The Effect of House and Rent Prices on Private Consumption in Israel—A Micro Data Analysis[*]

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Abstract

This work uses data from the Israeli Household Expenditure Survey for 2003–2011 to assess the effect of changes in home and rent prices on households' private consumption expenditure. We find that an increase in house prices acts to increase owners' consumption, particularly in the intermediate age groups—between 35 and 55—while the effects of house prices on consumption by younger or older households is not significant. The analysis shows that the development of regional prices, which better reflect the value of household property than the general average price, is what affects private consumption. The effect is of a magnitude of 0.18—higher than estimates obtained in studies for other countries. The effects of the substantial house price increases since 2008 on private consumption were stronger than those of the prolonged price decline in the ten years ending in 2007. The rapid increase in house prices between 2009 and 2011, and particularly in 2010, contributed more than 1 percentage point to private consumption expenditure in each of these years (according to the Expenditure Survey) as against a smaller contribution in the preceding years. The increase in rent contributed to a decline in consumption by apartment tenants, contrasted with an increase in consumption by landlords. Overall, the housing market abetted the growth of private consumption during these years.

1. Introduction

Between 2008 and the end of 2011, house prices in Israel rose by a hefty 40 percent in real terms. For owner-occupier households (accounting for 70 percent of households countrywide), an increase in the value of homes and, in turn, of owned housing services results in larger imputed expenditure—but also, and concurrently, greater

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imputed income from the property. Ostensibly, these households generally, and their consumption particularly, should not be affected by changes in the value of housing services. A dwelling not only provides present and future housing services but also constitutes part of the individual's portfolio of assets. Like any asset, it carries a risk when held; in contrast, however, it provides insurance against the inherent risk of future changes in the cost of housing services. (For elaboration on this point, see also Sinai and Souleles, 2005.) One can imagine several channels along which changes in the prices of dwellings and housing services would affect home-owning households' consumption. (See also Ludwig and Slok, 2002.) The first is the wealth effect: whether the property is realized or not, it has much the same effect as a portfolio asset. The sale of a property at a higher price than that paid, or even the assumption that such a sale can be made in the future, may affect current consumption.[1] Another effect is via liquidity. Since a dwelling can serve as collateral for financing or refinancing, an increase in its value makes credit for consumption easier to obtain. For households that do not own a dwelling, i.e., those that rent, an increase in house prices, accompanied by an upturn in the price of housing services, has an adverse income effect on consumption. Furthermore, if such households intend to buy a dwelling in the future, an increase in prices may also dampen consumption by forcing households to save more for the future purchase.

In the long term, the price of a dwelling reflects the discounted value of the price of present and expected housing services. In the short term, however, deviations from the long-term context may occur and some may be rather large. (See Dovman, Ribon and Yachin, 2012). These deviations, reflecting a change in property prices that exceeds the change that originates in a change in the value of housing services, may also pass through to households' behavior.

Due to the sharp changes in house prices in many countries, many studies in recent years have attempted to establish a connection between changes in the public's property, particularly the value of its dwellings, and private consumption. Nearly all of them find a positive relation, of one strength or another, between changes in house value and private consumption. The main question, however, is: What factor explains this relation? Is it mainly a property effect, or a liquidity constraint effect, or a reaction of both of these variables to a third factor, such as expectations of an increase in future income? One group of studies probed the question by using macroeconomic data relating to a panel of U.S. states (Carroll, Otsuka and Slacalek, 2011; Quigley and Shiller, 2011; Calmoris et al., 2012) or developed OECD countries (Slacalek, 2009; Ludwig and Slok, 2002). These studies find an effect of 0.05–0.1 of house prices on private consumption and most find that house value has a stronger relation than portfolio assets. Ludwig and Slok (2002) report a greater effect of both dwellings and portfolio assets in countries that their financial systems are based on capital markets than in those that are bases on the banking system.[2] Another class of studies that searches for the factor that links house prices to consumption is predicated on the use of micro data that distinguish among population groups and, particularly, between

[1] Ben Bernanke (2012), Chairman of the Federal Reserve Board, addressing the National Association of Home Builders, related to the sizable effect of the steep decline in US house prices on household property and private consumption and, in turn, on total activity and recovery from the crisis.

[2] For the profiling of various countries' financial systems, see Levine (2002).

home owners and renters and among individuals of different ages. These studies use diverse methods of analysis, if only due to data constraints. Some use genuine panel data, in which data exist for one household across several successive periods. Others adopt a pseudo-panel approach, creating homogeneous groups in reference to relevant characteristics and comparing their behavior over time. Specifically, some studies that investigate the issue over a relatively lengthy period analyze cohorts of households bounded by years of birth. By using micro data, it becomes possible to link a household to the property value that is relevant to it—the household's self-valuation of its dwelling or house prices in the relevant region. This capability is of immense analytic importance because, unlike the value of portfolio assets, which is determined in a (relatively) perfect market, identical for everyone, and known at any moment, house prices that are relevant to households in different regions may behave differently over time.

These studies arrive at different conclusions, if only due to the use of different kinds of data, particularly those relating to the value of individuals' dwellings; different methods of analysis; and different periods of investigation. Many researchers find a stronger effect on older households and a weak or insignificant effect on younger ones. One such study, Campbell and Cocco (2007), analyzes data for the UK; others (Calgagno et al., 2009, and Grant and Peltonen, 2008) analyze data for Italy, and Smith (2010) does the same for New Zealand. Each of these studies interprets the findings as supportive of the hypothesis that the effect of property, which is held more extensively by older households than by younger ones, is dominant. Others, in contrast, find a stronger effect among young people and tend to interpret this as the alleviation of the liquidity constraint because this constraint is probably more effective among the young. Thus, while Skinner (1996) finds no effect on older people's consumption, Bover (2005), analyzing data for Spain, finds a stronger effect on young people's consumption, as does Gan (2010), who tackles the question by employing a unique database that includes change in the value of dwellings purchased and credit-card expenditure of individuals in Hong Kong. Browning, Gortz, and Leth-Petersen (2013), examining the question via panel data for households in Denmark, indicate that since the path of Danish house prices is stationary, no protracted effect of house prices on private consumption should be foreseen. They also find that unexpected changes in house prices affect only the young and do so only in the period after the liberalization of the Danish financial markets—an outcome that supports the proposition that the alleviation of liquidity constraints is the main channel of pass-through from changes in house prices to consumption. Windsor, Jaaskela, and Finley (2013), examining individual data for Australia households, find a strong positive effect of an increase in house prices on young home-owning households and a negative effect on households that rent—lending the liquidity pass-through thesis further support.

In contrast, Attanasio and Weber (1994), followed by Attanasio et al. (2009), claim that contrary to the findings of other studies, increases in both house prices and private consumption respond to a third factor: expectations of an increase in future permanent income. That house prices respond similarly among home owners and renters supports this approach, they claim. They find that young people are more affected than older ones and interpret this outcome as weakening the hypothesis that the property effect is the dominant one. They attempt to explain the difference between their results and those of Campbell and Cocco (2007), who examine similar

data for the UK, as tracing to the difference between the two studies' sampling periods.

Studies based on micro data yielded evidence that a change in dwelling value has a stronger effect than a change in portfolio asset value. Bostic, Gabriel, and Painter (2005), for example, examine the question using data on household balance sheets that allowed them to analyze households' net worth.

Another aspect in analyzing the nexus of housing prices and consumption that ties into the permanent income is the role of temporary shocks relative to permanent shocks in explaining consumption. The lengthier a shock is expected to be, the stronger its expected effect on consumption. Contreras and Nichols (2010), investigating this aspect, find that in U.S. geographical regions that had lengthier shocks to house prices (=stronger serial correlation), the effect of the shocks on consumption was greater. Campbell and Cocco (2007), in a similar analysis, show that expected shocks have a stronger effect on consumption than surprise shocks but are affected by changes in the general price level as opposed to a regional one, and affect renters as well as home owners. By implication, they say, the effect evidently means that the credit constraint has become weaker.

Some studies, such as Skinner (1996) and Calcagno, Foreno, and Rossi (2009), present a frame for discussion of the effect of house value on consumption by applying a simple two-period model of consumption across the life cycle. This frame, however, overlooks possible imperfection in capital markets, the existence of liquidity constraints, and uncertainty, and surprise shocks. Therefore, it cannot be used to isolate, within the set of factors, those that may explain a relation between house prices and consumption. It does, however, allow a relation among home ownership, changes in dwelling prices, and private household consumption to be shown.

To the best of our knowledge, no study has yet been written in Israel on the relation between changes in the value of real estate held by the public and private consumption in Israel, particularly using micro data for the analysis. Lavi (1998), investigating the relation between private consumption and disposable income within the framework of the permanent income theory, found not only that the rate of change in expected wage income is strongly related to the expected rate of change in consumption, but also that the rate of change in portfolio asset value (measured through the proxy of return on shares) and short-term interest rates had a considerable effect on the change in consumption in 1963–1993. Lavi and Strawczynski (2003), probing the relation between public consumption and private consumption, also included the change in total (per capita) property in the equations that they estimated and found a positive and significant effect (0.14) on the change in per capita consumption. Neither of these studies, however, addressed itself directly to the effect of physical property value, let alone the specific effect of the value of dwellings, which account for most household physical property. An equation in the macro model of Beenstock, Lavi, and Offenbacher (1992) relating to private consumption (in the long term and changes in the short term) includes a positive effect of net (per capita) property with a coefficient of 0.20. The change in property in this study is defined as private savings plus capital gains. Other studies, e.g., the Bank of Israel's MOISE model (Argov et al., 2012) and the quarterly macro model in Friedman and Hercowitz (2010), represent the effect of property on private consumption through the media of individuals' capital stock and holdings of bonds.

The purpose of the current study is to examine the effects of the development of house and rent prices on private consumption in Israel on the basis of household-level micro data. It is very important to answer this question in order to understand the past development of total macro private consumption and estimate its future development, specifically against the background of the steep increase in housing prices in recent years and the possibility of a change in this trend in the future. The Bank of Israel Annual Report (2009, p. 46) analyzes the factors that explain why private consumption contracted less vigorously in Israel than other countries in response to the crisis. It mentions three factors—low interest, increase in the value of portfolio assets, and increase in housing prices—but does not subject these factors to quantitative analysis. The current study proposes a framework for quantitative analysis of the effect of housing prices on private consumption.

To perform the analysis, we cull data from the Household Expenditure Surveys for 2003–11 and aggregate data for quarterly house prices parsed by regions and number of rooms (both from the Israel Central Bureau of Statistics, hereinafter: CBS). By using these micro data to analyze household behavior, we show that changes in house prices have a positive effect on households' consumption expenditure.[3] The effect is especially strong and significant among middle-aged home owners (35–55) and insignificant among young and old home owners. The magnitude of the effect, 0.18, exceeds estimates obtained in studies for other countries. Among renters, it was found that rent as measured by CBS has a negative effect on other consumption, particularly among non-elderly (<55) households. These findings support the view that the pass-through is via the wealth effect. Conversely, it was found that an increase in households' income from the rental of a dwelling, whether they themselves are owner-occupiers or renters, has an upward effect on consumption. Furthermore, the effect of a change in house prices (as well as changes in income) on home owners' consumption is stronger for consumption of durable goods than for the consumption of non-durables. Testing the change in the intensity of the effect during the sample years, we found that the strong price increases since 2008, far exceeding the change in rent prices, had a much stronger effect on private consumption than the protracted downtrend in prices during the decade ending in 2007. The rapid increase in house prices in 2009–11, and particularly that in 2010, contributed more than 1 percentage point to private consumption expenditure each year (according to the Expenditure Survey) as against a smaller contribution in preceding years. The increase in rent prices had a downward effect on renters' consumption and an upward effect on landlords' consumption. The effect of change in payments on housing loans was stable and relatively small in all years examined (except 2004). Overall, the housing market abetted the growth of private consumption expenditure in recent years.

The rest of this study is structured as follows: Part 2 presents the data and provides a brief statistical description; Part 3 describes the estimation and its outcome; Part 4 relates to the contribution of the housing market to the development of private consumption; and Part 5 concludes.

[3] Here and hereinafter, household private consumption expenditure is total consumption expenditure net of actual or imputed expenditure on housing services.

