

SELLERS' WILLINGNESS TO COMPROMISE ON PRICE –
A NOVEL INDEX TO IDENTIFY PRICING TRENDS IN THE
HOUSING MARKET

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Abstract***

This paper offers a novel index to identify pricing trends in the housing market, based on the difference between sellers' initial asking price and the final transaction price of the same property (the "Willingness to Compromise" Index). To construct this index, we use data from "Yad2", the leading classified ads website in Israel, on individual ads for real estate properties offered for sale and data reported by the Israel Tax Authority on final transactions. We then apply the index to 28,933 real-estate transactions in 28 Israeli cities between 2015 and 2017. Our analysis documents a significant increase in the willingness to compromise between the third quarter of 2016 and the third quarter of 2017. This increase was observed in nearly all cities in the sample, including when controlling for property characteristics. Our findings also suggest that the increase in willingness to compromise was greater in cities where lotteries associated with the government-subsidized "Buyer's Price" project were held, compared with other cities.

1. INTRODUCTION

Housing prices have been the focus of the public and media discourse in Israel in recent years due to the steep rise of prices in the housing market. According to the Home Price Index published by Israel's Central Bureau of Statistics (CBS), prices increased by 47%

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from 2011 to October 2017.¹ With the aim of reducing housing prices or at least slowing down their growth rate, several policy initiatives have been proposed, only some of which were actually implemented. Such programs include the Zero VAT program, the government subsidized Buyers' Price program, increased tax on investor-held homes, and increased tax on owners of a third home.

This work proposes a new index for identifying price fluctuations in the real estate market, the Willingness to Compromise ('WTC') Index. The proposed index is based on the difference between sellers' initial asking price and the final selling price for the same real estate property. We argue that changes in the WTC Index across geographic locations and over time may reflect changes in the underlying trends in the housing market, and may also be used to identify changes in sellers' and buyers' bargaining power, especially in the second-hand home segment.² Thus, an increase in sellers' willingness to compromise on the final transaction price may indicate a cooling down in the real estate market accompanied by better bargaining power for buyers. In contrast, a decline in willingness to compromise on the selling price may suggest that the market expects that prices will rise, and thus provides better bargaining power for sellers. We believe that the proposed WTC Index may assist policymakers and real estate market participants to identify market trends, and may provide valuable information above and beyond the price indices that are currently used in analyzing the real-estate market.

Common price indices, such as the Consumer Price Index, typically focus on products such as bread, gasoline, or specific mobile phone models, and track how the price of a given item changes over time. In contrast, the index proposed in this work is mostly relevant for products or services in which the features of the product under investigation are not fixed over time. In such cases, and specifically in the market for second-hand homes where each home has unique features (such as size, physical condition, precise location, and view), it is inherently difficult to assess how the price of the same product changes over time. Put differently, it is difficult to determine whether observed differences in the average prices of homes sold in two time periods are driven by classic economic factors such as a decline in demand or increased supply, or alternatively are driven by a compositional change in the nature of homes sold in the two periods (e.g., homes sold in the later period may be smaller or of inferior physical condition).

¹ See the Home Price Index at http://www.cbs.gov.il/reader/?MIval=%2Fprices_db%2FPriceInd_M_OneSeries_OneBase_H.html&Separated=11040010&MyCode=11040010&BasePeriods=28%2F01%2F1994&DataType=Ind&Years_1=2011&Years_2=2017&Months_1=1&Months_2=10&Subjects=45&MyPeriod=m&Radio1=1_3&FileType=1. Notably, the Central Bureau of Statistics also reported a slight decline in home prices in September and October 2017.

² Below we also present findings related to the time that elapsed from listing to sale (shelf life), which also serves as an indication of the state of the real estate market.

The 2018 report by the CBS's Advisory Committee on Construction, Housing, and Real Estate (1), which is based on academic literature on this topic, discusses two common approaches that are designed to address the inherent heterogeneity typical of the housing market: the hedonic approach and the repeat-sale approach. The Committee notes that the hedonic approach is commonly used in developed countries and is also used by the CBS in Israel. This method tries to control for the differences among real-estate properties by estimating a regression equation in which the transaction price is the explained variable, and observable home characteristics (such as number of rooms, number of floors in the building, or geographic location) are the explanatory variables. By including a rich set of covariates, this approach attempts to mitigate the inherent differences across homes. As the Committee notes, the main shortcoming of the hedonic approach is that many characteristics of sold properties are unavailable to researchers, and therefore this approach may nevertheless yield inaccurate estimates. The concern about missing information is quite fundamental in this market. In particular, even if researchers had access to additional home features (such as elevator, year of construction, and additional building rights), there would still remain features (e.g., the physical condition of the home, the view from the home, and the state of the building) unavailable to researchers which could potentially affect the price. It is likely that these unobservable features are particularly relevant in transactions involving second-hand real-estate properties. To the extent that these unobserved features play an important role in determining the transaction price, the results of the hedonic model may fail to accurately reflect the actual price trends in the real estate market.

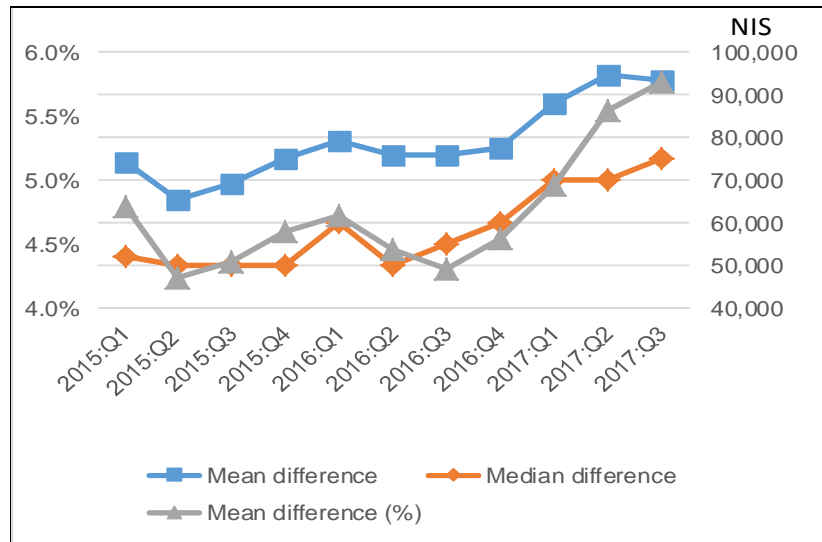
In contrast to the hedonic approach, the repeat-sales approach (also known as the Case-Shiller approach) aims to control for the inherent differences across real-estate properties by examining the changes in selling prices of properties that have been sold several times. This approach indirectly takes into account a home's unobservable characteristics by assuming that these unobserved characteristics of properties are fixed over time. In other words, this method assumes that features such as noise, view, or physical condition remain constant over time, and hence over time differences in the selling prices of the same home may provide an indication of underlying fundamentals in the real estate market over the two periods. The repeat-sales approach also has shortcomings. First, it is based only on transactions of properties that were sold multiple times, and therefore covers a relatively small proportion of all transactions in the housing market. Homes sold multiple times do not necessarily constitute a reliable representation of all transactions in a specific geographic location. Second, the assumption that a home's characteristics remain constant over time is not necessarily correct. For example, renovations performed between sales can be expected to affect home prices, and bias the repeat-sales index. Nonetheless, despite these shortcomings, the resale approach is commonly used in the United States and in other countries where there is a large number of transactions involving the same property.

We believe that the Willingness to Compromise Index adequately deals with the shortcomings of both indices discussed above. First, the WTC Index addresses the hedonic index's heterogeneity concerns by examining differences between sellers' initial asking price and the final transaction price of the same property. The WTC Index examines changes in the price of the same property over time. It therefore effectively takes into account the observed and unobserved characteristics that caused each property owner to set the initial asking price and that are also reflected in the final purchase price of the same property. In this manner, the WTC Index enables us to examine how the propensity to compromise (between the listing publication date and the date of the sale) has changed over time and to be less concerned about changes in the composition of properties sold in the market between two time periods. Second, the WTC Index is advantageous compared to the repeat-sales approach because it is not limited only to properties that were sold multiple times. Moreover, since the period between the advertisement publication date and final sale date is relatively short, potential price effects caused by extensive property changes (such as renovations) are less relevant in the case of the WTC Index than in the resale approach.

In this paper we use the proposed index to examine changes in the second-hand housing market in Israel. To construct the index we rely on two main data sources. Our first data source is the Yad2 website, the leading classified ads website in Israel. The data obtained from Yad2 include rich information on ads for homes for sale. The second data source is the Israel Tax Authority which collects information on actual real-estate sales transactions in Israel. We use these two datasets to match data on transactions from the Tax Authority database to the corresponding ads in the Yad2 data. The matching algorithm was applied to second-hand home sales in 28 major cities in Israel³ between 2015:Q1 and 2017:Q3. The transactions in these 28 cities constitute 63% of the total home sales in Israel during that period, and 66% of the total second-hand home sales in Israel in that period. In total, the matching procedure yielded 28,933 matched transactions, which account for 26% of the second-hand home transactions in these cities during that period. The primary finding of the analysis is that sellers' willingness to compromise on their asking price increased significantly between 2016:Q3 and 2017:Q3. As can be seen in Figure 1, the change reflected an additional 1.5% increase in sellers' willingness to compromise on their original asking price, rising from 4.3% in 2016:Q3 to 5.8% in 2017:Q3. In absolute terms, this corresponds to a decrease of NIS 20,000 in the selling price. While the median difference between asking price and selling price was NIS 55,000 in 2016:Q3, the median difference in 2017:Q3 was NIS 75,000.

