shahaf Harari, Ofek Zini, Dorri Caspi and Daniel Korkevados

Section 1 - Introduction:



Plot 1



Plot 2

Public housing is government-owned housing units provided to low-income individuals and families who cannot afford market-rate housing. Currently, public housing companies which are mostly government-funded, own around 50,000 apartments across Israel. The Ministry of Construction only allows eligible individuals to obtain housing in their registered city, leading to around 4,300 people on the waiting list. Additionally, 25,000 more individuals are eligible to enter the waiting list, facing an average wait time of 3 to 4 years, with longer waits in Jerusalem and central regions. Another problem is the inconsistency between the Ministry of Finance, which assigns a fixed budget, and the Ministry of Construction, which determines the number of purchases. This discrepancy results in the government failing to buy the number of units it has pledged, leading to a shortage of public housing units. In addition, examining the total number of apartments bought in each city reveals significant variation, with some cities experiencing a high volume of purchases while others see very few. This situation prompts questions about the government's public housing policy, leading to our research question:

Is there a relation between coalition support of a city to public housing purchases in the same city?

Since 2015, Israel has had 6 national elections and 4 different governments. While previous research focused on apartment shortages and long waiting times, we aim to investigate if there's a hidden government agenda influenced by the support of each city. We will combine public housing data (property purchases) and election data (from 2015-2022) to find patterns indicating such policies.

Section 2 - Data overview:

Our data is divided into 2 main categories: **Public housing** - 3 datasets. The first shows vacant apartments, the second shows available apartments in each city and the third shows the amount of purchases in every city from 2017 to 2024. In all 3 data sets each city is identified by name and Lamas code.

Election results - 6 datasets. The remaining datasets has information about each election for the israeli knesset from 2015 until 2022, (knesset 20 - 25), each dataset shows results of each ballot in a city, the city ID(same as Lamas), the amount of eligible voters, the amount of voters and the amount of votes for each party.

Later we've web scraped from Bituah Leomi's statistics site the amount of citizens eligible for public housing in each city by different criteria, such as families with many children and elderly, to further investigate our results by trying to find different confounders (will be further discussed in section 3).

Section 3 - Methods and results:

Feature engineering: To further define our explaining variable, we had to develop a feature that calculates the coalition support of each city. Our coalition support index is calculated as follows: out of the 4 most voted parties in each city, if a party was a part of the coalition we add its vote

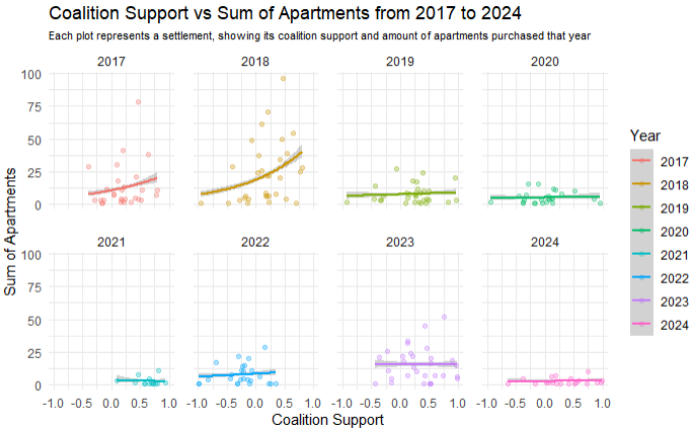
percentage to the index, if it was a part of the opposition, we subtract the vote percentage. By doing so we can identify cities that fully support the coalition (index closer to 1) or opposition (where the index is closer to -1) and cities that are split in the middle (index is around 0). We calculated this index for all six election datasets, based on the coalition formed in each respective year. Afterward, we chose to focus primarily on the purchases dataset because it tracks each city over time. To accurately identify the coalition support index for each city, we integrated the relevant index based on the year of purchase.

The model: We sought to find a correlation between coalition support and public housing purchases using a regression model. After exploring our data, we determined that linear regression won't fit the data properly knowing we are not only interested in the sum of purchases but also the frequency of it in each city, hence we chose to use the Poisson regression model. Assuming a Poisson distribution for the number of units purchased (sum_apartments) over the years, we ran the regression with coalition support as the explanatory variable.
The model results are:

Coefficients	Estimated	Std error	Z value	P value
Intercept	2.33383	0.02399	97.3	2*e^-16
Coalition support	0.34278	0.5009	6.844	7.72*e^-12