2. Data

Two main sources of data underlie the analysis. The first is the CBS Household Expenditure Survey, which yields data on private consumption expenditure and income of households in Israel and additional household characteristics such as region, marital status, and characteristics associated with consumption of housing services—residence in owned or rented accommodations and the number of rooms in the dwelling at issue. The survey also provides information on household financial income and expenditure and, particularly, payments related to housing loans. The quality of the financial data in this survey has not been examined thus far. This study presents an opportunity to test these variables and assess their relations with other household characteristics. The second major source of data is a file of housing transaction prices—sale and rental—processed by CBS, including information on the average quarterly price in these transactions, parsed by regions and dwelling size. Below we also relate to alternative metrics for these prices.

a. General household characteristics

The Household Expenditure Survey is published annually but its data are gathered all year long and include household and consumption indicators. Since the purpose of this study is to test the effect of long-term changes in dwelling value on consumption, the time dimension is crucial. To enhance the accuracy of the analysis, we use the variance that exists among individuals in each period, i.e., we generate estimates by means of a panel. Since each household in the Expenditure Survey sample is sampled only once, we use the conventional pseudo-panel approach by aggregating them into categories typified by certain characteristics, yielding homogeneous cells in regard to these characteristics, to which we relate as though they were panel observations. This method, of course, allows aggregation on the basis of different characteristics, yielding different panels.

Table 1 shows the distribution of the basic characteristics of the research population in the sample. Since the variables undergo little change over the sample years, we present the average for the entire period. All frequencies are shown after being inflated by the appropriate weights in accordance with the survey sampling.[4]

[4] The data presented, and their analysis below, omit households in Judea-Samaria because we do not have measurements of home and rent prices for this region. We also omit observations for which ages below 20 or over 99 are recorded, individuals who neither own nor rent their accommodations (key money, kibbutz, etc.), observations showing negative household income, and observations that yielded a >3 ratio of consumption (net of housing) to net income (net of imputed housing). The omitted observations are 8 percent of the total sample in the surveys.

Table 1. Basic characteristics of the data (heads of household), 2003–2011

Age group	Frequency in sample
20–34	19.0
35–44	20.4
45–54	20.9
55–64	17.6
65+	22.1

Region *	Frequency in sample
1—Jerusalem	9.0
2—Tel Aviv	8.7
3—Haifa	10.1
4—Dan	12.3
5—Central	17.9
6—Southern	13.9
7—Sharon	13.3
8—Northern	15.0

* Excl. Judea-Samaria and Haifa suburbs

Owner-occupier	Frequency in sample
Yes	74.4
No	25.6

Number of rooms	Frequency in sample
1	9.5
2.5–3	31.4
3.5–4	38.3
4.5+	20.8

Individuals in household	Frequency in sample
1	16.9
2	25.3
3	16.2
4	17.2
5+	24.5

Breadwinners in household	Frequency in sample
0	24.3
1	33.9
2+	41.8

An accepted method for sorting the data is by cohorts, i.e., reference to individuals who share a major indicator—year of birth—over time (e.g., Campbell and Cocco, 2007; Attanasio et al. (2009); Smith, 2010) and examination of changes in behavior in conjunction with change in age along the timeline of the data. This approach may be used when the research period is long enough to allow a large portion of the lifecycle to be tested. However, since we have less than a decade of surveys to work with, the reference to the sample members' age group resembles the cohort distribution.

The cells for which we chose to generate the panel and estimate the model are based on owning or renting a home, age group, and region—eighty different cells in all (5 age groups * 8 regions * 2 ownership groups) in each period. These indicators are the ones most likely to differentiate among households in the effect of house prices on household consumption.[5]

For the other characteristics indicative of any household such as size, number of breadwinners, and marital status, each cell in the panel includes the average value of this characteristic in the population of the cell.[6] For example, if a dummy variable is

[5] Age is certainly an exogenous variable. Home ownership and region may be affected by changes in house prices and other factors; here, however, we assume that they are given—a reasonable proposition given the relatively short time period of the analysis.

[6] In further checks that we performed (not presented), we found that changes in the mean level of schooling among households in the cell and the share of Jewish households in the cell have a

assigned the value of 1 for a married head of household and 0 otherwise, it would receive, in each cell, the value between 0 and 1 that expresses the proportion of households in the cell that are headed by a married person.

Another indicator of the population is dwelling size, expressed in number of rooms. Although we relate to this characteristic by adjusting the data on house and rent prices to each individual, we did not choose it as an identifying characteristic of the cells in the panel. This is because the cells resulting from a distribution that also takes account of the number of rooms would have too few observations to allow reliable analysis.

Table 2. Average observations of panel cells

	Home owners	Renters
20–34	16.2	17.5
35–44	26.6	9.4
45–54	30.2	6.6
55–64	26.4	4.7
65+	30.7	8.4

Table 2 shows the average number of observations (over time and across regions) in each cell before appropriate weighting of the sample. It is evident that home owners far outnumber renters among the sample, according to their share in the population, in each age group other than the youngest. Therefore, the ability to analyze renters' behavior, particularly on the basis of age groups, is more limited than the possibility of analyzing the behavior of home owners, who in any case are the majority of the population.

Table 3a presents the average share of renters by regions and age groups during the sample period. This indicator declines steadily and inversely to age group up to age 64; then it rises again, probably because some members of the oldest population move to rented sheltered housing. The proportion of renting is highest in the Tel Aviv region.

significant effect. Their inclusion, however, makes no meaningful difference as to the results obtained for the effects of the other variables, particularly those related to the housing market.

Table 3a: Proportion of renters by region and age group, 2003–11 average

	20–34	35–44	45–54	55–64	65+	Total
1—Jerusalem	0.59	0.32	0.24	0.19	0.20	0.32
2—Tel Aviv	0.84	0.58	0.33	0.23	0.18	0.48
3—Haifa	0.65	0.33	0.21	0.16	0.24	0.31
4—Dan	0.58	0.35	0.21	0.14	0.15	0.28
5—Central	0.40	0.23	0.13	0.13	0.15	0.21
6—Southern	0.46	0.25	0.17	0.16	0.36	0.29
7—Sharon	0.39	0.20	0.15	0.11	0.17	0.20
8—Northern	0.26	0.13	0.10	0.10	0.25	0.16
Total	0.51	0.27	0.17	0.14	0.21	0.27

Table 3b: Proportion of renters by region and year, 2003–11

	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
1—Jerusalem	0.26	0.32	0.28	0.29	0.37	0.33	0.38	0.32	0.35	0.32
2—Tel Aviv	0.44	0.44	0.46	0.49	0.49	0.47	0.51	0.48	0.50	0.48
3—Haifa	0.25	0.27	0.33	0.29	0.34	0.32	0.33	0.33	0.33	0.32
4—Dan	0.28	0.27	0.26	0.29	0.29	0.27	0.25	0.31	0.32	0.29
5—Central	0.21	0.20	0.20	0.21	0.22	0.24	0.20	0.22	0.22	0.22
6—Southern	0.31	0.26	0.27	0.28	0.29	0.28	0.30	0.31	0.28	0.29
7—Sharon	0.19	0.20	0.19	0.22	0.23	0.18	0.21	0.20	0.19	0.21
8—Northern	0.16	0.15	0.17	0.19	0.15	0.17	0.15	0.17	0.16	0.17
Total	0.25	0.25	0.26	0.27	0.28	0.27	0.27	0.28	0.28	0.27

While the proportion of renters did not change much over the years, a mild upward trend did ensue in 2007, chiefly in the major cities (Table 3b). Observation of the age structure of owner-occupiers as opposed to that of renters (Table 3c) shows that the age distribution of owner-occupiers is relatively balanced, apart from a smaller share of the very youngest. In contrast, a large proportion of renters, some 40 percent, is under age 35.

Table 3c: Age structure of home owners and renters, 2003–2011 (percent)

	Home owners	Renters
20–34	14.2	39.8
35–44	20.9	20.9
45–54	22.3	13.0
55–64	19.5	9.0
65+	23.0	17.3
Total	100	100

Turning to the share of rent in total expenditure among renting households parsed by region and age, we find that, generally speaking, this indicator rises for the 65+ age group (Table 4a). Furthermore, the share of expenditure on rental of housing is greater in the Tel Aviv and Dan regions than in the other regions. The proportion of rent in total expenditure did not change meaningfully over the years; it ranged from

0.22 to 0.26 in all age groups other than the oldest, for which the range is 0.24–0.29 in the relevant years (Table 4b).

Table 4a: Proportion of rent expenditure in total expenditure, renters only, 2003–11 average

	20–34	35–44	45–54	55–64	65+	Total
1—Jerusalem	0.25	0.23	0.20	0.18	0.27	0.24
2—Tel Aviv	0.29	0.30	0.27	0.23	0.26	0.28
3—Haifa	0.21	0.24	0.24	0.25	0.27	0.24
4—Dan	0.27	0.28	0.29	0.29	0.38	0.29
5—Central	0.24	0.23	0.25	0.27	0.34	0.25
6—Southern	0.19	0.17	0.16	0.21	0.20	0.19
7—Sharon	0.25	0.24	0.27	0.28	0.32	0.27
8—Northern	0.19	0.16	0.17	0.16	0.17	0.17
Total	0.24	0.24	0.23	0.24	0.26	0.24

Table 4b: Proportion of rent expenditure in total expenditure, renters only, by age and year

	20–34	35–44	45–54	55–64	65+	Total
2003	0.26	0.23	0.26	0.24	0.24	0.26
2004	0.24	0.24	0.24	0.26	0.26	0.25
2005	0.25	0.25	0.23	0.23	0.23	0.24
2006	0.23	0.22	0.22	0.24	0.24	0.23
2007	0.23	0.23	0.22	0.22	0.22	0.23
2008	0.24	0.22	0.21	0.23	0.23	0.23
2009	0.26	0.25	0.23	0.23	0.23	0.25
2010	0.24	0.24	0.24	0.25	0.25	0.25
2011	0.25	0.26	0.22	0.23	0.23	0.25
Total	0.24	0.24	0.23	0.24	0.24	0.24

b. Private consumption

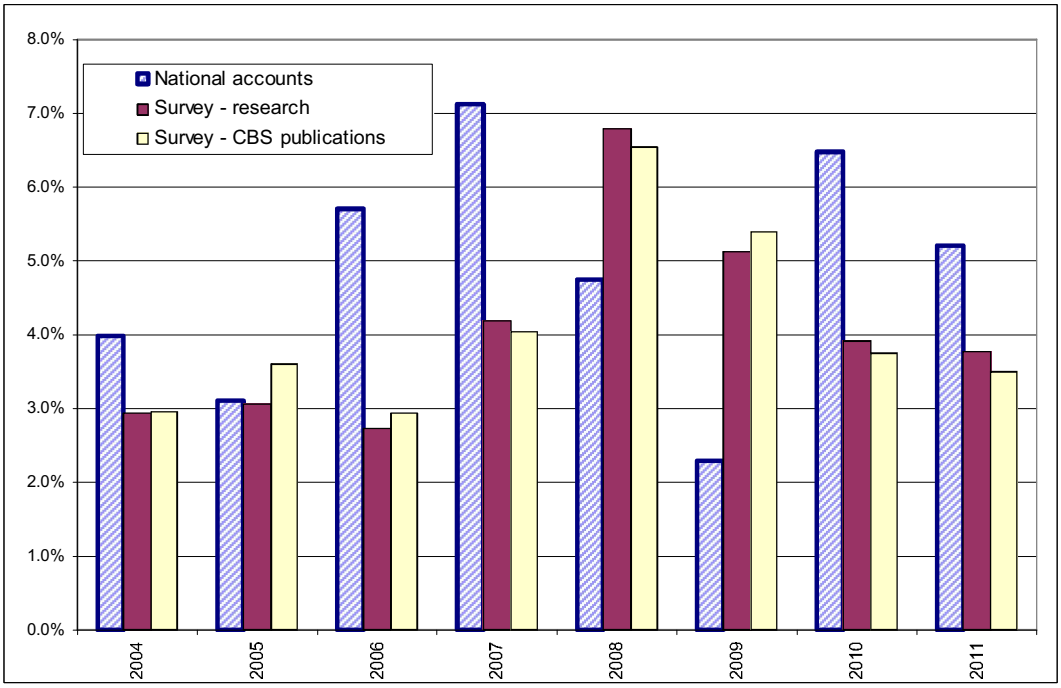
The private consumption that we are examining is total household consumption expenditure net of expenditure on housing services. For home-owning households, we subtract imputed expenditure; for renting households, we subtract actual payment of rent. The data are shown in current prices deflated by the Consumer Price Index net of its housing component. The use of private consumption expenditure data from the Household Expenditure Survey allows us to examine households' behavior in consideration of various household characteristics, particularly the development of regional housing prices and dwelling size. Our ultimately aim, however, is to determine the effects of the housing market on aggregate private expenditure, as reflected in National Accounts data.