³ The cities examined in this study were selected according to population size. The complete list of cities is: Ashdod, Ashkelon, Bat Yam, Be'er Sheva, Beit Shemesh, Bnei Brak, Eilat, Givatayim, Hadera, Haifa, Herzliya, Hod Hasharon, Holon, Jerusalem, Kfar Saba, Kiryat Ata, Kiryat Gat, Lod, Modi'in, Nahariya, Netanya, Petah Tikva, Ra'anana, Ramat Gan, Ramle, Rehovot, Rishon Letzion and Tel Aviv-Jaffa.

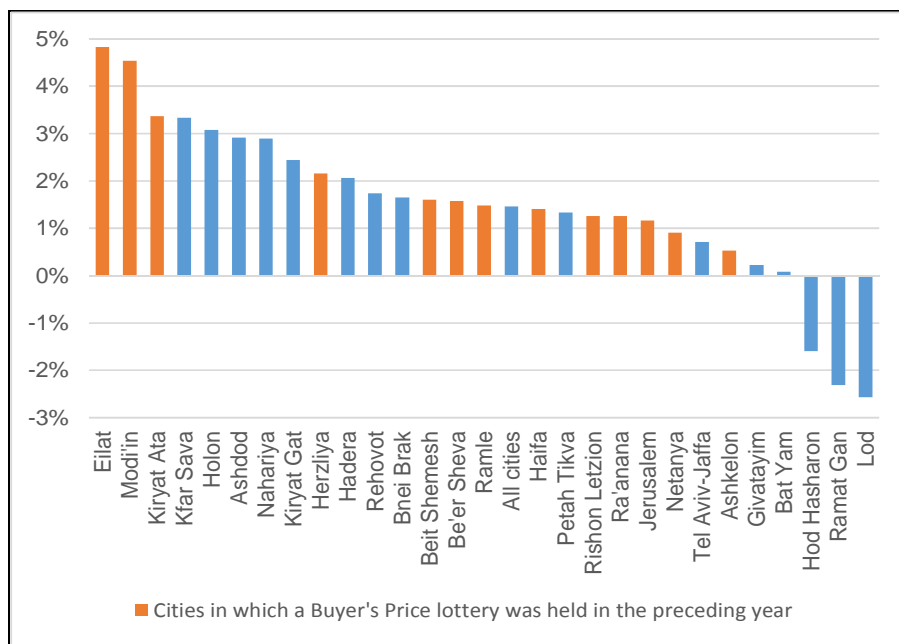
Figure 1
Willingness to compromise on price (Difference between original asking price and final selling price), all cities



As can be seen in Figure 1, 2015:Q2 offers an interesting reference point. In this quarter, home sales in Israel increased significantly, in response to expectations of a tax hike on real estate investors (the tax hike was effectively imposed in the end of June 2015). Accordingly, in this quarter, sellers' willingness to compromise on their asking price was relatively limited. Indeed, in this quarter, the WTC Index dropped to 4.2%, its lowest point in the period under investigation.

We also separately examine changes in the WTC Index in each of the 28 cities in our sample. Concentrating on transactions in the final year of our data (2016:Q3 to 2017:Q3) we find an increase in sellers' willingness to compromise in 23 of the 28 cities. The difference between the initial asking price and the final transaction price decreased in three cities, and remained almost unchanged in two additional cities (see Figure 2).

Figure 2
Changes in willingness to compromise between 2016:Q3 and 2017:Q3, by city



Interestingly, the breakdown of the data by city suggests that changes in sellers' willingness to compromise in each city was affected by the government-subsidized Buyer's Price project, which was accelerated towards the end of 2016 and early 2017. In Figure 2, cities in which Buyer's Price lotteries were held between 2016:Q3 and 2017:Q3 are marked in orange.⁴ According to our findings, sellers' willingness to compromise increased significantly in these cities in this period. For example, in Eilat, where willingness to compromise rose by 4.8%, representing a price drop of NIS 40,000, a Buyer's Price lottery was held in 2017:Q1. Buyer's Price lotteries were also held that year in or adjacent to Modi'in and Kiryat Ata, both of which also showed a significant rise in sellers' willingness to compromise (4.5% and 3.4%, respectively). In contrast, we identified the greatest decline in willingness to compromise (-2.6%) in Lod, where no Buyer's Price lottery was held in 2017.

Related literature:

Several studies in the economic literature and specifically in the field of real estate have examined the role of sellers' original asking price, and some have also examined the

⁴ Data on Buyer's Price lotteries were taken from the government website: <http://dira.gov.il/Pages/HomePage.aspx>.

difference between original asking prices and final transaction prices. For example, Merlo and Ortalo-Magne (2004) focus on changes in asking prices in England, and show that as a home remains on the market longer, it receives fewer offers from potential buyers, and at the same time the probability increases that the seller will reduce the original asking price, attracting more potential buyers and increasing the probability that the home will be sold [2]. Genesove and Mayer (2001) also study changes in sellers' asking price, and examine the effect of loss aversion on both the original asking price and the final selling price. These authors use data from the Boston real estate market and demonstrate that home sellers who expect to sell their homes at a loss (compared to their own purchase price) set an asking price that is significantly higher than the expected selling price. Based on their findings, the researchers expect a greater difference between asking price and expected selling price in a slow real estate market, while this difference should contract significantly during a real estate boom [3]. Han and Strange (2016) study data on home sales in North America and find many cases in which the final selling price of properties is above the original asking price. According to the authors, this phenomenon stems from the asking price being negatively correlated with the number of potential buyers. A low asking price may lead to a better quality fit between potential buyers and the home for sale, which will cause a bidding war among potential buyers. As a result, the final selling price may exceed the original asking price. Furthermore, in a booming real estate market, a greater percentage of homes are sold at or above the original asking price, compared with a slow market [4]. Although these studies highlight the role of the asking price and attempt to understand why sellers set the prices that they do, they do not purport to use the difference between original asking price and final selling price as an indicator of the state of the real estate market nor as an indication of sellers' and buyers' bargaining power.

The Case-Shiller Index, which focuses on repeat sales of homes, is one of the most commonly used indices to examine real estate market fluctuations. Based on the earlier work of Bailey, et al. [5], Case and Shiller [6] developed and applied the repeat-sales index to US metropolises. Their index is currently published monthly by S&P and used extensively by real estate researchers. For example, Coleman, LaCour-Little, and Vandell apply this index to study the causes of the US real estate bubble [7]; Agarwal uses this index to study of the effect on household consumption of home owners' misjudgments of the value of their property [8]; Calomiris, Longhofer, and Miles similarly apply this index to study the effect of home values on household consumption [9].

2. DATA AND METHODOLOGY

This study is based on two primary databases. The first is based on data from the Yad2 website and includes advertisements of homes for sale posted by individual sellers (i.e., it does not include listings by real estate agents). The Yad2 database includes details on

listings since January 2014.⁵ Each listing corresponds to a real estate property, typically a home, and includes the following information: city, street address, footage, number of rooms, floor, and information on the publication date of the advertisement, the asking price, and changes in the asking price over the lifetime of the advertisement. Yad2 data are extremely useful as the website accounts for a considerable share of all second-hand home listings in Israel and is ranked among the most popular websites in Israel. As a result, the findings of this work likely fairly represent the general trends in the second-hand home market in Israel. The second data source is the Israel Tax Authority, which publishes data on all real-estate transactions executed in Israel. Our analysis focused on sales between 2015:Q1 and 2017:Q3 (final data retrieval was performed in October 2017). By comparing home features included in these two databases, we matched homes whose sales had been reported to the Israel Tax Authority with listings that appeared on Yad2.⁶ The matching process used the following variables in the two databases: city, street address, floor, number of rooms, and home size. By its nature, the matching process to identify homes listed on Yad2 and reported to the Israel Tax Authority was not perfect. First, not all homes sold and reported in the Israel Tax Authority data were listed on the Yad2 website. Second, as our Yad2 listings exclude listings by real estate agents, no matches were found for properties that were sold through agents.⁷ In Appendix 1, we provide further details on how we addressed additional issues in the matching process.

The matching procedure identified 28,933 sales executed in 28 major Israeli cities between 2015:Q1 and 2017:Q3. These transactions account for 26% of all the second-hand home sales in those cities. Notably, the match rate differs across these cities: The highest match rate was found in Rishon Letzion (37%), Ashkelon (35%), Nahariya (34%), Modi'in (34%), and Holon (33%), while the lowest match rates were found in Bnei Brak (12%), Beit Shemesh (17%), Tel Aviv-Jaffa (17%) and Givatayim (17%). Three other major cities—Jerusalem, Be'er Sheva, and Haifa—had a match rate of 23%, 31%, and 21%, respectively. One possible explanation for the variability in match rates across cities is differences in the number of advertisements posted on Yad2 in each city relative to the total number of sales. In fact, we find that in cities with a low match rate, the ratio between the number of listings and the total number of sales is also low. Similarly, cities with a high match rate exhibit a high ratio between the number of listings posted on Yad2 and the total number of second-hand home sales. Overall, we find a 95% positive correlation between the number of advertisements posted on Yad2 and the match rate.