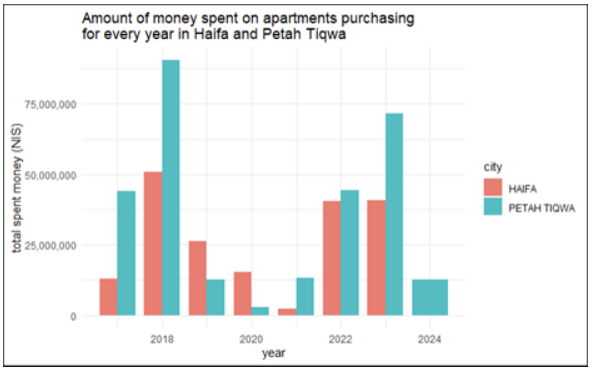
Residuals:
MAE - 10.0363
RMSE - 14.4539

Poisson regression performs a linear regression in the log space of the predicted variable. Thus, for each unit increase in coalition support, the state purchases $e^{2.67}$ new public housing apartments. This indicates a statistically significant correlation between coalition support and housing purchases. Specifically, higher coalition support predicts more public housing units purchased in that area (see plot 3). An interesting insight we discovered is that from 2017 to 2024, most purchases were made in coalition-supported cities (see plot 3), even when the trend appears balanced overall. Additionally, before Israel entered the political turmoil of 2019-2022, this pattern was more evident in 2017 and 2018, where Israel had an annual budget.



Plot 3

Comparison between two similar cities: We wanted to take two cities that have similar population size and number of citizens who potentially need a public housing unit, but a different coalition approval rating, then perform a comparison between the purchases in those cities. We found the cities: **Haifa** – with 253292 eligible voters and **Petah Tiqwa** – with 197815 eligible voters. Both are in socio-economic cluster 7 according to the Lamas, both have a similar number of eligible voters (Haifa has a bit more), and both are politically divided – but overall Petah Tiqwa has higher coalition support than Haifa over the last 8 years. We checked how much money the country has spent on apartment purchases in those cities over this period of time, and we can see the result in Plot 4. However, there are other factors that can affect our results, like how many citizens ask



Plot 4

In every year the government managed to pass a budget (2017- 2018, 2022 - 2024), the country invested significantly more money to buy properties in Petah Tiqwa, except 2022 – when the government was changed.

for public housing in each city – which is private information, and maybe the socio-economic cluster isn't accurate enough as an indicator.

In summary, the current government and the government of 2017-2018 (which was very similar) invested much more money in a city that supports it than another city with similar properties that supports the opposition. However, it remains premature to make any definitive judgments on that subject.

Conclusions: After examining the residuals and variance of our model, we concluded that while there is a significant relationship between public housing purchases and coalition support, other variables also intervene purchases. We investigated these further by using the data from Bituah Leomi to estimate the number of individuals eligible for public housing in each city to determine using Poisson regression if this is another influencing factor:

Coefficients	Estimated	Std error	Z value	P value
Intercept	3.970	1.042*e-01	38.103	< 2*e^-16
Families with kids allowance	-6.245*e^-5	8.065*e-6	7.743-	9.74*e^-15
Families with more than 4 kids	1.043*e^-4	2.077*e^-5	5.023	5.08*e^-7
Number of elderly	7.705*e^-5	5.553*e^-6	13.876	< 2*e^-16
Number of disabled children	7.454*e^-5	3.423*e^-05	2.178	0.0294
Socio-economic cluster	-1.696*e^-1	1.837*e^-2	-9.234	< 2*e^-16

Residuals:
MAE - 24.716
RMSE - 33.287
Residual SD- 33.773

Since eligibility data is private, we assumed that individuals from these certain categories would be eligible for a unit. If this assumption holds, these variables also affect purchases. However, there remains unexplained variance, which we will discuss further in section 4.

Section 4 - Limitations and Future Work:

Limitations in our research- The data we used is limited, summarising public housing purchases in each city over the past eight years. Purchase policies are long-term projects, so to achieve better results, we need data from before 2017, which isn't available on gov.il. Additionally, the current data only includes the number of units purchased. More variables and detailed data such as number of units who are candidates for purchase, and what is the required amount of units each city needs, would be essential for us to improve our estimation of public housing purchase policies for our analysis.

Furthermore, we've encountered temporal data gaps during 2019-2021. This period saw substantial political instability, including a nearly two-and-a-half-year absence of an annual budget, alongside the global COVID-19 pandemic. These events likely impacted public housing purchases, potentially affecting the reliability and interpretation of our findings.

Future work- Given more time, we would try to scrape additional data on public housing purchases from before 2017 to determine if the observed pattern is long-term or specific to the last eight years. In addition we would contact the Public Housing Forum to obtain more detailed information that the data sets did not provide (see limitations).

We would also improve the model discussed at the end of section 3 by refining our estimates of eligible individuals and identifying more intervening variables, such as the influence of lower average unit prices on public housing purchases.