Figure 1 shows the average annual rate of change in households' private consumption expenditure according to data published by CBS from the Expenditure Survey, the survey data as processed by us, and National Accounts data, reconciled as far as possible with the respective definitions in the Expenditure Survey.[7] There is a

[7] Household expenditure on private consumption, excluding NPOs that serve households and net of expenditure on housing services.

small difference between the published Expenditure Survey data and those that we calculated because we use a slightly different sample, as specified in Note 4. The difference relative to the National Accounts data, however, is not negligible. The National Accounts data, while also based on the Household Expenditure Survey among other sources, are adjusted by means of miscellaneous sources such as those on imports of consumer goods, retail trade, and so on.[8] The difference in the direction of developments between 2007 and 2009 is particularly salient: during this time, the national accounting shows a slowdown in the pace of increase in household private consumption whereas the Expenditure Survey shows acceleration. In 2010, too, the National Accounts data indicate acceleration and the Expenditure Survey data show the opposite.

Figure 1. National Accounts data (striped columns) vs. Household Expenditure Survey data, annual average nominal rates of change



Consumption of durables and non-durables —Total private consumption is customarily divided into two main groups: consumption of non-durables such as food, clothing, or services, and consumption of durable goods, those purchased at a specific time but consumed over time, such as cars and refrigerators. Theoretically, for goods that have relatively long life spans, consumption should be imputed for a specific period for only part of the value of the product acquired, as opposed to charging its entire value to consumption at point of purchase.[9]

[8] For certain goods and services, e.g., purchases of durable goods, national accounting is based on data on imports of goods. Other elements of consumption are adjusted on the basis of turnover and domestic production data.

[9] The household expenditure data impute the use value of a motor vehicle periodically; therefore, we have no information about motor-vehicle purchase expenditure at any specific point in time. In the

The exact definition of consumption of durable goods is not unequivocal. In our analysis, we make an effort to reconcile the components of the definition with that of the National Accounts. Accordingly, we include furniture, electrical appliances, TV sets and DVDs, computers, and computer accessories. We do not include consumption of owned motor-vehicle services because, as this item is measured in the Expenditure Survey (see explanation in Note 9), it reflects decisions made not at that point in time but in the past; therefore, it cannot respond to changes in income in the current period.

Private consumption, according to the permanent income theory (with rational expectations), responds only to unforeseen changes in income (or property). Empirical studies, however, find only partial evidence that individuals behave as this theory says they should. (See Campbell and Mankiw, 1990, and Lavi, 1998.) Mankiw (1982), investigating Hall's permanent income hypothesis for durable goods separately, found that empirical behavior does not fit the hypothesis, which was tested for private consumption exclusive of durable goods and services. Furthermore, empirical studies that examined the response of durable-goods consumption to changes in income as distinct from consumption of non-durables found a stronger effect on durable-goods consumption than on consumption of non-durables. Examples are Souleles (1999), who examined the effect of tax refunds on consumption, and Chen, Chen, and Chou (2010), who investigated the effects of change in house prices on consumption of durables and non-durables with reference to the effects of the existence of a credit constraint on the response of consumption to changes in house prices.

Below we ask whether changes in house prices affect consumption of non-durables and durables differently.

c. Household income

The Expenditure Survey includes information about total household income and its origins. Total gross income is composed of labor income, capital income (imputation of income from a dwelling, a motor vehicle, property rent—specifically from dwellings—and interest and dividends), pension and provident-fund income, and income from benefits and support. Non-consumption expenditure comprises compulsory payments and transfers. We define disposable income as total income less compulsory payments (taxes) and, for home owners, less the imputation of housing services. We separated rent income from disposable income and defined a two-part distribution: labor and transfer income net of taxes and capital income (without imputing income from a dwelling to home owners, and without rent income).[10] Table 5 shows the proportion of households that have rent income. The rate is 9 percent both for owner-occupiers and for those who live in rented accommodations but own another dwelling that they rent out.[11]

National Accounts, the full value of the vehicle is included in private consumption at point of purchase. The Expenditure Survey records all other durable goods at full value at point of purchase.

[10] Even though these taxes pertain to all forms of income, we subtracted them from labor income.

[11] This rate seems relatively low, given that some 30 percent of households are renters, even if some households rent out more than one dwelling. In other words, the share of households that have rent income appears to be underreported.

d. Housing loans

The survey questionnaire also solicits information about payments on loans related to housing (mortgage loans and others)—current payments and payback.[12] Some 40–45 percent of individuals were found to have a positive value on this payment line (Table 5). Half of the home owners make payments related to housing loans; only 8–9 percent of renters do so. We cannot determine whether all the others make no payments on housing loans or do not report them. According to these data, the share of households that incur housing loan expenses is declining somewhat. For individuals who make such payments, the share of the expenditure in net income (less imputation of housing services) is 20 percent.

Table 5. Housing market indicators—2003–2011

	Pct. making payments related to housing loans		Pct. share of *net* income spent on payments related to housing loans (housing services not imputed) among those who make such payments	Pct. receiving rent income		Pct. of rent income in total income among those receiving rent income
	Owner-occupiers	Renters		Owner-occupiers	Renters	
2003	45.1	10.6	22	7.5	10.6	16.7
2004	45.5	8.3	22	7.8	8.3	17.1
2005	46.2	9.2	22	8.6	9.4	17.2
2006	44.9	9.8	22	7.8	11.3	16.0
2007	44.6	9.0	20	7.8	9.1	15.0
2008	44.7	8.5	19	8.3	8.9	16.0
2009	42.9	8.0	19	8.6	9.0	18.0
2010	40.7	8.2	20	8.9	9.1	17.9
2011	40.4	8.0	19	8.8	10.2	20.2

e. Rent income

Eight to 10 percent of households earn income by renting out a dwelling (Table 5). Given that a higher share of renters out of all people report having rent income, home owners may be more inclined than them to underreport such income. For those who have rent income, it constitutes 17 percent of total household *gross* income (net of imputation of owner-occupier income derived from housing services). Table 6 shows the distribution of landlords by age and the nature of their own accommodations (owned or rented). Some 14 percent of those in the 35–54 cohort live in rented accommodations but also have income from renting out a dwelling that they own. This behavior—renting out their own home and moving to a rental unit for themselves—allows them to tailor their housing services to their needs. Among owner-occupiers who own another dwelling that yields rent income, the 54–65 age group figures rather strongly at 13 percent. Contrasted to the large proportion of young households that own one dwelling but do not occupy it, a large proportion of relatively old households owns more than one dwelling. In our analysis of the factors

[12] The Expenditure Survey questionnaire does not solicit information about total household liabilities and assets.

that affect private consumption (below), we separate income from different sources—labor, rental of a dwelling, and other capital.

Table 6. Percent of households with rent income, by age and home ownership

	Owner-occupiers	Renters
Up to 34	3.0	6.9
35–44	4.9	14.3
45–54	9.0	13.5
54–65	13.0	10.3
65+	9.8	6.3
Total	**8.2**	**9.5**

f. House prices

The main variable that we wish to analyze for its effect is the change in house prices. For this purpose, we adopt two approaches based on different sources of data. CBS calculates the quarterly average dwelling price by region and number of rooms, basing itself on the totality of transactions carried out during the relevant quarter. This series, based on actual transactions concluded in each period, is not adjusted to changes in quality. The House Price Survey series is different: published each month and based on the same transactions, it calculates the change in prices on the basis of weights of different types of dwellings in housing stock (and not on actual transactions in each period) and also adjusts for changes in quality. Our check showed that the two series behave similarly over time. The correlation between house prices according to the quality-adjusted series (from the Survey) and house prices according to transactions is 0.97; the correlation of the rate of change is 0.61 (for quarterly data from 2003 to 2011).

Table 7. Real annual change in house prices, by region, 2003–11

	Jerusalem	Tel Aviv	Haifa	Dan	Central	South	Sharon	North	Total
2003	-2.2	-3.5	-2.6	-1.9	-2.0	-0.3	-0.5	-4.1	-0.5
2004	11.6	1.3	-8.7	-6.6	-9.7	-6.5	5.9	-3.6	1.5
2005	2.9	10.1	10.6	2.5	13.9	3.4	7.2	-1.2	6.9
2006	7.4	-7.7	-14.6	-1.1	-15.5	2.7	-4.4	-5.5	-3.0
2007	2.3	19.2	-10.9	3.0	13.2	4.0	6.5	-6.9	2.2
2008	6.9	-0.7	1.2	18.3	9.1	4.0	2.8	-6.0	-0.6
2009	11.5	29.5	14.0	14.4	21.4	17.3	18.2	5.3	18.2
2010	12.0	14.1	9.0	10.5	18.5	12.1	8.6	18.6	14.2
2011	6.0	-7.1	13.0	-3.5	0.2	-0.4	-2.9	27.3	-2.4

* The total includes the Haifa suburbs, which are omitted from this study.

Table 7 presents the real rates of change (deflated by the Consumer Price Index) in regional house prices as measured by CBS. The sizable variance among the regions stands out, mainly up to 2008. In 2009 and 2010, however, all regions reported hefty price increases. In 2011, regional variance widened, with prices continuing to increase in some regions and the trend changing in others. Again, these prices are based on actual transactions in each region and are not adjusted to the region's weight in housing stock; thus, they are more volatile than those in the CBS price survey series.

The variance in development among the regions underscores the need to use detailed data when analyzing the behavior of different households. Wishing to fit each observation in the income survey to the housing price that best approximates the one that reflects the household's dwelling, we match each household to the respective price according to the indicators of the region and the number of rooms in its dwelling, as reported in the survey.

The Household Expenditure Survey also includes a variable describing the value of the dwelling that the household owns (for owner-occupier households only) in the head of household's estimation. We examine this value as an alternative to the macro variable described above.

It is true that individuals' valuations may not measure the market value of a dwelling correctly. Such valuations are, however, more accurate in reflecting values that home owners attribute to their assets, on the basis of which they act and, particularly, set their level of consumption. Since this information exists for each and every household, it gives a reflection of the various characteristics of the dwelling. Conversely, the advantage of using aggregate data is that it reduces the possibility of endogeneity of dwelling value relative to private consumption.

To know how a change in the market value of dwellings affects consumption, one may directly examine the effect of such a change on consumption even if the value is different from the one that an individual estimates subjectively. An alternative way is to test the effect of a change in individuals' valuation of their dwellings and to link this change to change in the real price.

Figure 2a. Average house price as measured by CBS (thin line) and individuals' valuation (thick line), by region, 2003–11

Regions: 1—Jerusalem, 2—Tel Aviv, 3—Haifa, 4—Dan, 5—Central, 6—Southern, 7—Sharon, 8—Northern

Figure 2b. Change in average house price as measured by CBS (thin line) and individuals' valuation (thick line), by region, 2003–11

Regions: 1—Jerusalem, 2—Tel Aviv, 3—Haifa, 4—Dan, 5—Central, 6—Southern, 7—Sharon, 8—Northern

Figures 2a and 2b show the level and rate of change in (average) housing prices by regions and the average change in individuals' valuations parsed by regions. It is evident that the average price level estimated by individuals resembles the measured one but exceeds it slightly in some regions. The series correlate rather well even in the rate of change—around 50 percent—but the changes are more volatile in individuals' valuations than in prices as measured.[13]

A simple check for the relation between the change in measured price and change in individuals' valuations of their dwellings, based on data aggregated by regions and age groups (5*8=40 groups) for home owners only, shows that the correlation between these rates of change in data aggregated by cells is 0.50. The relation obtained in a simple equation is the following (standard deviations in parentheses):

$$\text{drapval} = -0.002 + 1.015\ \text{drp\_own} \qquad R^2=0.25$$
$$(0.005)\quad (0.04)$$

drp_own—real change in price measured by CBS, by region and number of rooms;
dapval—real change in average valuation of dwelling by dwelling owner.