⁵ We are thankful to Yad2 for providing us access to their data.

⁶ We begin the analysis in January 2015 (although the Yad2 data are available from 2014) because we allow a maximum of one year for ads to translate into actual transactions that appear in the Israel Tax Authority data.

⁷ For the purpose of the analysis presented in this work, the issue of whether the Yad2 listing effectively triggered the sale is irrelevant. From our perspective, the Yad2 listing is a sufficient indication of the owner's willingness to enter the market and accept offers from potential buyers.

Similarities between homes matched in the two databases and all homes sold in the second-hand market

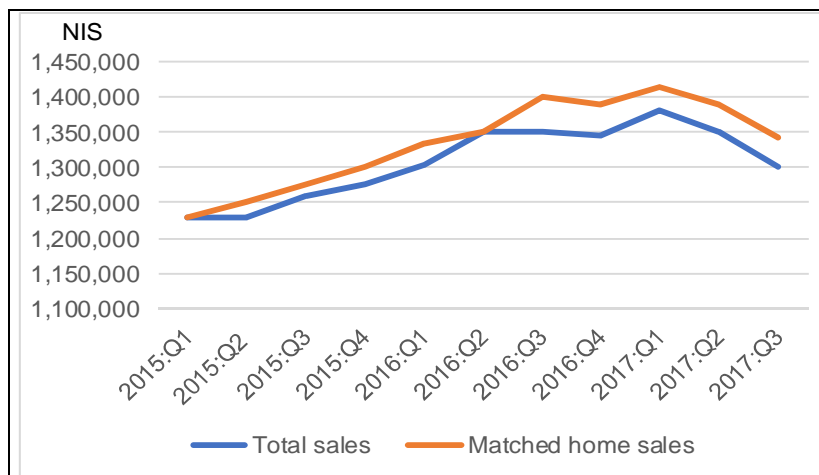
Before proceeding to describe the findings of this study, we examine whether the matched homes identified in both databases fairly represent all second-hand market home transactions. The greater the similarity between these two groups of real-estate properties, the stronger would be the claim that our findings reflect general trends in the Israeli real-estate market. To explore this similarity, we compared the characteristics of the homes that were identified both in the Yad2 database and in the Tax Authority database with the characteristics of all second-hand homes sold during the same period in the same cities. Table 1 separately presents descriptive statistics of the main variables used in this work, for homes that were matched, and then also for the universe of second-hand properties sold in the same period and in the same cities.

Table 1
Descriptive Statistics of the Variables in the Two Databases

Variable	Mean	SD	Min	Max
No. of rooms (matched sales)	3.697888	0.925407	1	9
No. of rooms (total sales)	3.646703	1.084868	1	15
Size (in sq. m.) (matched sales)	87.8173	31.37751	21	480
Size (in sq. m.) (total sales)	87.67005	40.77236	21	492
Floor no. (matched transactions)	3.230394	2.812473	0	21
Floor no. (total sales)	3.12139	5.371149	0	99
Price (NIS, matched sales)	1,428,549	665,037.80	175,000	11,484,200
Price (NIS, total sales)	1,502,669	1,117,647	6,072	64,000,000
Furniture (only matched sales, from Yad2 data)	0.2688625	0.443376	0	1
Protected space ["mamad"] (only matched sales, from Yad2 data)	0.4175509	0.4931638	0	1
Renovation (only matched sales, from Yad2 data)	0.5116649	0.4998726	0	1
Parking space (only matched sales, from Yad2 data)	0.7311029	0.443394	0	1
Difference between listed price and final price (matched sales)	0.5588428	0.496534	0	1
Time to sale (shelf life) (matched sales)	77,313.46	133,467.90	-850,000	1,900,000

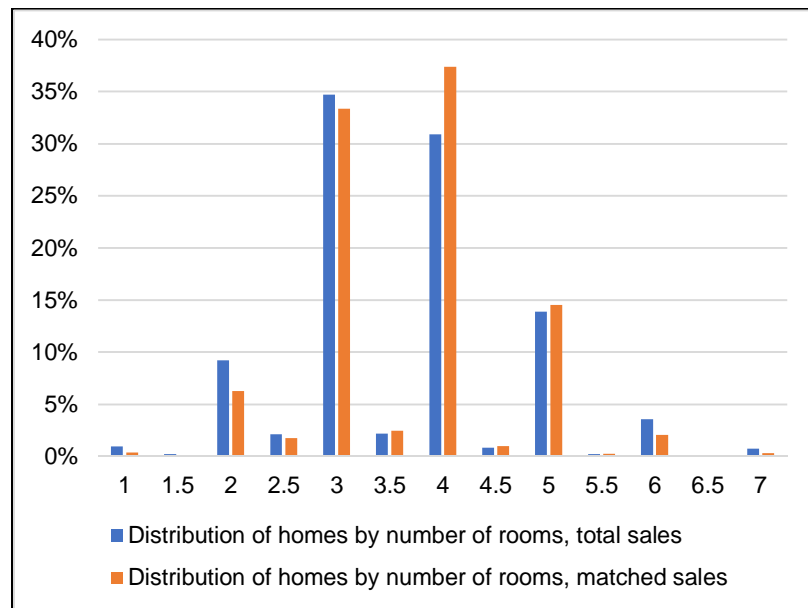
As evident from Table 1, there is a considerable similarity between the characteristics of the matched sales and the characteristics of all homes sold. We also performed two additional comparisons to confirm the similarity between the matched sales and all sales. The first comparison focuses on the median selling price, while the second comparison focuses on the number of rooms in each group. The first comparison shows that the median price in our sample is NIS 1,325,000, while the median price for all sales is NIS 1,300,000. More importantly, price changes for matched transactions and for total second-hand home sales in each city exhibit similar patterns across the period under investigation (see Figure 3). Such similarities support our view that the matched homes fairly represent the universe of second-hand home transactions in the same period.

Figure 3
Median price in matched and total second-hand home sales



We also compared the two groups in terms of the number of rooms in each property. We found that 6% of the matched transactions are two-room apartments, 33% are three-room apartments, 37% are four-room apartments, and 15% are five-room apartments. For the universe of apartments sold in the same period, we find the following rates: 9%, 35%, 31%, and 14% (see Figure 4). This comparison shows that, notwithstanding the slightly greater representation of four-room apartments in the matched home database, the distribution of number of rooms is fairly similar for matched home data and total sales data. Overall, we assess that these comparisons show that no significant difference exists between the features of the matched homes (constituting 26% of all sales), and the features of all second-hand homes sold.

Figure 4
Number of rooms in identified and total second-hand home sales



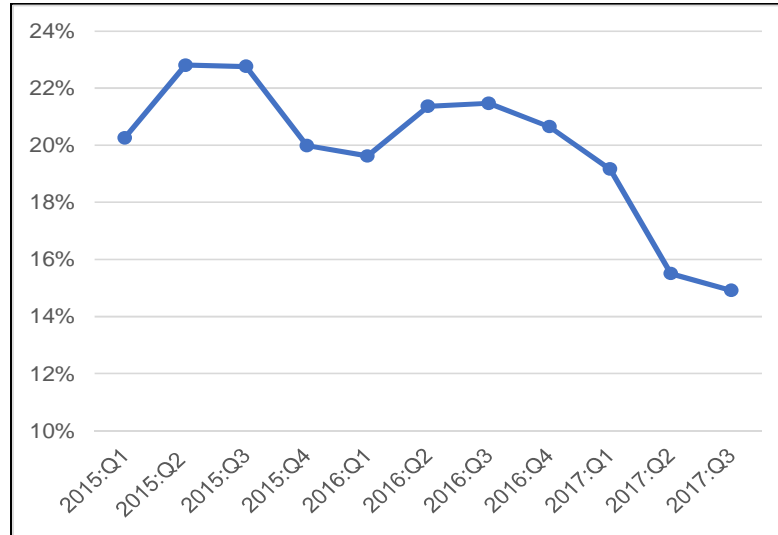
3. FINDINGS AND ECONOMETRIC ESTIMATION

The main finding of this study is the change in the WTC Index between 2016:Q3 and 2017:Q3. In this period, the difference between asking price and selling price increased significantly. While in 2016:Q3, sellers were willing to settle on a final selling price that was on average 4.3% lower than their original asking price (NIS 76,000, on average), they were willing to forgo an additional 1.5% of their original asking price in 2017:Q3 (a total difference of NIS 93,000 on average)—representing a 34% increase in willingness to compromise between 2016:Q3 and 2017:Q3.

Another way to assess changes in second-hand home sellers' expectations is to examine the percentage of homes in which sellers did not compromise on their original asking price (where transactions were made at the original asking price or higher). Presumably, this percentage will be relatively high in periods of increasing home prices and lower when market participants expect that prices will not continue to rise at the same rate. To examine this assumption, in Figure 5, we plot the share of transactions in which the final price was at or above the initial asking price. As can be seen in the figure, beginning in 2016:Q3, a decline is evident in the percentage of homes whose sellers did not compromise on price or even sold at a price that exceeded their original asking price. In 2016:Q3, such transactions

accounted for 21% of all matched sales (582 sales), while in 2017:Q3 they accounted for only 15% of all matched sales (193 sales).