Appendix:

Bibliography:

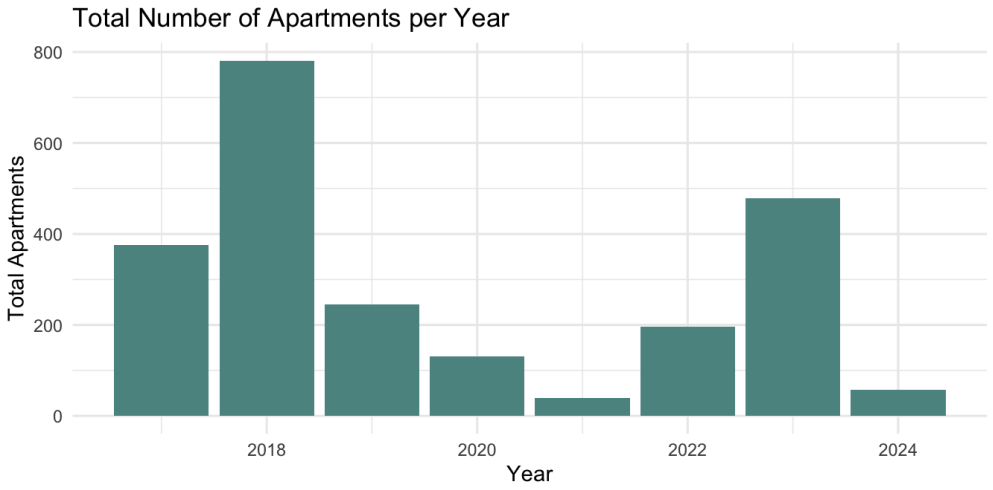
The public housing report for 2022
Eligible for public housing and rent assistance 2021- Knesset.gov.il
Who's trying to destroy public housing- Yaron Hoffmann-Dishon

Our git repo (including all our data):

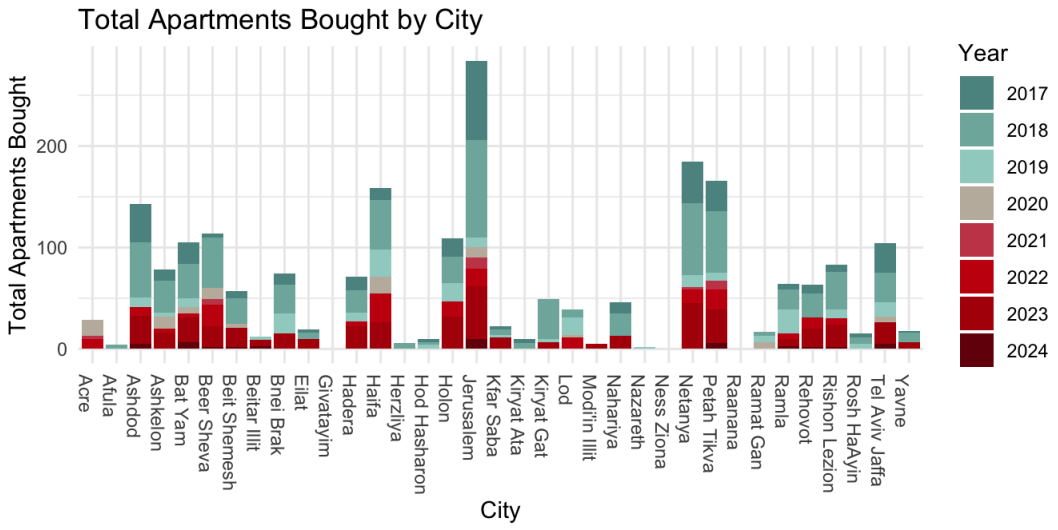
https://github.com/dorricas/public_housing_procurement_analysis

Plots:

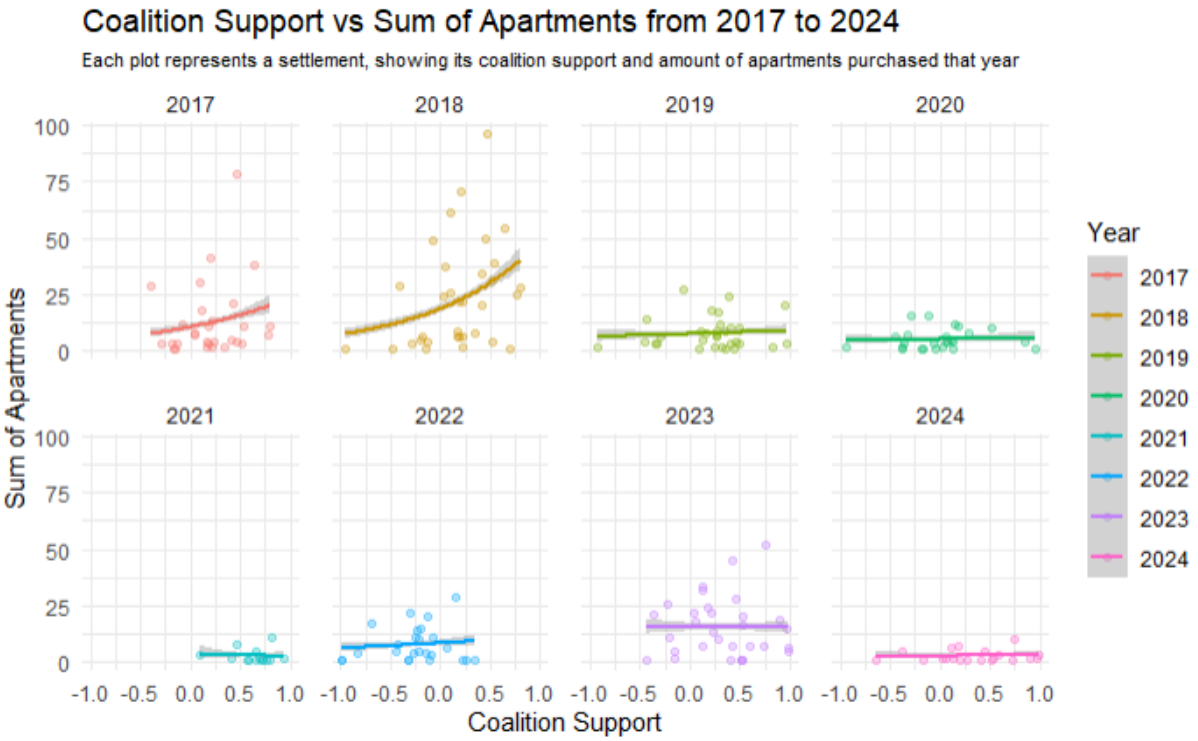
Plot 1:



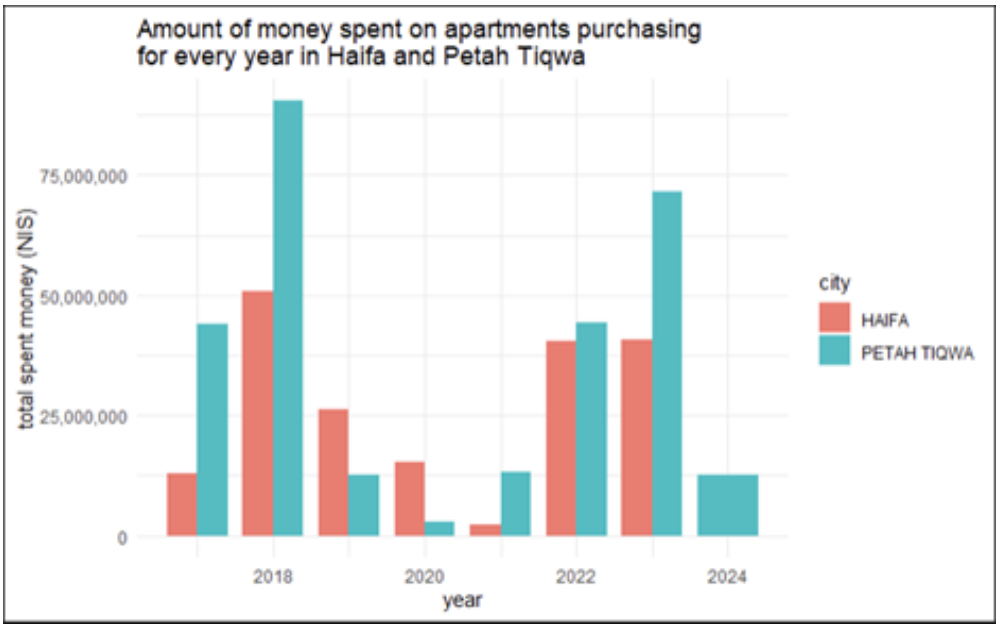
Plot 2:



Plot 3:


Coalition Support vs Sum of Apartments from 2017 to 2024
Each plot represents a settlement, showing its coalition support and amount of apartments purchased that year
2017
2018
2019
2020
2021
2022
2023
2024
Sum of Apartments
Coalition Support
Year

Plot 4:


Amount of money spent on apartments purchasing
for every year in Haifa and Petah Tiqwa
total spent money (NIS)
year
city
HAIFA
PETAH TIQWA