Thus, there is no bias in individuals' estimates of change in the value of their dwellings relative to the measured changes, parsed by dwelling size and region.

[13] Romanov, Fleishman, and Tur-Sinai (2011) show, by contrasting individual-level data from the Household Expenditure Survey with the pool of transactions, that self-valuation exceeds market price by 27 percent on average.

In addition to the prices mentioned above, we were able to access series of regional housing prices adjusted for quality.[14] The development of quality-adjusted prices in the various regions over time resembles that of raw prices, although in some regions, Tel Aviv in particular, the upward trend in recent years is milder when the change is adjusted to dwelling composition and quality. Below we test this series, too, as part of the estimation.

g. Rent

Apart from data on house prices, CBS gathers data on average rent, parsed by regions and number of rooms. We include these data to explain the private consumption of households that rent their accommodation. Table 8 presents the changes in rent as determined by this metric. Variance among regions exists but less so than in house prices. The beginning of the period was typified by a decrease in rent prices; toward the end, however, particularly in 2009, rent went up in most regions.

Table 8. Real annual change in rent, by regions, 2003–11

	Jerusalem	Tel Aviv	Haifa	Dan	Central	South-ern	Sharon	North-ern	Total
2003	-5.4	-9.5	-8.2	-6.2	-3.7	-4.5	-3.5	-6.6	-6.9
2004	-4.3	-6.2	-4.7	-1.9	-2.0	-3.3	-3.6	0.8	-4.2
2005	3.1	6.0	1.8	3.3	4.0	3.3	4.7	-0.9	4.4
2006	-5.1	-0.2	-7.2	-5.9	-5.8	-6.5	-5.3	-3.6	-4.5
2007	-1.3	5.7	-7.8	-1.2	-2.0	-6.3	2.3	-5.8	-1.4
2008	3.5	-0.9	1.5	8.5	12.5	5.0	4.5	5.0	3.6
2009	10.8	10.1	2.8	7.0	7.3	8.4	7.0	3.7	8.3
2010	3.0	6.5	6.2	3.4	4.3	1.4	5.0	5.1	5.2
2011	-3.3	5.2	6.0	4.6	2.3	3.8	6.6	1.8	2.5

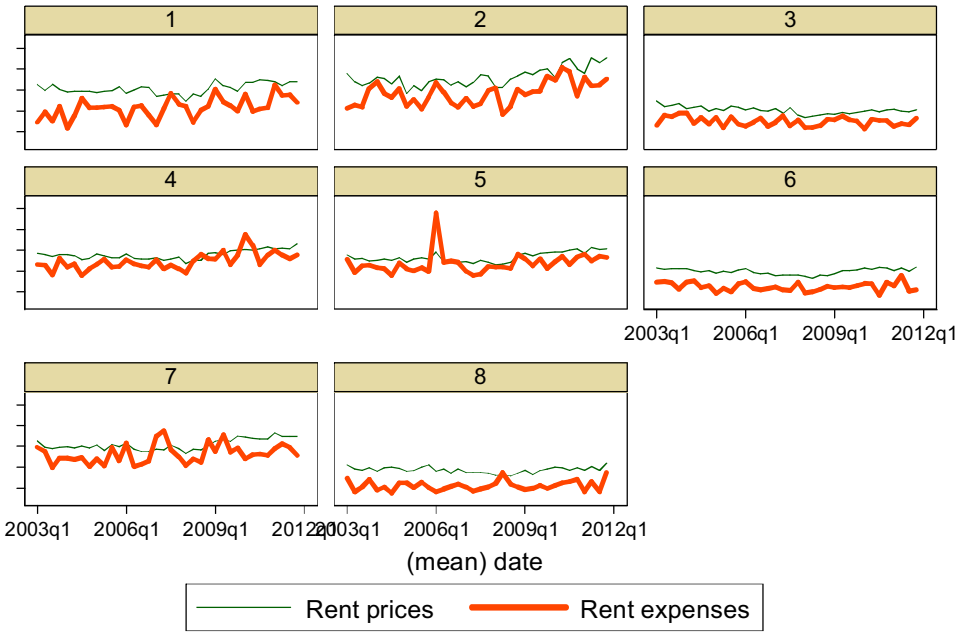
* The total includes the Haifa suburbs, which are omitted from this study.

In addition to these data, the Household Expenditure Survey provides data on rent payments actually made by renting households. Examining the relation between the two magnitudes, we find that, in most regions, actual average rent payments by members of the sample are lower than the average rent level in the same region as measured by CBS (Figures 3a, 3b). It also seems that the average rates of change in actual payments are larger and the series is more volatile, across the entire sample, than changes in the CBS index of rent prices. This is due, among other things, to change in the composition of the population into cells relating to dwelling size and other characteristics in different periods.

In the estimation that follows, these alternative metrics are put to an alternative use. While rent payments relate to actual household expenditure, something that we wish to measure for private consumption as well, they are somewhat endogenous. The regional rent index is exogenous to every household but is less effective in expressing actual changes in households' rent expenditure.

[14] We thank Doron Sayag of the Central Bureau of Statistics for making these data available to us. They were calculated using the conventional methodology in a professional literature, as described in CBS Paper No. 51. The data are not part of the official statistics that CBS publishes regularly.

Figure 3a. Rent prices as measured by CBS (thin line) and actual rent payments (thick line), by region, real terms



Regions: 1—Jerusalem, 2—Tel Aviv, 3—Haifa, 4—Dan, 5—Central, 6—Southern, 7—Sharon, 8—Northern

Figure 2b. Change in rent prices as measured by CBS (thin line) and in actual rent payments (thick line), by region, 2003–11

Regions: 1—Jerusalem, 2—Tel Aviv, 3—Haifa, 4—Dan, 5—Central, 6—Southern, 7—Sharon, 8—Northern

Regions: 1—Jerusalem, 2—Tel Aviv, 3—Haifa, 4—Dan, 5—Central, 6—Southern, 7—Sharon, 8—Northern

h. Relation between house prices and rent prices

Figure 4 contrasts the rate of change in house prices by regions and number of rooms with the rate of change in rent prices following the same breakdown. The rates of change in both magnitudes, for each of the groups, are very similar (>80% correlation). Therefore, when one investigates the effect of changes in home and rent prices on households' consumption, one should bear in mind the correlation (multicollinearity) between these magnitudes.

Table 9 shows the correlation among different indicators of house and rent prices. The data indicate that the correlation between change in house prices by region and number of rooms and change in the index based on the Housing Price Survey is only 22 percent. The change in households' self-valuation corresponds more strongly to regional changes and number of rooms than to changes in the overall index.

A 90 percent correlation exists between changes in house and rent prices when the metrics are parsed by regions and dwelling size, as against only 27 percent for the aggregate data. The rent data show a weak correlation between measurement parsed by regions and dwelling size and total measurement, and the change in actual payments is correlated with the regional index and weakly correlated with the total rent index. This check again demonstrates the importance of observations that allow regional differentiation in the development of house and rent prices.

Figure 4. Change in house prices (thin line) and rent prices (thick line), by region*

* The data are shown for a panel defined by region and rooms in accordance with the existing distribution of prices reported by CBS. The first digit denotes one of the eight regions; the number of rooms is aggregated into two groups: 1–3 rooms and 4+ rooms.

Table 9. Correlation between rates of change of various owned-housing price and rental indices, measured on the basis of actual transactions: distribution into cells parsed by regions, age, and home ownership, 2003–11

	Change in house prices, by region and no. of rooms	Change in house prices, overall avg.	Change in rent prices, by regions and no. of rooms	Change in rent, overall avg.	Change in actual rent payments**
Change in household self-valuation of price *	0.50	0.03	0.47	0.04	—
Change in house prices by region and no. of rooms		0.22	0.90	0.11	0.29
Change in house prices, overall avg.			0.13	0.27	-0.04
Change in rent prices by region and no. of rooms				0.21	0.30
Change in rent prices, overall avg.					0.06

* Calculated for home owner cells only. ** Calculated for renter cells only.

Mindful of the strong correlation between the index of house prices and rent prices, in addition to the estimation that relates to the entire population, we also estimated equations in which only the relevant magnitude (dwelling value or rent) is assigned to each group (home owners/renters) and estimated equations for each group separately. Since the share of renters in the population is rather small, the estimation for this population, divided into cells by regions and age, is less effective than that for home owners, who account for most of the population. Since only about one-fourth of households rent their accommodations, the analysis of home owners' behavior and the effect of house prices on their consumption will explain a large proportion of aggregate consumption.

3. Estimation

a. Estimation details

The dependent variable in the equations estimated is the real rate of change in private consumption net of housing services. We estimated the model by panel GLS estimation, one that relates to characteristics of the cells (region, age, home ownership) and allows for serial correlation over time, with the possibility of a different correlation for each cell in the panel and heteroskedasticity among the panels.[15]

The distribution into cells based on home ownership vs. renting, region, and age group creates eighty groups in each period of time. The estimation is performed for 2003–2011 on a quarterly basis.[16] Overall, excluding first periods for some variables due to the use of lags, the equations are estimated for approximately 2,600 panel observations.

[15] The equation was estimated by performing an XTGLS procedure using Stata12 software with a corr(psar1) panel(hetero) option that allows serial correlation (different from one panel to the next) and heteroskedasticity among the panels.

[16] We also estimated some of the specifications at semiannual frequency to attenuate the volatility caused by the use of quarterly data in the annual Expenditure Survey. The results were essentially the same and are not presented.

The factors that affect private consumption are estimated for the entire population and for subgroups. The main differentiation is between owner-occupiers and renters. We also tested separate age groups. The different versions of the estimations are shown in Tables A-1–A-10 at the end of this paper.

Since the cells are characterized by region, age, and home ownership but the composition of the other traits in each cell may vary over time, we also included the inter-period change in the average value of the defining characteristics of each cell, in order to control for the effect of these changes. Therefore, all demographic characteristics such as number of persons in the household, a dummy for being married, and the like, are included in the equation at their rate of inter-period change.[17]

All control variables that appear in the versions presented are usually significant at 5 percent at least and act in the expected direction. An increase in the number of rooms, the proportion of households headed by a married person, the number of breadwinners in the household, household size, and the share of households that belong to the upper clusters in their localities abets a greater change in private consumption expenditure. Conversely, a larger share of immigrants has a downward effect on the rate of change in private consumption. Interestingly, the share of immigrants has an especially visible effect on change in consumption expenditure on the group that has a head of household older than 55, chiefly among owner-occupier household and less so for renters.

b. Income and (nonhousing) property variables

The main factor that affects consumption decisions is household income. In the Household Expenditure Survey, one may separate total gross income into labor income and capital income (the latter including imputation of the value of housing services), rent income (from an owned dwelling that is rented out), pension and provident fund income, and benefit and support income. There is also information about total compulsory payments—various taxes—by the household. We choose to separate rent income from other household income. In addition to the main version, which includes total other net income (in addition to rent income and without imputation of housing services), we also estimate a version that separates labor and transfer payment income net of compulsory payments[18] from capital income (net of imputation of housing-services value and rent income). This division allows us to relate separately to the effects of labor income and capital income on private consumption. The effect of total household disposable income is obtained in all estimations at around 0.4–0.5—similar to that obtained in other studies (e.g., Cocco and Campbell, 2007; Case, Quigley and Shiller, 2011; Smith, 2010). We treated the property or capital-income effect by including macro variables such as change in the Tel Aviv 100 index or change in the real value of the public's portfolio of financial assets, both at different lags. We also included the real one year yield on government bonds (at a one period lag), a metric that reflects the return on interest-bearing assets

[17] See also note 6.

[18] We subtracted all compulsory payments from labor income even though some taxes pertain to other income.

and serves as an indicator of credit cost. Finally, we included a variable that describes the change in payments on housing loans, obtained from the Expenditure Survey.

Dividing disposable income into labor income and other income, we find in all versions that the propensity to consume is much greater out of labor income (0.30) than out of other income (0.06). Other income may serve as an estimate of capital income (albeit of dubious reliability) that affects private consumption positively. In contrast, we are unable to obtain a significant effect of the share index or the portfolio of assets on private consumption. As mentioned in the Introduction, an abundance of articles in this field has found that financial property has a smaller effect on consumption than dwellings. Other articles arrive at the opposite result. We should also mention that other studies on the Israeli economy that use macro data usually include only an indicator of financial property, in many cases an aggregate share index. Other studies include total property of individuals, not distinguishing between financial and physical property.