Figure 5
Percentage of matched sales above list price

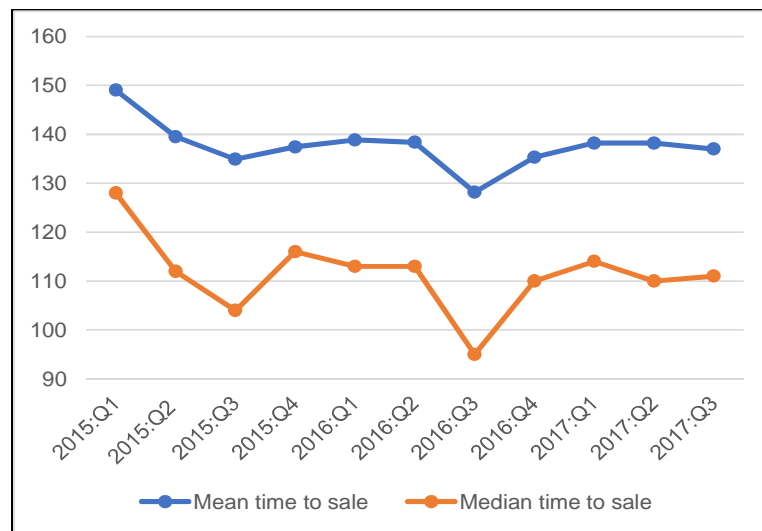


We also analyzed the change in WTC in different cities. Between 2016:Q3 and 2017:Q3, we find that the difference between asking price and selling price increased in 23 of the 28 cities investigated. The most significant increase in the difference occurred in the following cities: Eilat (where the difference increased by 4.8%, from 1.6% to 6.4%, representing NIS 39,000, on average), Modi'in (where the difference increased by 4.5%, from 1.8% to 6.3%, representing NIS 119,000, on average), Kiryat Ata (where the difference increased by 3.4%, from 6.5% to 9.8%, representing NIS 35,000, on average), and Kfar Saba (where the difference increased by 3.4%, from 2.9% to 6.3%, representing NIS 46,000, on average). The difference between asking price and selling price diminished during this period in only three cities: in Lod the difference declined by 3.3%, from 5.6% to 2.3%, representing NIS 25,000 on average), in Ramat Gan the difference contracted by 3% from 5.6% to 2.6% (representing NIS 28,000 on average), and in Hod Hasharon the difference diminished by 1.6% from 5.2% to 3.6% (representing NIS 65,000). In the remaining two cities, Givatayim and Bat Yam, the differences between asking and selling prices remained unchanged in this period. In Appendix 2, we also provide WTC graphs for each of the cities that appear in our analysis.

We also note that the increase in the WTC is also evident, though with a smaller magnitude, when we examine it for the entire period under investigation—i.e., from 2015:Q1 to 2017:Q3. The mean price difference in 2015:Q1 was NIS 74,000, and rose to NIS 93,000 in 2017:Q3. The increase also remains when we calculate the price difference as a percentage of the original asking price (from 4.8% in 2015:Q1 to 5.8% in 2017:Q3).⁸

Finally, we also report how a listing shelf life, which is the period required by sellers to sell their home, changed over the investigated time period. Between 2015:Q1 and 2016:Q3 we identify a decline in time to sale, from an average of 149 days to 128 days (median values are 128 and 95 days, respectively). Interestingly, since 2016:Q3, we observe an increase in the time to sale, reaching an average of 137 days in 2017:Q3 (median to sale is 111 days) (see Figure 8). This increase in time to sale after 2016:Q3 coincides with the increase in WTC that we document.

Figure 6
Time to sale from listing to sale (all cities)



⁸ When we examine the change from early 2015 to 2017:Q3, we find an increase in the difference between asking price and final selling price in 17 of the investigated cities. The largest increase appeared in the following cities: Modi'in, where sellers' willingness to compromise rose from 2.6% of the asking price to 6.3% (an increase of NIS 111,000, on average); Ashdod, where willingness to compromise increased from 4.1% to 6.9% (NIS 55,000, on average); and Be'er Sheva, with an increase from 3.2% to 6% (NIS 27,000 on average). In six additional cities (Hadera, Bat Yam, Tel Aviv-Jaffa, Lod, Hod Hasharon, and Ramat Gan), the difference between asking and selling price declined, with the most significant decline recorded in Ramat Gan, where the difference dropped from 4.9% in 2015:Q1 to 1.7% in 2017:Q3. In five cities (Rishon LeZion, Jerusalem, Herzliya, Rehovot, and Givatayim), price differences changed little between 2015:Q1 and 2017:Q3.

4. ECONOMETRIC ESTIMATION

To further support our findings, we also performed an econometric analysis. This analysis is designed to reduce the concern that the changes discussed above in the WTC Index were driven by changes in the mix of homes that were sold over the investigated period. If, for instance, sellers tend to compromise more on larger homes and, for whatever reason, many large homes were sold towards the end of 2017, then we may erroneously attribute the changes in the WTC to changes in market forces, rather than to changes in the composition of properties sold in the real-estate market. To address such concerns, we estimate the following regression equation:

$$\Delta P_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 Days_i + \gamma_t Quarter - Year_i + \theta_c City_i + \epsilon_i$$

where the dependent variable ΔP_i denotes the willingness to compromise measure for home i , and Δ refers to the difference between the initial list price for a given property and the final transaction price for that property. In different specifications, we use either the absolute difference between the list/asking price and the final price, or the rate of compromise (i.e., the absolute price difference divided by the home's asking price). X_{1i} is the vector of home characteristics reported by the Tax Authority, including the number of rooms, floor, and home size. X_{2i} is the vector of home features appearing in the Yad2 listing, which includes the following dummy variables: elevator, parking space, furniture, protected space ('mamad') and renovation. We also include the variable $City_i$ and the variable $Quarter - Year$ to represent the quarter in which the sale was made. In some specifications, we add the variable $Days_i$ as an explanatory variable, reflecting the shelf life of the listing. Omitting this variable had little impact on the results. Our main interest is the change in the last four quarters (2016:Q4 and 2017:Q1–3). Hence, in the estimation, we examine whether the estimators of the most recent four quarters are positive and large compared with 2016:Q3. Accordingly, the quarter omitted from the regression is 2016:Q3, to which we compare the estimators of the remaining quarters.

Table 2 presents the findings of the econometric analysis. According to the estimation results, a positive association exists between home size and willingness to compromise. We found that a 10 square meter increase in home size is associated with a 0.23% increase in the difference between asking and selling prices. In absolute terms, an increase of 10 square meters in home size corresponds to an increase of NIS 13,000 in the difference between asking and selling prices. Moreover, listing shelf life is negatively associated with willingness to compromise: an increase of one month in a listing's shelf-life is correlated with a 0.1% decrease in the difference between asking and selling prices. Nonetheless, this negative correlation is statistically significant only when we study the difference between asking and selling prices as a percentage of the asking price, and is insignificant when the difference is calculated in absolute terms. We do not find a statistically significant

relationship between sellers' willingness to compromise and the number of rooms or the floor.

Table 2
Results of the Econometric Estimation

Variable	Price difference (%)	Price difference (NIS)
Size (in sq. m., hundreds)	0.0226 ^{***} (0.00367)	128,424 ^{***} (20,140)
Floor	0.000511 ^{***} (0.000179)	879.6 [*] (487.3)
No. of rooms	-0.000675 (0.00122)	-1,429 (3,164)
Shelf life (months)	-0.000835 ^{***} (0.000227)	-373.1 (325.0)
Elevator	-0.00405 ^{***} (0.00140)	-7,456 ^{**} (3,479)
Parking	-0.000296 (0.00124)	2,540 (2,217)
Furniture	0.00424 ^{***} (0.000789)	7,074 ^{***} (1,443)
Renovation	0.00254 ^{***} (0.000660)	2,853 ^{**} (1,154)
Protected space	-0.00750 ^{**} (0.00164)	-8,836 ^{**} (3,525)
Constant	0.0310 ^{***} (0.00481)	-30,208 ^{**} (14,275)
Observations	28,933	28,933
R-squared	0.011	0.077
No. of cities	28	28
No. of quarters	11	11

* Statistically significant at the 10% level, ** statistically significant at the 5% level, *** statistically significant at the 1% level.

Figures 7 and 8 present the estimators for each quarter, where 2016:Q3 is the omitted variable and therefore serves as a point of reference for the remaining estimators. In Figure 7, the explanatory variable is the absolute difference between the initial and final price, measured in NIS, while in Figure 8, the explanatory variable is the percentage difference between prices, and accordingly the figure presents the willingness to compromise as a percentage of the original asking price, for each quarter. The range marked in gray in this

figure is the 95% confidence interval of the estimator for each quarter. As is shown, we find that the increase in sellers' willingness to compromise on the final selling price was statistically significant in the final year investigated, with the exception of the estimator for 2016:Q4. Furthermore, in 2015:Q2—when expectations of an increase in purchase tax increased—sellers' willingness to compromise dropped to its lowest level.

Figure 7
Coefficients based on econometric estimation, by quarter
(DV is price difference)

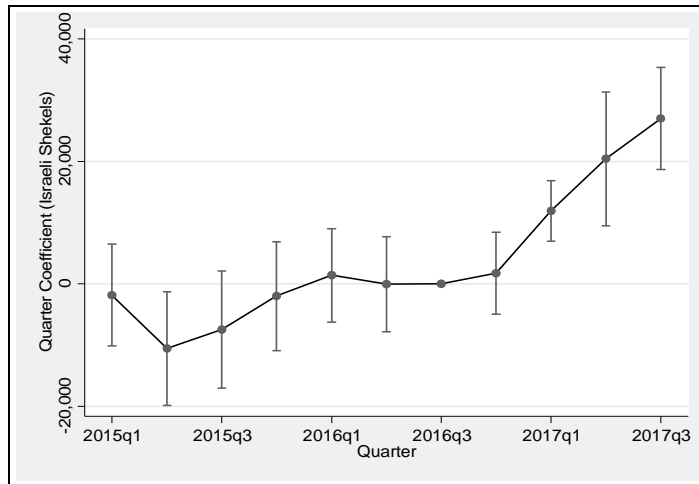
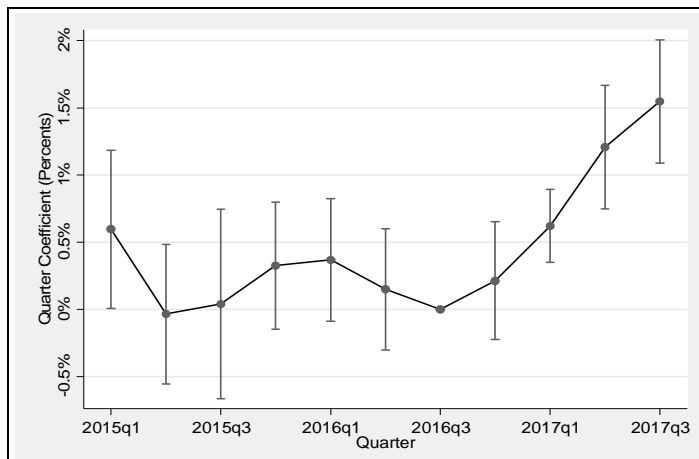


Figure 8
Coefficients based on econometric estimation, by quarter
(DV is percent price difference)



5. CONCLUSION

This work proposes a new index for identifying price trends in the real-estate market and attempting to uncover changes in the bargaining power of sellers and buyers in the market. The proposed index (the WTC Index) is based on the price differences between the listing price of real estate properties and the selling price of the same properties. We use data from Israel's leading classified ads website and administrative data on actual transaction data to construct the index in 28 large cities in Israel and to examine changes in the index over 11 quarters, from 2015:Q1 until 2017:Q3. The findings point to a significant increase in the willingness to compromise of sellers of second-hand homes, particularly between 2016:Q3 and 2017:Q3. We believe that this increase in willingness to compromise is indicative of a cooling down of the real estate market in Israel, which is consistent with findings from additional sources on the Israeli real estate market in this period.

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Appendices

Appendix 1:

Details of the process used to match Yad2 listings to transactions reported in the Israel Tax Authority database

The matching process followed the following steps:

- By street name and house number

A successful match requires that the city, street name, and house number are identical in both databases. To facilitate this requirement, we first focused on identifying identical street names. However, examining the two databases indicated that the same street name might be written differently in each database. For example, street names comprising two words might appear in a different order (e.g., Menachem Ussishkin Street vs. Ussishkin Menachem Street). Another difference is that an eponymous street name might contain or omit the individual's first name (e.g., Berl Katzenelson Street vs. Katzenelson Street) or titles such as "Rabbi" or "Doctor". Another difference is the appearance of words such as "street" "road" or "boulevard" in one database and their omission on the second database. Street names might appear as acronyms in one database and written in full in the second database (e.g., KKL Street vs. Keren Kayemet L'Yisrael Street). After resolving these differences, some of which were corrected in an automatic procedure while others were corrected manually, street names were matched allowing for a difference of maximum one letter between database records. In this manner we resolved differences in spelling and formats of street names (e.g., Sivan Street vs. Sivvan Street).

Matching was based on sales in which the house number in the Yad2 listing was identical to the house number in the Israel Tax Authority records. In the matching process we also addressed homes with two street addresses (e.g., houses located on corner lots). Based on information on dual street addresses, we identified the cases in which the same home was listed under one street name in one database and under another street name in the second database.

- By floor, number of rooms, and home size

The next step in the matching procedure used information on the floor, number of rooms and home size. We matched properties in both datasets, allowing for a difference of a maximum of one room in the number of rooms, a maximum difference of one floor in the floor number, and a maximum 25% difference in the area of the home. We believe that these restrictions are sensible given that the Tax Authority data regarding [such items](#) is not always accurate. In instances where the Yad2 listing did not include a house number (5% of the total matches performed), we defined more restrictive constraints on the matching criteria to reduce potential mismatches. In these cases, records in the two databases were considered a match if there was a maximum difference of one-half room, an identical floor number, and a maximum 25% difference in the area of the home. In addition, in cases

where the Yad2 listings omitted a house number, we matched the two databases only when the number of sales on that street was lower than 12 transactions during the relevant calendar year.

- By listing date and asking price

To focus on the matches that reflected the seller's genuine desire to enter the market, we also filtered Yad2 listings by shelf life (the time that elapsed from the listing date to the sale date), and by the difference between the asking price and the final selling price. In particular, we defined a maximum duration of 365 days between the listing date and the date of the sale appearing in the Tax Authority records. In other words, we disregarded all matches between listings and Tax Authority records where the difference between the listing date and date of the sale exceeded 365 days. This constraint was designed to eliminate the cases in which sellers did not genuinely intend to enter the market when the listing was posted. We assumed that a listing posted more than one year before a sale is apparently not directly related to the final sale and that a match between the asking price on this listing and the final selling price does not fairly represent the behavior of players in the second-hand home market, neither in terms of the price difference nor in terms of time-to-sale. Similarly, we defined a minimum difference of seven days between listing date and sale date. This constraint is also designed to exclude matches that are not representative of players in the real estate market, based on the assumption that such a listing could not have led to a sale in such a short period.

We also defined a maximum difference of 25% between the original asking price in the listing and the final selling price. We added this restriction, because we believe that the probability of sellers settling for a price that is more than 25% lower than their original asking price is extremely low and may represent coding mistakes.

Finally, in the few cases in which a transaction reported in the Tax Authority database was matched to more than one Yad2 listing, we selected the listing that best matched the sale based on floor number, number of rooms, and area.

Appendix 2:
WTC graphs for each of the 28 cities in our sample

Figure 9
Ashdod
Difference between original asking price and final selling price

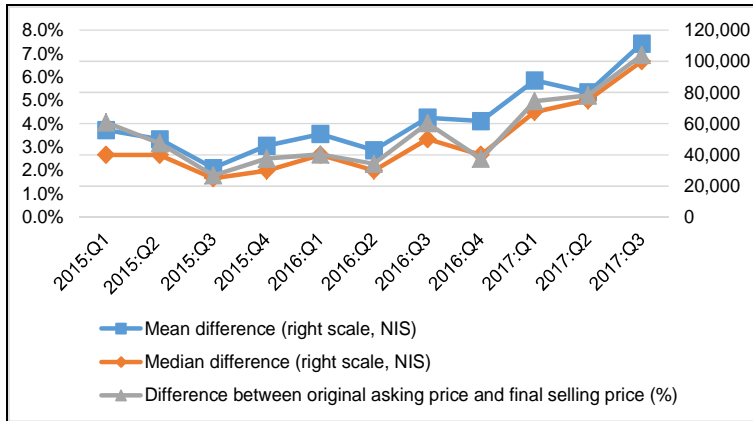


Figure 10
Ashkelon
Difference between original asking price and final selling price

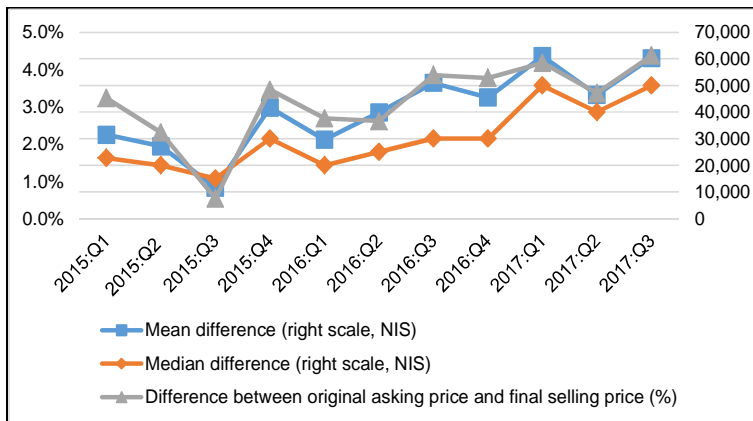


Figure 11
Bat Yam
Difference between original asking price and final selling price

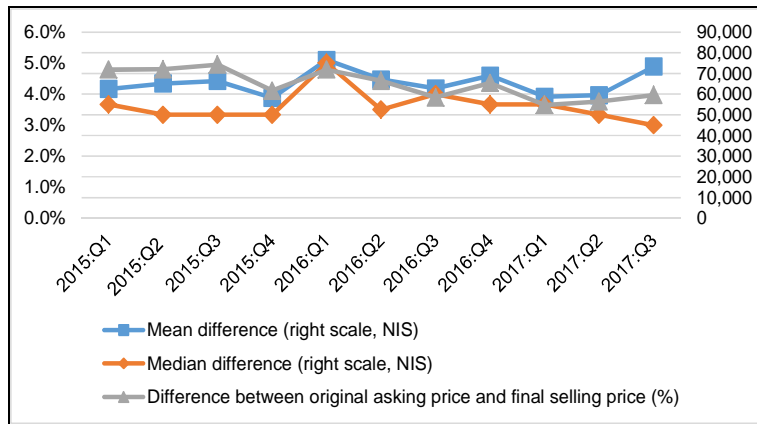


Figure 12
Be'er Sheva
Difference between original asking price and final selling price