In all versions that we estimated, we found a significant positive effect of rent income on private consumption with a small coefficient of 0.01–0.03 for both owner-occupier households and renting households that also rent out a dwelling that they own.

Change in expenditure on housing loans has a significant negative effect on consumption, at 0.03 for the entire population and for home owners. Usually, however, this variable is of marginal significance among renters, being relevant for only a minority of them.

The change in real short-term return is found to have a significant negative effect on an increase in private consumption in most versions. According to the results of this estimation, the negative substitution effect of short-term interest exceeds the positive effect of income.

c. Effect of the macroeconomic situation

In all versions, we give expression to the economic business cycle by including the change in unemployment in the household's region of residence. This variable is found to have a negative and significant effect on change in private consumption in most versions of the estimation equations. Thus, the aggregate economic situation affects individuals' behavior in a manner that transcends the indirect effect of household income, evidently due to its influence on household decisions about future income and, particularly, the risk of future impairment to this income.

d. House and rent prices

The main variable in this study, the change in house prices, is included in most estimations as the price measured by CBS according to dwelling size and region. In an alternative version, we include home owners' self-valuation to ask whether individuals act on the basis of their subjective valuation of their dwelling or whether the average price by region and number of rooms better reflects the impact of dwelling value on consumption. The estimations also included references to alternative versions of rent prices—the CBS rent index, calculated on the basis of dwelling size and region, and actual household rent payments.

We test the effect of a change in house prices and a change in rent costs for three population groups—the total population, owner-occupier households (70 percent of all households), and renting households. Since only 30 percent of the population rents,

the sampling for this group is not as effective; the results obtained for it should be treated cautiously.

d1. House prices: developments in the housing market affect owner-occupier households and renting households differently. Ostensibly, home owners can estimate that the value of their property rises when house prices rise and increase their consumption for this reason. Renters cannot do this and may even believe that an increase in house prices worsens their situation by forcing them to save more so that they can afford to buy a dwelling in the future.

The estimation results show that an increase in house prices has an upward effect on consumption, particularly that of owner-occupier households. A strong and significant effect is obtained for the middle-aged group—35–55—which accounts for 43 percent of all owner-occupier households (Table 3c) as against an insignificant effect of house prices on the consumption of young or old households.

This outcome reinforces the proposition that the wealth effect is more meaningful than the liquidity effect, which one expects to find of greater importance for younger households. This effect may not be perceptible among the very oldest households because their future path of consumption and expenditure is prone to greater uncertainty.

To test the average effect of changes in price on household consumption, we perform an estimation for the entire population (Table A-1). According to Equations (1)–(3) in Table A-1, a 1 percent increase in real house prices should raise the average household's private consumption (net of housing services) by 0.15 percent. Due to the strong correlation between change in house prices and change in rent prices, the ability to estimate the effect of each of these prices is impaired. Therefore, we estimate the effect of house prices on owner-occupier households and that of rent prices on renting households separately.

Table A-2 presents similarly structured equations for the entire population but includes separate housing-related variables for each group—owners and renters. Thus, column (1) reports the effect of house prices on owner-occupier households and the effect of change in the rent price index for renters only. This version, which zeroes out the correlation between house prices and rent prices in the estimation by assigning each price to a different group, shows that the effect of house prices on home owners' consumption is 0.18. The use of households' self-valuation of dwelling value yields a weaker effect—0.08–0.10.

In a third version, we estimated equations for each population group—home owners and renters—separately. In the home-owners–only estimation (Table A-3) , we found that a 1 percent real increase in house prices is likely to raise home owners' consumption by 0.19 percent. When the household estimates that house prices have gone up by 1 percent (Table A-4), its private consumption expenditure increases to a slightly smaller (but not significantly different) extent—0.1 percent.

Many studies in this field describe a similar effect of asset value on people of different ages (e.g., Tobing, 2011; Li and Yao, 2007; Bover, 2005; Attanasio et al., 2009). The elderly are expected to increase their consumption more in response to an upturn in asset prices because they do not need to save for a future increase in the price of housing services. Our results show a stronger positive response of older people to an increase in dwelling value only when home owners' self-valuation is used. When we base our estimation on prices as measured by CBS, we find that it is

in fact the middle-aged group (35–55) that responds significantly and positively to an increase in house prices.

d2: Rent prices: For the population at large and in the estimate for renters only, we include a variable relating to rent expenditure measured in different ways. Given the strong correlation in behavior between house prices and rent prices, it is hard to test the effect of both magnitudes on consumption expenditure concurrently.

In the estimation for the entire population, we find that a 1 percent real increase in rent reduces consumption (net of rent payments) by 0.2–0.3 percent. When we assign the change in rent to renters only (Table A-2), creating a version that allows rent prices to affect the renting population only (Table A-2), the rent index shows a negative coefficient (-0.3 percent). Since rent payments account from one-fourth to one-third of total consumption expenditure, this coefficient means that an increase in rent expenditure causes other consumption to contract by a similar magnitude (in absolute value). When we include actual rent payments as an alternative (a two-period average at a one-period lag) to obtain a better representation of actual household expenditure, again we find a significant, albeit smaller, negative effect on the consumption of renting households, at 0.13.

In the estimation that includes renters only (Tables A-5 and A-6), the results obtained resemble those obtained in Table A-2: an increase in rent, as measured by CBS, has a 0.3–0.4 negative effect on these households' consumption.

The use of actual payments (three-quarters average at a one-quarter lag) yields a negative and significant but smaller effect (-0.15) on renting households' other consumption. Parsed by age groups, the use of the rent index and actual payments elicits different results. Whereas measurement by the rent index reveals a strong and significant effect on the two middle-aged groups (35–55), the use of actual payments shows a significant effect on young households as well as those of middle age.

Unexpectedly, a change in house prices is found to have a positive and significant effect on renting households' consumption when actual payments are used. The explanation for this may trace to the strong correlation between house prices and rent prices.

d3. Estimation for households that have no rent income: The data in our possession allow us to determine whether households own or rent their accommodations but offer no information about ownership of additional dwellings (that the household does not inhabit). We do, however, have data on households' rent income from a dwelling (insofar as such income is reported); this allows us indirectly to detect households that own an additional dwelling. Including these households' income separately in the estimation, we find a positive effect. (See Section 3b above.) Alternatively, one may use this variable to separate households that own only one dwelling from others. By estimating separately the effect of changes in house and rent prices only on households that have no rent income, we check whether the effect also exists when the dwelling (if there is one that is owned) is used only for the household's own housing services and is not rented out as part of a portfolio of assets. The estimation results for the population of households that do not have (or do not declare) rent income is shown in Table A-1-2. It is evident that the effect of changes in house prices hardly varies (it is slightly but not significantly lower) and the effect of changes in rent expenditure and the other variables is essentially the same. The estimation by age groups yields results that strongly resemble those in the estimation for the entire population. This outcome reinforces the finding that changes in house

prices affect private consumption even if they are not accompanied by a change in actual income.

d4. Different ways of measuring house and rent prices: In our main versions, we examine the effect of house prices on the basis of the detailed CBS series of average prices by region and number of rooms and match each observation with the price that belongs to it according to these two variables. The cells that we choose to define for the panel, however, are based on ownership, region, and age, meaning that each cell has a different composition of dwellings in terms of number of rooms. Therefore, the inter-period change in price as measured for the cell is also affected by change in the composition of the sampled persons' number of rooms.[19] One may aggregate the house and rent prices published by CBS by regions only (with no differentiation in the number of rooms) or use the total average for each region and number of rooms. Both metrics are less effective in matching the relevant price to the sampled household but are much less volatile. In addition, one may examine house prices on the basis of regional prices adjusted to quality (see Note 14 above) and the CBS Housing Price Survey, which also adjusts for changes in housing quality but offers the overall average only, with no differentiation by regions and number of rooms.

Figure 5. Change in real house prices by regions and rooms (thin line) and by region only (thick line), Jerusalem region, various ages

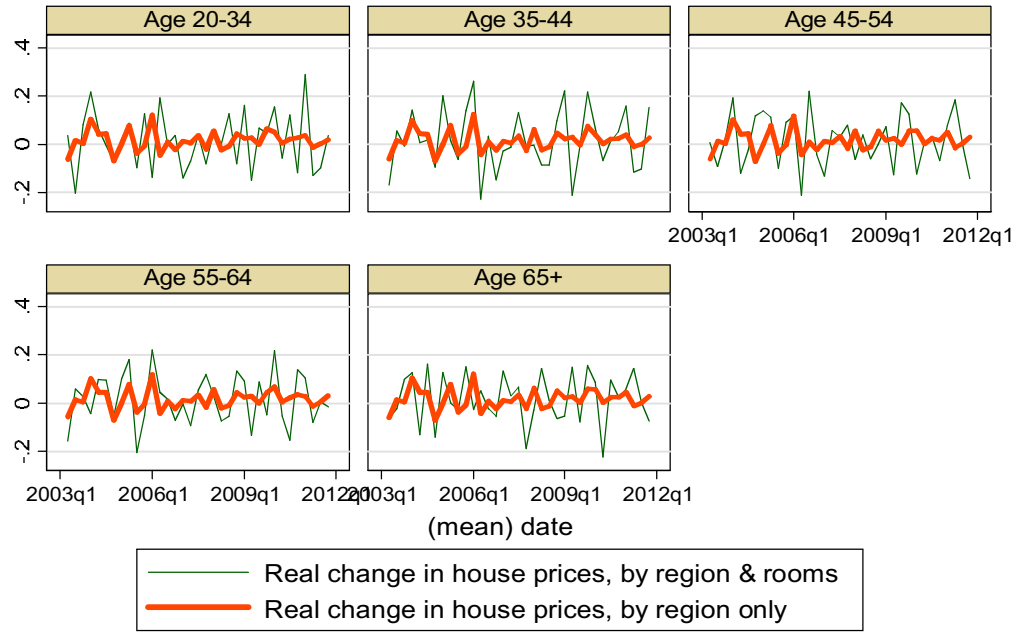


Figure 5 presents the change in (real) price by region and number of rooms and the change in aggregated price by region only, for different age groups of home owners in the Jerusalem region, as an example of the different nature of the series in

[19] The change in average number of rooms in each cell was included as an explanatory variable in all versions of the estimated equations.

the investigated cells.[20] The picture for renting is very similar. The correlation between changes in house prices by regions and rooms and those based on region only, distributed into the cells that we defined, is only 0.18. For rent prices, it is 0.24.

To accommodate the difference in the behavior of various indicators of house prices and determine which prices are more relevant—those purportedly representative of the variability of prices that represent the household's dwelling or a more inclusive index that represents macro developments—we estimated the equations in versions that include different metrics of house and rent prices. They are shown in Table A-7.

The table shows that house prices parsed by regions (not by rooms) have a borderline significant effect. However, the use of regional price series adjusted to quality makes the effect of price significant with a relatively large coefficient of 0.27. When average house prices according to the survey or according to total transactions are used, no significant effect of price on consumption is obtained.

We also examine a version that included change in relative dwelling price in a region and in the number of rooms of the household relative to change in average house price by two different measurements (Table A-7, Columns (5) and (6)). That is, we subtract the total price change from the local price change to leave only the relative change. In this version, a significant effect is obtained at a similar magnitude of prices.

In view of all these results, it appears that the more detailed prices, those that reflect changes in prices that are relevant to the household, are better than others at explaining the behavior of private consumption. Since the development of house and rent prices varies among regions and among different dwelling sizes, indices of total average price do not adequately describe dwelling value or rental payments that households anticipate. Therefore, these results do not reinforce the proposition that house prices reflect changes in expected income and not in property value. The results also support the assessment that the effect of house prices reflects not that of the general business cycle—which does not move in tandem with price cycles in the housing market (which are longer)—but rather the changes in house prices themselves.

e. Effect of expected house prices and price surprises

The literature that discusses the effect of income on private consumption customarily distinguishes between expected changes in income that have already been internalized and, therefore, do not affect current consumption, and unexpected changes, which are manifested in an adjustment of consumption. One may attribute this approach to the effect of changes in the value of individuals' property on consumption. To subject the claim that only surprise changes in property affect consumption to an examination, albeit an incomplete and simplistic one, we decompose the change in house prices to an expected portion and a residual. Lacking information about the expected price at any point in time, we use the conventional method—applying it, however, in a somewhat problematic way, mainly at turning points—of using a moving average several years back as an estimate of the expected price. We calculate the trend of prices in the trailing three or five years, parsed by regions and number of rooms and

[20] The behavior of average and survey prices strongly resembles the average of prices by region only.

the general price level, to obtain four possible ways of estimating the expected price. The residual is always the difference between the actual price in the given region and at the given number of rooms, a measure that we find relevant for individuals' decisions, and one of the four versions of the expected price. We re-estimate the preferred version of the equation for owner-occupier households, divided into the expected portion (trend) and the unexpected portion of the change in prices (residual). Table A-8 presents the results.