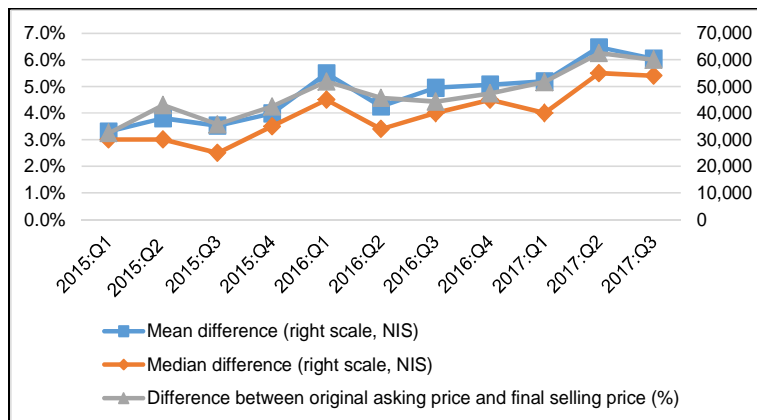


Figure 13
Beit Shemesh
Difference between original asking price and final selling price

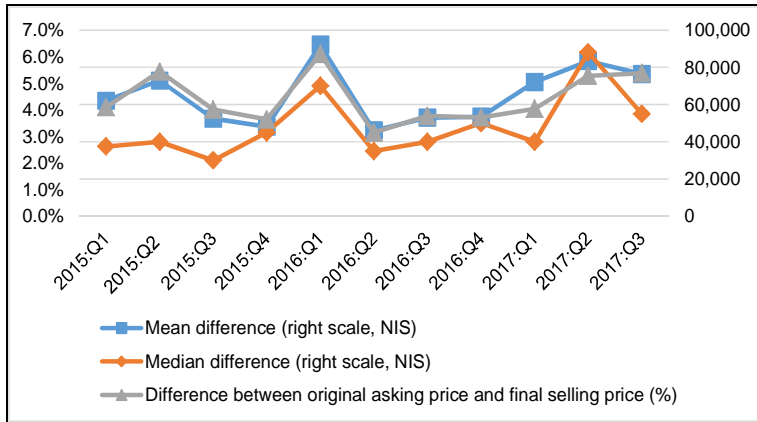


Figure 14
Bnei Brak
Difference between original asking price and final selling price

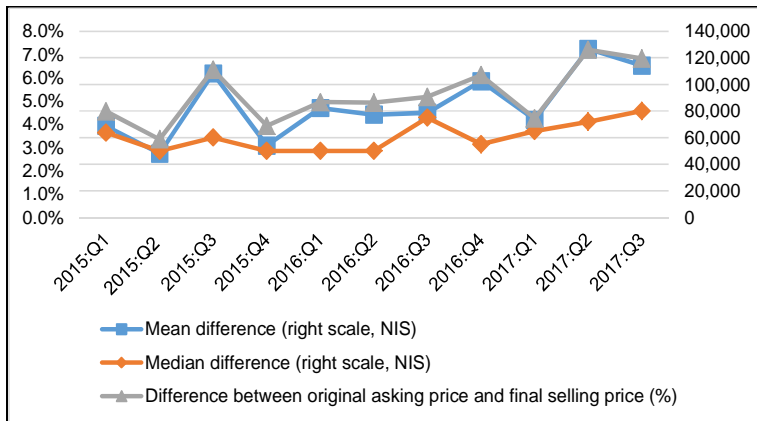


Figure 15

Eilat

Difference between original asking price and final selling price

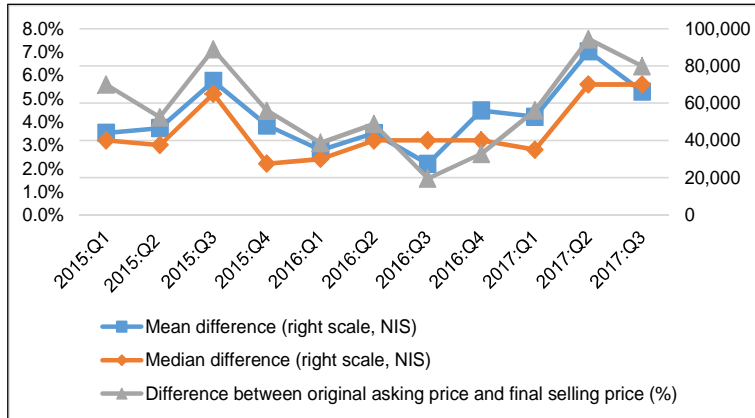


Figure 16

Givatayim

Difference between original asking price and final selling price

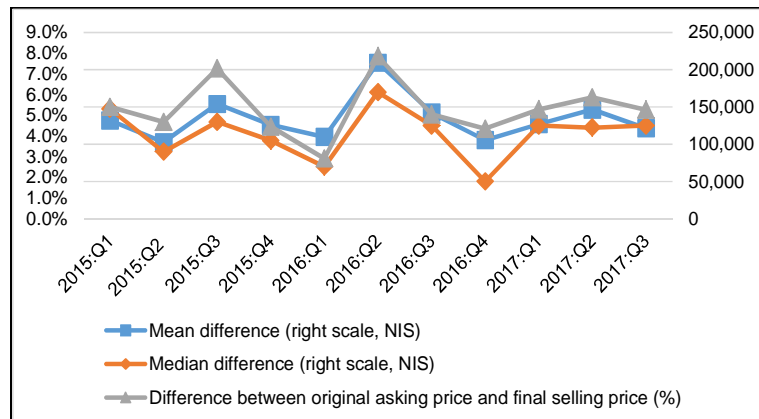


Figure 17
Hadera
Difference between original asking price and final selling price

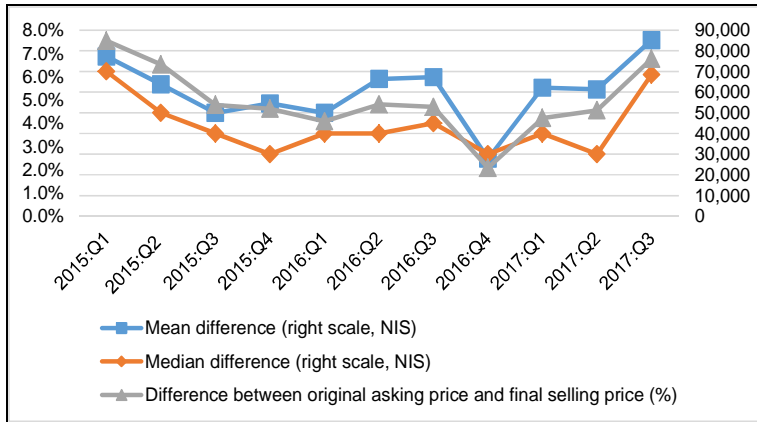


Figure 18
Haifa
Difference between original asking price and final selling price

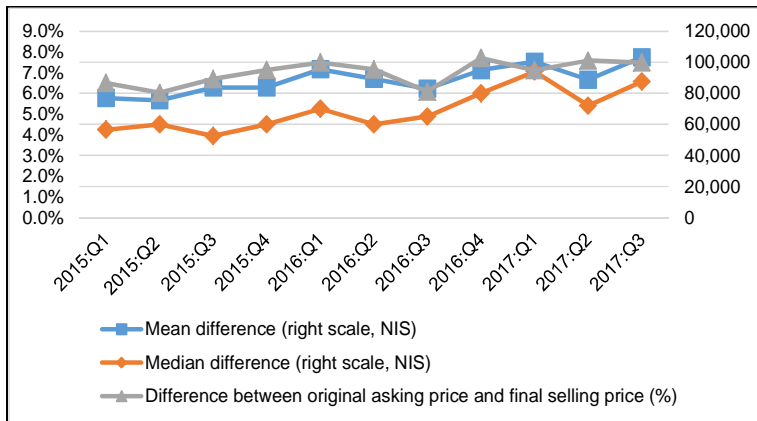


Figure 19
Herzliya
Difference between original asking price and final selling price

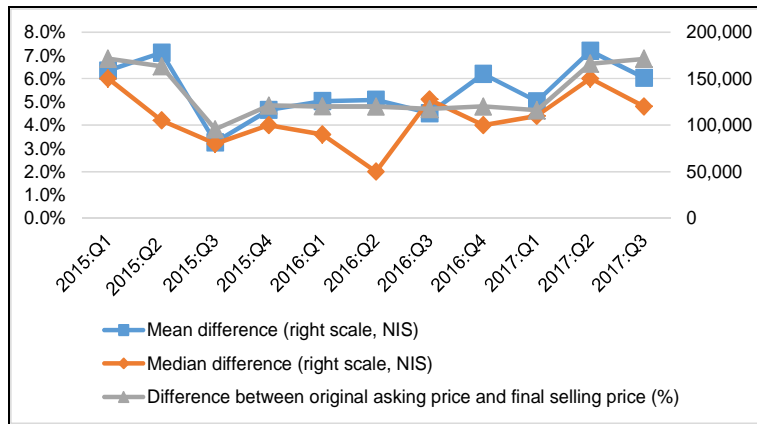


Figure 20
Hod Hasharon
Difference between original asking price and final selling price

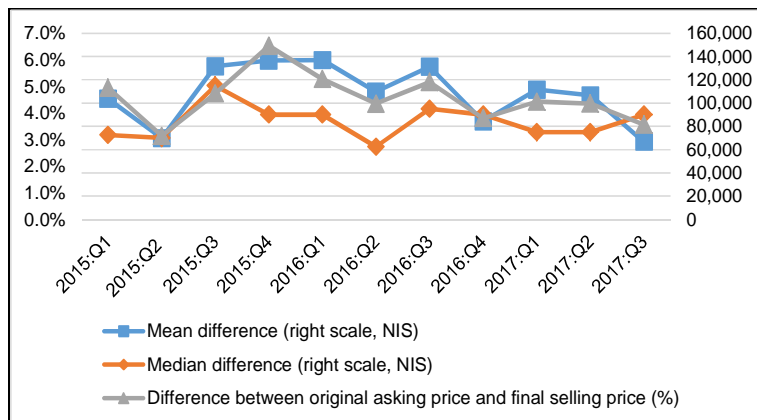


Figure 21
Holon
Difference between original asking price and final selling price

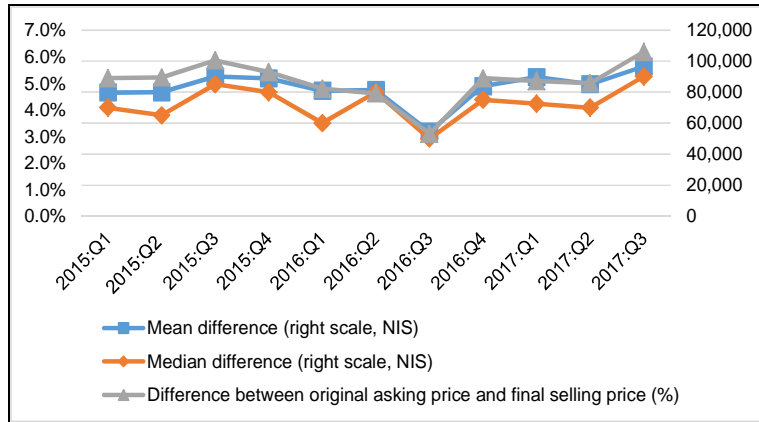


Figure 22
Jerusalem
Difference between original asking price and final selling price

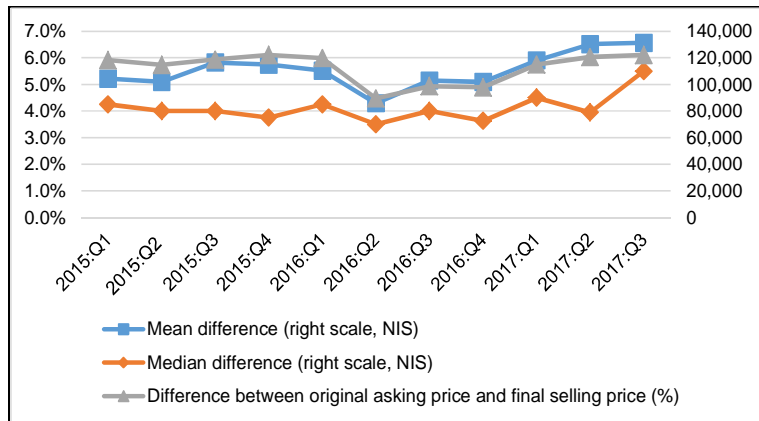


Figure 23
Kfar Sava
Difference between original asking price and final selling price

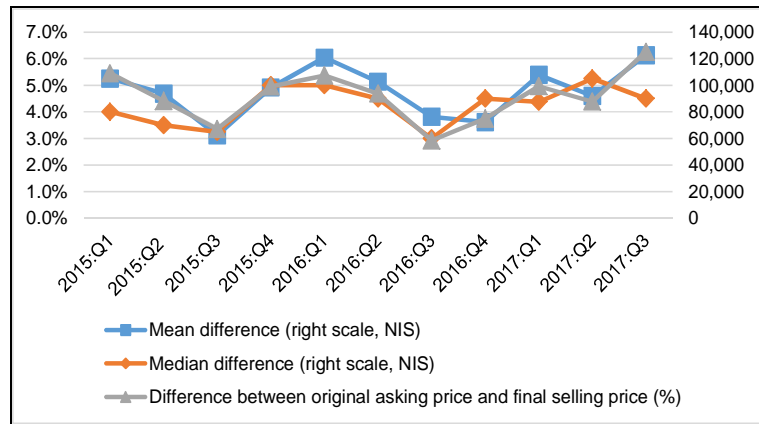


Figure 24
Kiryat Ata
Difference between original asking price and final selling price

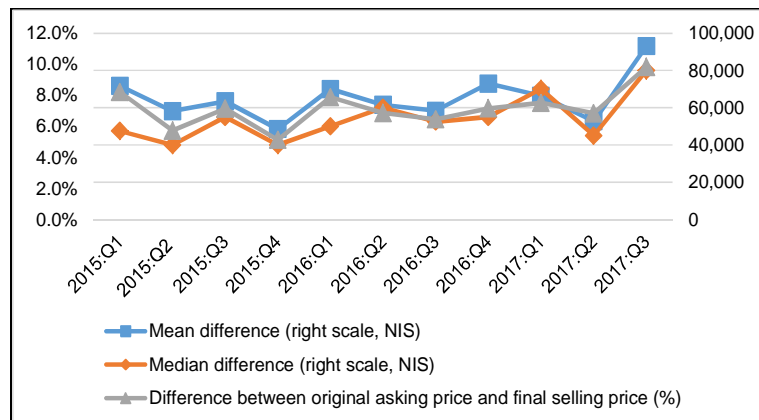


Figure 25
Kiryat Gat
Difference between original asking price and final selling price

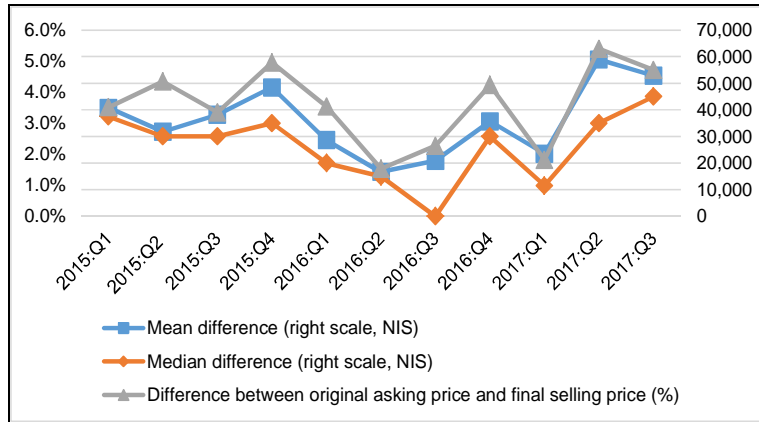


Figure 26
Lod
Difference between original asking price and final selling price

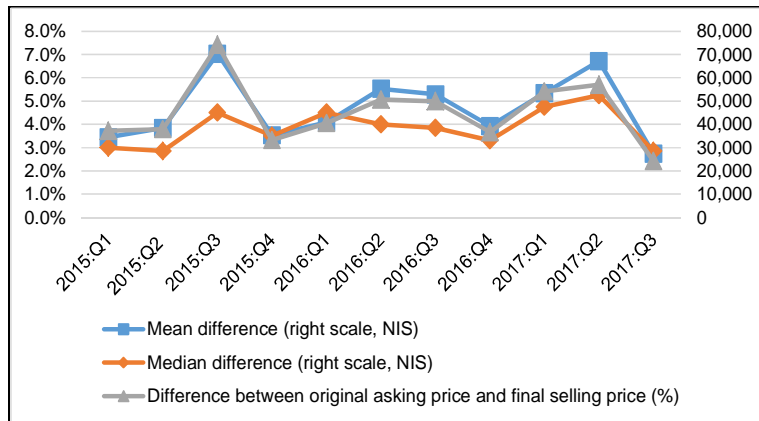


Figure 27
Modi'in
Difference between original asking price and final selling price

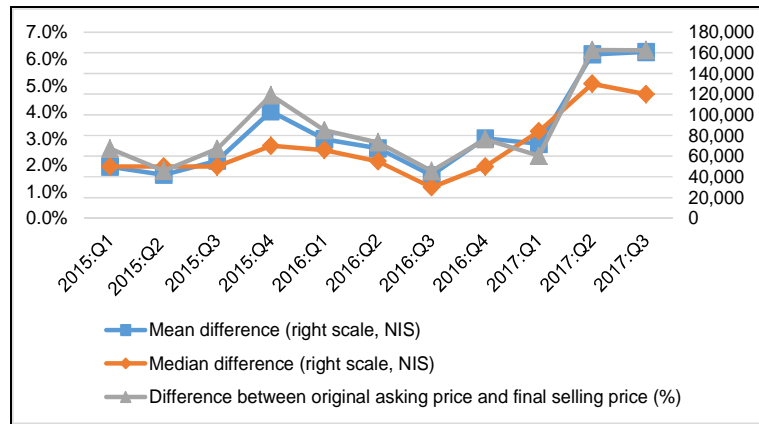


Figure 28
Nahariya
Difference between original asking price and final selling price