One may see that the trend portion has a relatively strong and significant effect on price. The residual from the price trend is significant and has a coefficient resembling that of the residual obtained for the entire observed price. There is no meaningful difference between the definitions of the trend in terms of the results. That is, one cannot state that the unexpected part, as defined, is the only part that affects changes in private consumption. This outcome does not contradict other empirical results, in Israel and abroad, that do not find full support for the permanent-income hypothesis.

f. Effect on consumption of durables and non-durables

As noted above, we examine the effect of changes in house prices on consumption of durables and non-durables separately. The results, shown in Table A-9, show that in the estimation for the entire population and for owner-occupier households only, changes in house prices have a much stronger effect on consumption of durable goods (as defined here) than that of non-durables. Much the same was found in studies abroad. (See Section 3b). However, since the coefficient for durable-goods consumption is roughly four times greater than that for non-durables consumption (0.52 vs. 0.14) while durable goods account for only 5 percent of total consumption in the data investigated (with no imputation of housing services), the absolute value of the increase in spending on durable goods due to an upturn in house prices is smaller than the increase in the consumption of non-durables. The estimation shows that the positive response of changes in current income and the negative response of short-term interest and regional unemployment are stronger for durable goods. Finally, changes in rent prices have a significant effect on the consumption of non-durables but not on consumption of durable goods.

g. Stability of relations in different periods

The period for which we estimate the relation between private consumption and housing prices is 2003–2011. House prices declined gently or remained stable in the first part of this period but rather quickly in 2009 and 2010 (Table 7). To test the stability of the relations that we found, we estimate the preferred version of the equation for the entire population in various subperiods (Tables A-10-1 and A-10-2). When the equation for 2003–2007 is estimated net of the last four years of the sample, the subperiod of rather vigorous price increases, the relation between house prices and consumption weakens and becomes insignificant; in contrast, when we omit the beginning of the period and leave ourselves mainly with the time of price increases, the relation remains positive and significant. Apparently, then, the perceptible and rapid price increases from 2008 onward had a stronger effect on private consumption, whereas the moderate and slow price decreases in the decade ending in 2007 had a weaker effect on households' behavior. Some of the increase in the effect during these years had to do with the uncoupling of house prices from rent prices, a phenomenon

that opened a spread between changes in the cost of housing services, as reflected by rent, and house prices, in which the house is also part of the household's portfolio of assets. The effect of the changes in rent, which were milder throughout the period, remained significant in most subperiods but have had a stronger effect in recent years, a subperiod that included a year of much faster increases in rent prices (2009) than those in the first years of the sample. When the equations are estimated only for home owners in various subperiods, the result is similar—a stronger and significant effect in the second part of the sample period (Table A-10-2).

4. Estimated private consumption and the contribution of the housing market

a. Private consumption—actual and estimated

In the estimation method that we used, which takes account of serial correlation and the heteroscedasticity of the panel, we have no simple statistic that would allow us to compare the various versions for quality of fit, particularly when they relate to different population groups.

Here we present the change in actual and estimated consumption expenditure for an aggregate of groups in the panel in accordance with the three main age groups (in consideration of the constituent groups' weights).

Figure 6a presents the results of the estimation relating to the entire population but attributes the effect of house prices and rent payments to the group for which each is relevant (Table A-2); Figure 6b presents the estimation for home owners only with actual house prices (Table A-3); and Figure 6-c presents the results for equations estimated for renters only with actual rent payments (Table A-5). Overall, the fit between the actual data and those estimated is good, at least in the directions of the larger fluctuations. The estimate does a better job of tracking the two age groups up to 55 and does not successfully reconstruct the larger fluctuations in the consumption of the 55+ age group, as measured in the survey.

Figure 6a. Actual and estimated private consumption (thin line and thick line, respectively), entire population

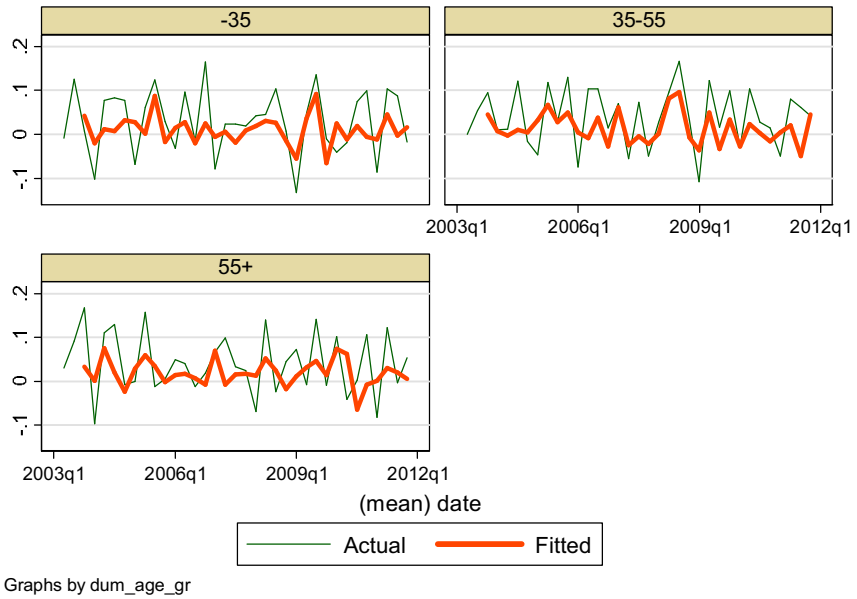


Figure 6b. Actual and estimated private consumption (thin line and thick line, respectively), home owners

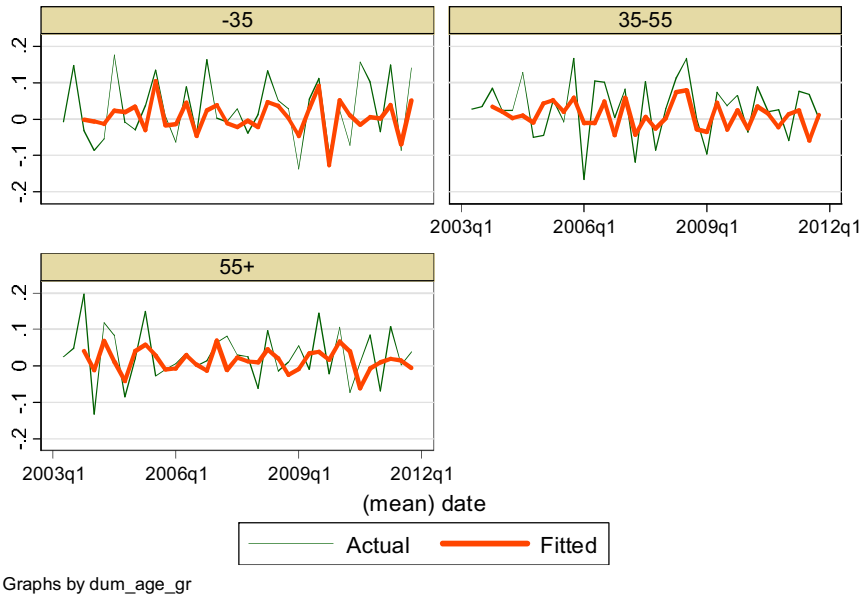
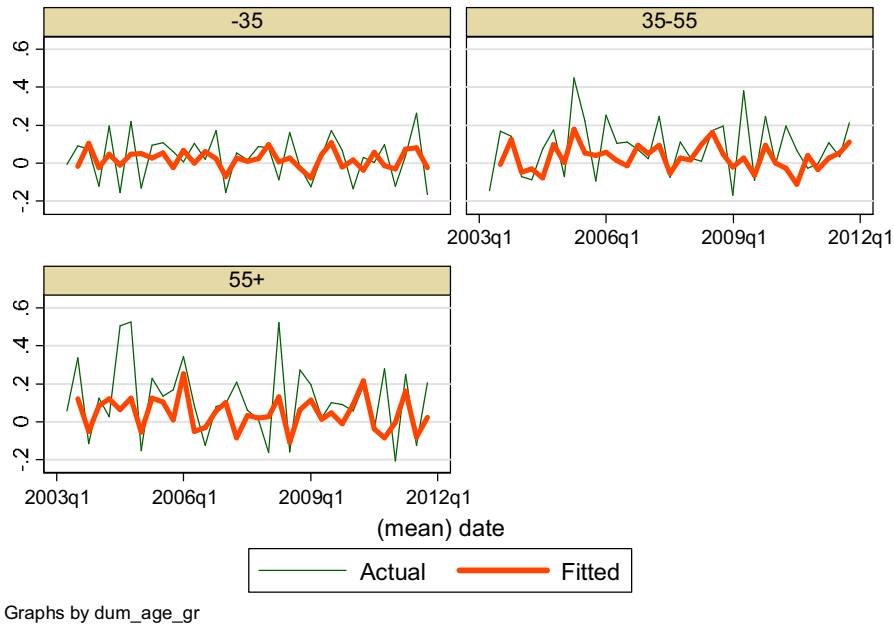


Figure 6c. Actual and estimated private consumption (thin line and thick line, respectively), renters



b. Contribution of the housing market to private consumption

By using the coefficients obtained in the estimation for the housing market variables, one may estimate the contribution of changes in house and rent prices to private consumption expenditure during the years investigated.

We choose to examine the effect for the estimation that assigns house prices to owner-occupier households only and rent expenditure to renters only. For renters, we

choose two versions—one based on the rent price index and one based on actual rent payments. The coefficients used for the calculation appear in Table A-2. Table 10 presents the cumulative annual effect of change in house and rent prices, in accordance with the lags and the averages that appear in the equations, weighted by each group's level of consumption. We also relate to the effect of changes in expenditure on housing loans even though these are affected by additional factors apart from changes in housing prices, e.g., LTV ratios and interest rates. The table shows that the rapid increase in house prices in 2009–2011, and particularly in 2010, contributed 1.0 percent–2.2 percent to private consumption expenditure in each of these years, as against smaller contributions in most preceding years. The increase in rent prices and actual rent expenditure, foremost in 2009, abetted a meaningful decrease in renting households' consumption during those years—an effect offset by the increase in landlord households' income. The effect of change in housing-loan payments was stable and relatively small in all years investigated (except 2004). Overall, the housing market has abetted an increase in private consumption expenditure in recent years.

Table 10. Contribution of housing market to change in real consumption expenditure (percent during year, weighted by each group's consumption)

	Contribution to home owners' consumption * weight (1)	Contribution to renters' consumption * weight—**according to rent index** (2)	Contribution to renters' consumption * weight—**according to actual payments** (3)	Contribution of rent income to all households (4)	Contribution of expenditure on payment of housing loans (5)	Total, according to rent index (1)+(2)+(4)+(5)	Total, according to actual rent payments (1)+(3)+(4)+(5)	Real change in private consumption expenditure (according to survey, net of housing)
2004	0.6	0.2	-0.1	0.1	-0.6	0.3	0.0	3.7
2005	1.1	-0.1	-0.1	0.2	-0.1	1.1	1.1	7.3
2006	0.5	0.3	-0.1	-0.4	-0.1	0.3	-0.1	4.0
2007	-0.1	0.1	0.2	0.3	-0.2	0.1	0.2	0.8
2008	0.7	0.0	-0.1	0.0	0.1	0.8	0.7	8.6
2009	1.3	-0.7	-0.6	0.2	0.2	1.0	1.1	5.8
2010	2.1	-0.3	-0.1	0.1	0.1	2.0	2.2	2.6
2011	1.2	-0.1	0.1	0.3	0.0	1.4	1.6	2.8
Total	**7.4**	**-0.6**	**-0.8**	**0.7**	**-0.6**	**6.9**	**6.7**	**35.6**

5. Conclusion

This study uses data from the Household Expenditure Survey for 2003–2011 to examine the effect of changes in house prices in Israel on private consumption expenditure. By creating a pseudo-panel comprised of cells of households characterized by type of residence (home owner/renter), age group, and region of residents, and linking it to quarterly data on housing and rent prices parsed by regions and number of rooms, we estimate the effect of changes in housing and rent prices on consumption. We do this for the entire population of households and for owner-occupier households (70 percent of all households) and renters separately. Since the share of renters in the population is relatively small, the estimation for this population, divided into cells by region and age, is less accurate than the estimation for home owners. For the very reason that the share of renters in the population is small, however, the analysis of home owners' behavior and the effect of house prices on their consumption explains the major part of aggregate consumption.