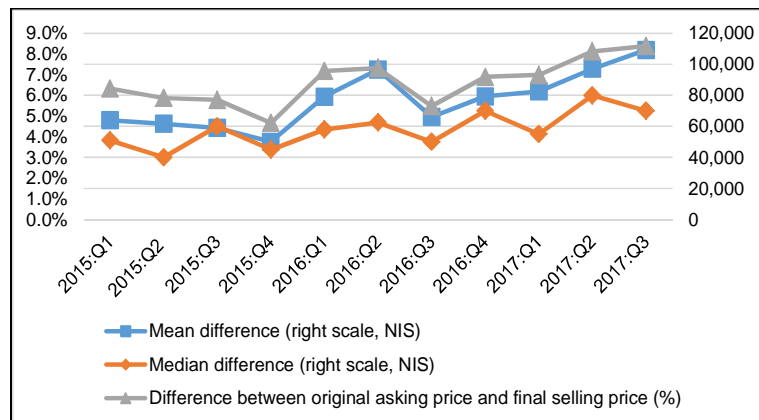


Figure 29
Netanya
Difference between original asking price and final selling price

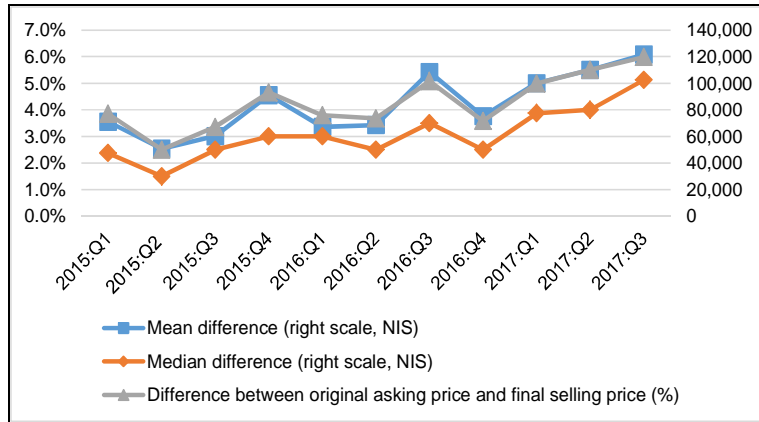


Figure 30
Petah Tikva
Difference between original asking price and final selling price

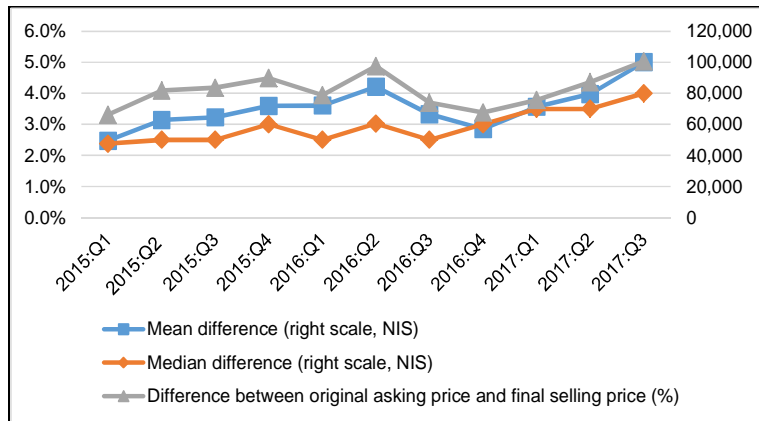


Figure 31
Ra'anana
Difference between original asking price and final selling price

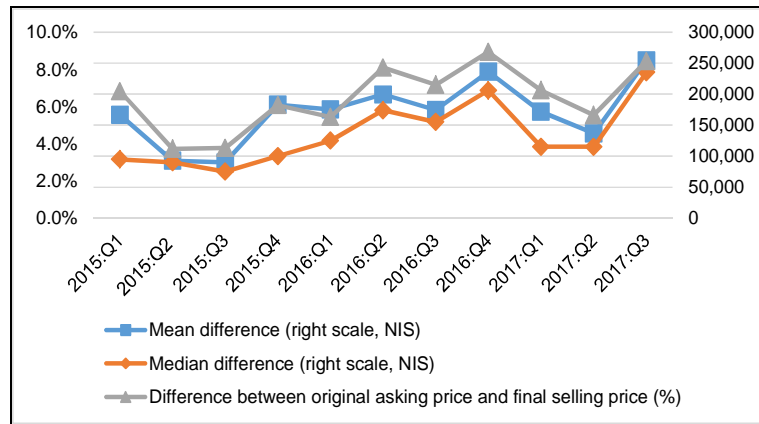


Figure 32
Ramat Gan
Difference between original asking price and final selling price

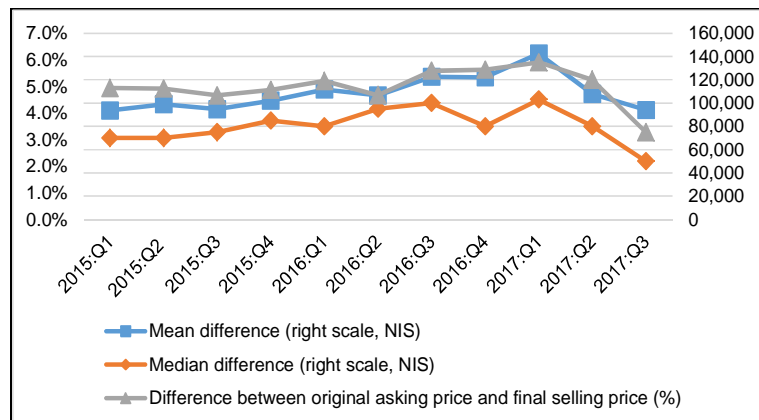


Figure 33

Ramle

Difference between original asking price and final selling price

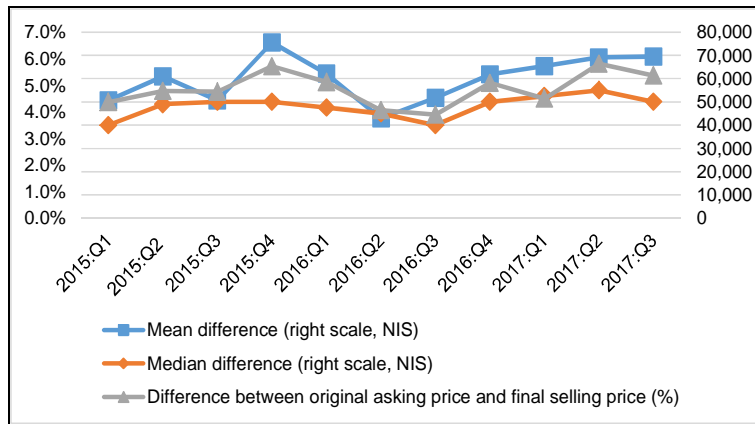


Figure 34

Rehovot

Difference between original asking price and final selling price

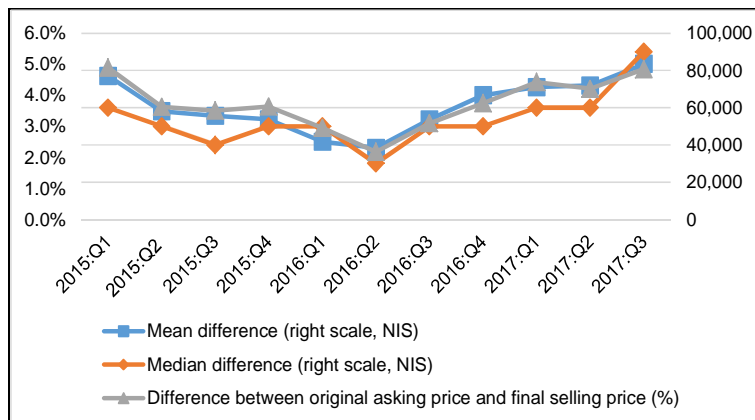


Figure 35
Rishon LeZion
Difference between original asking price and final selling price

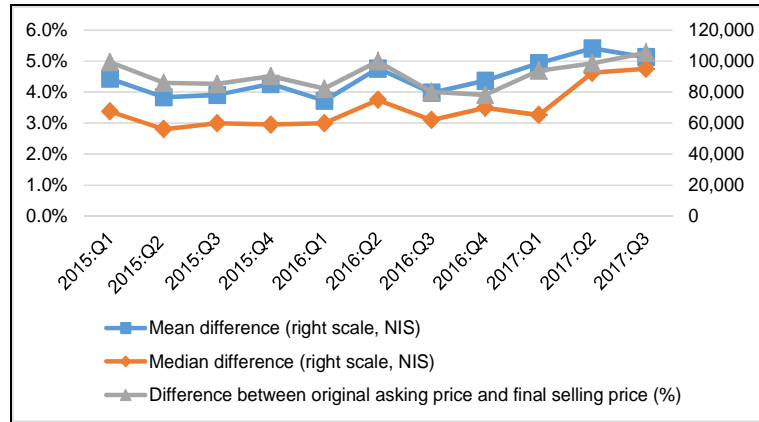


Figure 36
Tel Aviv-Jaffa
Difference between original asking price and final selling price