The results of the estimation show that an increase in house prices has a positive effect on consumption, particularly among owner-occupier households. The size of the effect, 0.18, exceeds some estimates obtained in studies on other countries. A strong and significant effect is found for the middle-aged group—35–55—which accounts for 43 percent of owner-occupier households. The effect of house prices on the consumption of young and old households is smaller and insignificant. The change in house prices is also found to have a similar effect on change in private consumption when estimated for the population net of households that earn income by renting out a dwelling that they own .

For renters, it is found that rent prices have a negative effect on consumption (net of rent expenses). The effect of actual household payments for rent on other consumption is also negative but smaller. Conversely, an increase in landlords' rent income (whether the landlords live in a dwelling that they own or in a rental dwelling) has a positive effect on consumption.

It is also found that the price that explains the changes in consumption is the one relating to region and number of rooms matched to the household; the effect of the overall average house price, in contrast, is not significant. In addition, even when we exclude long-term price trends by examining the changes in house prices in accordance with region and number of rooms relative to changes in average price, house prices do affect household consumption. These findings, together with the larger effect on older households, support the belief that the pass-through takes place more via the wealth effect than by a liquidity constraint or change in expected income (which is reflected in a general increase in prices, not necessarily limited to the region of residence). This finding attenuates the concern that house prices represent the business cycle and the macro situation and not the effect of the housing market. An attempt to determine whether expected or surprise price changes have meaningful effects on consumption shows that both of these price components—expected and surprise—affect the change in consumption significantly. This analysis, however, is only partly valid due to the difficulty in estimating the "expected price," particularly at times of changes in the price trend.

Examining the change in the intensity of the effect over the sample period, we find that the hefty price increases in recent years, far exceeding the upturn in rent prices during that time, had a stronger effect on private consumption than the milder price decreases that had occurred up to 2007. The impact of changes in rent, although gentler throughout the era, remained significant in most subperiods and gathered strength in recent years.

Finally, we estimated the quantitative effect of change in house and rent prices on private consumption expenditure (according to the Expenditure Survey) during the investigation period. We found a rather strong effect of changes in house prices in recent years. The rapid increase in house prices in 2009–11, and particularly in 2010, contributed 1.0 to 2.2 percent to private consumption expenditure as against a smaller contribution in most preceding years. The increase in rent prices and actual rent expenditure, in 2009 above all, abetted a major decrease in the consumption of households that rented their accommodations during those years—an effect offset by the increase in landlord households' rent income during that time. The effect of changes in payments on account of housing loans was stable and relatively mild in all years investigated (except 2004). Overall, the housing market has abetted an increase in private consumption expenditure in recent years.

Table A-1: Cells parsed by ownership, age, and region—house prices and rent prices, based on CBS*

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Population	Total	Total	Total	<35	35–55	>55
Constant	-0.01	-0.00	-0.01	-0.01	-0.01	0.00
	(0.11)	(0.73)	(0.00)	(0.28)	(0.07)	(0.96)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.45	0.45		0.46	0.48	0.41
	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)
Change in rent income, 2-qtr. avg.	0.02	0.02	0.02	0.03	0.01	0.03
	(0.01)	(0.01)	(0.00)	(0.15)	(0.58)	(0.00)
Change in labor and transfer income net of compulsory payments, 2-qtr. avg.			0.31			
			(0.00)			
Change in capital, pension, and provident-fund income less imputation of housing and rent income, current quarter			0.06			
			(0.00)			
Change in **house prices by region and rooms (CBS),** 2-qtr. avg. at 2-period lag	0.15	0.14	0.17	0.11	0.22	0.07
	(0.05)	(0.00)	(0.01)	(0.23)	(0.00)	(0.39)
Change in **rent prices by region and rooms (CBS)**, 2-qtr. avg.	-0.32	-0.34	-0.23	-0.15	-0.22	-0.58
	(0.00)	(0.00)	(0.01)	(0.39)	(0.12)	(0.00)
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	-0.03	-0.03	-0.03	-0.02	-0.05	-0.02
	(0.00)	(0.01)	(0.01)	(0.35)	(0.01)	(0.29)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	-0.03		-0.02	0.01	0.01	-0.10
	(0.32)		(0.62)	(0.88)	(0.80)	(0.07)
Real change in public's portfolio of financial assets, 5-qtr. avg. at 2-period lag		-0.23				
		(0.28)				
Change in avg. no. of rooms	0.21	0.21	0.20	0.15	0.22	0.23
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change in marriage rate	0.16	0.16	0.15	0.24	0.08	0.19
	(0.00)	(0.00)	(0.00)	(0.00)	(0.07)	(0.00)
Change in avg. no. of breadwinners	0.13	0.13	0.14	0.20	0.12	0.08
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change in avg. no. of members of household	0.04	0.04	0.04	0.02	0.04	0.07
	(0.00)	(0.00)	(0.00)	(0.29)	(0.00)	(0.00)
Change in share of immigrants	-0.23	-0.23	-0.22	-0.17	-0.21	-0.30
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change in share of members of middle–upper cluster	0.04	0.04	0.04	0.13	-0.01	0.01
	(0.12)	(0.12)	(0.07)	(0.04)	(0.82)	(0.81)
Change in share of members of upper cluster	0.20	0.19	0.19	0.17	0.19	0.17
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change in real 1Y interest rate at 1-period lag	-0.01	-0.01	-0.02	-0.01	-0.02	-0.01
	(0.00)	(0.00)	(0.00)	(0.23)	(0.01)	(0.09)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.02	-0.02	-0.02	-0.01	-0.02	-0.01
	(0.04)	(0.02)	(0.02)	(0.39)	(0.11)	(0.26)
Observations (and groups), N	2596	2596	2456	528	1043	1025
	(80)	(80)	(80)	(16)	(32)	(32)
Wald Chi-square	1662.1	1661.9	1515.7	332.9	728.0	674.8

* In parentheses: P-value of coefficient.

Table A-2: Cells parsed by ownership, age, and region—house prices and rent prices, for each group separately*

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Population	Total	Total	Total	<35	35–55	>55
Constant	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.04)	-0.01 (0.32)	-0.01 (0.02)	-0.00 (0.44)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.44 (0.00)	0.43 (0.00)	0.43 (0.00)	0.48 (0.00)	0.45 (0.00)	0.36 (0.00)
Change in rent income, 2-qtr. avg.	0.02 (0.02)	0.02 (0.01)	0.02 (0.01)	0.03 (0.09)	0.01 (0.60)	0.03 (0.01)
Change in **house prices by region and rooms (CBS), <u>home owners only</u>,** 2-qtr. avg. at 2-period lag	0.18 (0.00)	0.17 (0.00)		0.02 (0.89)	0.33 (0.00)	0.08 (0.48)
Change in **self-estimate of house value, <u>home owners only</u>,** 4-qtr. avg. at 3-period lag			0.10 (0.04)			
Change in **rent prices by region and rooms (CBS), <u>renters only</u>,** 2-qtr avg.	-0.32 (0.00)					
Change in **actual rent payments, <u>renters only</u>,** 3-qtr. avg. at 1-period lag		-0.13 (0.00)	-0.13 (0.00)	-0.50 (0.00)	-0.18 (0.00)	-0.06 (0.23)
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	-0.03 (0.00)	-0.03 (0.00)	-0.03 (0.00)	-0.02 (0.31)	-0.05 (0.01)	-0.03 (0.25)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	-0.01 (0.81)	-0.00 (0.96)	-0.00 (0.97)	-0.01 (0.87)	0.03 (0.50)	-0.04 (0.48)
Change in avg. no. of rooms	0.19 (0.00)	0.17 (0.00)	0.17 (0.00)	0.13 (0.00)	0.18 (0.00)	0.19 (0.00)
Change in marriage rate	0.16 (0.00)	0.16 (0.00)	0.16 (0.00)	0.22 (0.00)	0.09 (0.06)	0.20 (0.00)
Change in avg. no. of breadwinners	0.12 (0.00)	0.13 (0.00)	0.13 (0.00)	0.19 (0.00)	0.13 (0.00)	0.08 (0.00)
Change in avg. no. of members of household	0.04 (0.00)	0.04 (0.00)	0.04 (0.00)	0.02 (0.29)	0.04 (0.00)	0.07 (0.00)
Change in share of immigrants	-0.23 (0.00)	-0.23 (0.00)	-0.23 (0.00)	-0.18 (0.00)	-0.21 (0.00)	-0.30 (0.00)
Change in share of members of middle–upper cluster	0.04 (0.14)	0.03 (0.17)	0.03 (0.19)	0.15 (0.00)	-0.01 (0.71)	0.00 (0.94)
Change in share of members of upper cluster	0.19 (0.00)	0.19 (0.00)	0.18 (0.00)	0.15 (0.01)	0.20 (0.00)	0.16 (0.00)
Change in real 1Y interest rate at 1-period lag	-0.01 (0.00)	-0.02 (0.00)	-0.01 (0.00)	-0.02 (0.10)	-0.02 (0.01)	-0.01 (0.09)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.02 (0.02)	-0.02 (0.03)	-0.02 (0.02)	-0.01 (0.44)	-0.02 (0.08)	-0.02 (0.17)
Observations (and groups), N	2596 (80)	2596 (80)	2556 (80)	528 (80)	1043 (80)	1025 (80)
Wald Chi-square	1636.6	1637.2	1622.7	345.7	740.3	648.3

* In parentheses: P-value of coefficient.

Table A-2-1: Cells parsed by ownership, age, and region—house prices and rent prices, for each group separately, net of households that have rent income*

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Population	**Net of households that have rent income**					
				<35	35–55	>55
Constant	-0.01 (0.04)	-0.01 (0.04)	-0.01 (0.07)	0.06 (0.66)	-0.01 (0.01)	-0.00 (0.72)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.45 (0.00)	0.45 (0.00)	0.45 (0.00)		0.44 (0.00)	0.41 (0.00)
Change in rent income, 2-qtr. avg.	---	---	---		---	---
Change in **house prices by region and rooms (CBS), home owners only,** 2-qtr. avg. at 2-period lag	0.14 (0.00)	0.13 (0.03)		-0.47 (0.00)	0.32 (0.00)	-0.03 (0.79)
Change in **self-estimate of house value, home owners only,** 4-qtr. avg. at 3-period lag			0.09 (0.05)	-0.02 (0.36)		
Change in **rent prices by region and rooms (CBS), renters only,** 2-qtr avg.	-0.27 (0.00)			0.01 (0.89)		
Change in **actual rent payments, renters only,** 3-qtr. avg. at 1-period lag		-0.14 (0.00)	-0.14 (0.00)	0.11 (0.00)	-0.15 (0.00)	-0.10 (0.05)
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	-0.03 (0.01)	-0.03 (0.01)	-0.03 (0.01)	0.20 (0.00)	-0.05 (0.02)	-0.02 (0.33)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	-0.01 (0.98)	-0.00 (0.97)	-0.00 (0.86)	0.20 (0.00)	0.05 (0.35)	-0.07 (0.24)
Change in avg. no. of rooms	0.19 (0.00)	0.18 (0.00)	0.17 (0.00)	0.00 (0.86)	0.20 (0.00)	0.19 (0.00)
Change in marriage rate	0.17 (0.00)	0.18 (0.00)	0.18 (0.00)	-0.19 (0.00)	0.12 (0.00)	0.21 (0.00)
Change in avg. no. of breadwinners	0.13 (0.00)	0.13 (0.00)	0.13 (0.00)	0.11 (0.02)	0.12 (0.00)	0.08 (0.00)
Change in avg. no. of members of household	0.03 (0.00)	0.03 (0.00)	0.03 (0.00)	0.11 (0.09)	0.03 (0.00)	0.06 (0.00)
Change in share of immigrants	-0.22 (0.00)	-0.23 (0.00)	-0.23 (0.00)	-0.02 (0.10)	-0.22 (0.00)	-0.24 (0.00)
Change in share of members of middle–upper cluster	0.03 (0.25)	0.03 (0.30)	0.02 (0.37)	-0.01 (0.24)	0.02 (0.57)	-0.06 (0.18)
Change in share of members of upper cluster	0.15 (0.00)	0.15 (0.00)	0.14 (0.00)	528 (80)	0.17 (0.00)	0.07 (0.23)
Change in real 1Y interest rate at 1-period lag	-0.01 (0.01)	-0.01 (0.00)	-0.01 (0.01)	335.7	-0.02 (0.01)	-0.01 (0.22)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.02 (0.03)	-0.01 (0.03)	-0.02 (0.02)		-0.02 (0.05)	-0.02 (0.22)
Observations (and groups), N	2574 (80)	2574 (80)	2534 (80)		1033 (80)	1013 (80)
Wald Chi-square	1615.5	1641.9	1638.0		744.1	653.6

* In parentheses: P-value of coefficient.

Table A-3: Cells parsed by ownership, age, and region— house prices per CBS, home owners *

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Population	**Home owners**					
				<35	35–55	>55
Constant	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)	-0.00 (0.63)	-0.01 (0.02)	-0.01 (0.35)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.41 (0.00)	0.41 (0.00)		0.49 (0.00)	0.38 (0.00)	0.39 (0.00)
Change in rent income, 2-qtr. avg.	0.01 (0.07)	0.01 (0.07)	0.02 (0.05)	-0.01 (0.85)	0.01 (0.53)	0.03 (0.01)
Change in labor and transfer income net of compulsory payments, 2-qtr. avg.			0.28 (0.00)			
Change in capital, pension, and provident-fund income less imputation of housing and rent income, 2-qtr. avg.			0.02 (0.05)			
Change in **house prices by region and rooms** (CBS), 2-qtr. avg. at 2-period lag	0.19 (0.00)	0.21 (0.00)	0.17 (0.01)	-0.04 (0.79)	0.35 (0.00)	0.11 (0.30)
Change in **rent prices by region and rooms** (CBS)	Not incl.	Not incl.	Not incl.	Not incl.	Not incl.	Not incl.
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	-0.04 (0.02)	-0.04 (0.02)	-0.04 (0.03)	-0.06 (0.22)	-0.08 (0.10)	-0.03 (0.18)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	0.02 (0.60)		0.02 (0.60)	0.03 (0.71)	0.05 (0.42)	0.00 (0.93)
Real change in public's portfolio of financial assets, 5-qtr. avg. at 2-period lag		0.27 (0.21)				
Change in avg. no. of rooms	0.22 (0.00)	0.22 (0.00)	0.22 (0.00)	0.14 (0.00)	0.25 (0.00)	0.21 (0.00)
Change in marriage rate	0.07 (0.10)	0.07 (0.10)	0.07 (0.11)	0.10 (0.20)	-0.05 (0.54)	0.20 (0.00)
Change in avg. no. of breadwinners	0.09 (0.00)	0.09 (0.00)	0.10 (0.00)	0.14 (0.00)	0.12 (0.00)	0.02 (0.60)
Change in avg. no. of members of household	0.02 (0.01)	0.02 (0.01)	0.03 (0.01)	0.01 (0.55)	0.03 (0.07)	0.05 (0.00)
Change in share of immigrants	-0.18 (0.00)	-0.19 (0.00)	-0.18 (0.00)	-0.13 (0.10)	-0.15 (0.02)	-0.29 (0.00)
Change in share of members of middle–upper cluster	0.04 (0.17)	0.04 (0.18)	0.04 (0.19)	0.21 (0.00)	-0.01 (0.87)	-0.03 (0.63)
Change in share of members of upper cluster	0.17 (0.00)	0.18 (0.00)	0.18 (0.00)	0.18 (0.02)	0.15 (0.01)	0.11 (0.12)
Change in real 1Y interest rate at 1-period lag	-0.01 (0.00)	-0.02 (0.00)	-0.02 (0.00)	-0.01 (0.27)	-0.02 (0.03)	-0.02 (0.10)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.02 (0.05)	-0.01 (0.18)	-0.02 (0.03)	-0.01 (0.52)	-0.02 (0.11)	-0.02 (0.25)
Observations (and groups), N	1320 (40)	1320 (40)	1320 (40)	264 (8)	528 (16)	528 (16)
Wald Chi-square	671.4	673.4	660.4	144.2	300.3	304.1

* In parentheses: P-value of coefficient.

Table A-4: Cells parsed by ownership, age, and region— house prices per self-valuation, home owners *

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Population	**Home owners**					
				<35	35–55	>55
Constant	-0.01 (0.02)	-0.01 (0.06)	-0.01 (0.05)	-0.00 (0.56)	-0.01 (0.20)	-0.01 (0.19)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.41 (0.00)	0.41 (0.00)		0.48 (0.00)	0.34 (0.00)	0.41 (0.00)
Change in rent income, 2-qtr. avg.	0.01 (0.04)	0.02 (0.04)	0.02 (0.04)	-0.01 (0.79)	0.01 (0.43)	0.03 (0.00)
Change in labor and transfer income less compulsory payments, 2-qtr. avg.			0.40 (0.00)			
Change in capital, pension, and provident-fund income less imputation of housing and rent income, 2-qtr. avg.			0.01 (0.60)			
Change in **self-valuation of house price**, 4-qtr. avg. at 3-period lag	0.10 (0.03)	0.11 (0.03)	0.10 (0.03)	-0.01 (0.95)	0.02 (0.84)	0.24 (0.00)
Change in **rent price by region and rooms** (CBS)	Not incl.	Not incl.	Not incl.	Not incl.	Not incl.	Not incl.
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	-0.04 (0.03)	-0.04 (0.03)	-0.04 (0.03)	-0.06 (0.27)	-0.05 (0.35)	-0.03 (0.20)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	0.02 (0.60)		0.02 (0.56)	0.05 (0.53)	0.03 (0.63)	0.00 0.97)
Real change in public's portfolio of financial assets, 4-qtr. avg. at 2-period lag		0.22 (0.34)				
Change in avg. no. of rooms	0.21 (0.00)	0.20 (0.00)	0.20 (0.00)	0.14 (0.00)	0.24 (0.00)	0.19 (0.00)
Change in marriage rate	0.07 (0.11)	0.07 (0.12)	0.07 (0.10)	0.13 (0.12)	-0.04 (0.65)	0.20 (0.00)
Change in avg. no. of breadwinners	0.10 (0.00)	0.10 (0.00)	0.10 (0.00)	0.15 (0.00)	0.11 (0.00)	0.03 (0.33)
Change in avg. no. of members of household	0.03 (0.01)	0.03 (0.01)	0.03 (0.01)	0.00 (0.83)	0.03 (0.05)	0.05 (0.00)
Change in share of immigrants	-0.18 (0.00)	-0.19 (0.00)	-0.19 (0.00)	-0.10 (0.22)	-0.14 (0.03)	-0.32 (0.00)
Change in share of members of middle–upper cluster	0.04 (0.23)	0.04 (0.23)	0.04 (0.22)	0.19 (0.00)	-0.02 (0.69)	-0.01 (0.80)
Change in share of members of upper cluster	0.16 (0.00)	0.17 (0.00)	0.17 (0.00)	0.16 (0.03)	0.13 (0.04)	0.09 (0.21)
Change in real 1Y interest rate at 1-period lag	-0.01 (0.02)	-0.01 (0.01)	-0.01 (0.00)	-0.02 (0.16)	-0.01 (0.13)	-0.01 (0.17)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.02 (0.03)	-0.02 (0.10)	-0.02 (0.02)	-0.01 (0.49)	-0.02 (0.13)	-0.02 (0.14)
Observations (and groups), N	1280 (40)	1280 (40)	1280 (40)	256 (8)	512 (16)	512 (16)
Wald Chi-square	653.8	655.0	650.1	142.7	263.1	323.8

* In parentheses: P-value of coefficient.

Table A-5: Cells parsed by ownership, age, and region—renters *

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Population	Renters	Renters	Renters	Renters	Renters
Constant	-0.01 (0.31)	0.00 (0.62)	-0.01 (0.12)	-0.00 (0.64)	-0.01 (0.38)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.45 (0.00)	0.45 (0.00)	0.44 (0.00)	0.45 (0.00)	0.43 (0.00)
Change in rent income, 2-qtr. avg.	0.03 (0.07)	0.03 (0.07)	0.03 (0.06)	0.03 (0.07)	0.03 (0.07)
Change in **house prices by region and rooms (CBS),** 2-qtr. avg. at 2-period lag	0.12 (0.10)	0.09 (0.21)	0.21 (0.00)		
Change in **rent prices (CBS),** 2-qtr. avg.	-0.31 (0.03)	-0.38 (0.01)		-0.42 (0.00)	
Change in **actual rent payments,** 3-qtr. avg. at 1-period lag.			-0.15 (0.00)		-0.12 (0.00)
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	-0.03 (0.07)	-0.02 (0.10)	-0.03 (0.09)	-0.02 (0.10)	-0.02 (0.10)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	-0.06 (0.30)		-0.04 (0.46)	-0.03 (0.62)	0.01 (0.87)
Real change in public's portfolio of financial assets, 5-qtr. avg. at 2-period lag		-0.66 (0.08)			
Change in avg. no. of rooms	0.17 (0.00)	0.18 (0.00)	0.15 (0.00)	0.18 (0.00)	0.13 (0.00)
Change in marriage rate	0.20 (0.00)	0.20 (0.00)	0.19 (0.00)	0.19 (0.00)	0.20 (0.00)
Change in avg. no. of breadwinners	0.17 (0.00)	0.17 (0.00)	0.17 (0.00)	0.16 (0.00)	0.17 (0.00)
Change in avg. no. of members of household	0.06 (0.00)	0.06 (0.00)	0.06 (0.00)	0.06 (0.00)	0.06 (0.00)
Change in share of immigrants	-0.27 (0.00)	-0.27 (0.00)	-0.27 (0.00)	-0.27 (0.00)	-0.27 (0.00)
Change in share of members of middle–upper cluster	0.01 (0.69)	0.01 (0.68)	0.01 (0.87)	0.01 (0.70)	0.01 (0.84)
Change in share of members of upper cluster	0.20 (0.00)	0.20 (0.00)	0.18 (0.00)	0.18 (0.00)	0.17 (0.00)
Change in real 1Y interest rate at 1-period lag	-0.01 (0.17)	-0.01 (0.30)	-0.02 (0.07)	-0.01 (0.28)	-0.01 (0.18)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.02 (0.14)	-0.03 (0.04)	-0.02 (0.11)	-0.02 (0.22)	-0.02 (0.17)
Observations (and groups), N	1276 (40)	1276 (40)	1276 (40)	1326 (40)	1326 (40)
Wald Chi-square	1047.1	1048.9	1060.5	1060.3	1061.1

* In parentheses: P-value of coefficient.

Table A-6: Cells parsed by ownership, age, and region—house prices and rent prices per CBS, renters by age*

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Population	**Renters**					
	<35	35–55	>55	<35	35–55	>55
Constant	-0.01	-0.01	0.00	0.00	-0.01	0.00
	(0.32)	(0.57)	(0.32)	(0.32)	(0.54)	(0.69)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.40	0.58	0.35	0.35	0.54	0.31
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change in rent income, 2-qtr. avg.	0.06	-0.01	0.03	0.03	-0.00	0.06
	(0.02)	(0.77)	(0.55)	(0.55)	(0.87)	(0.28)
Change in **house prices by region and rooms (CBS),** 2-qtr. avg. at 2-period lag	0.20	0.04	0.13	0.13		
	(0.11)	(0.75)	(0.28)	(0.28)		
Change in **rent prices (CBS),** 2-qtr. avg.	-0.12	-0.57	-0.38	-0.38		
	(0.64)	(0.02)	(0.18)	(0.18)		
Change in **actual rent payments,** 3-qtr. avg. at 1-period lag					-0.20	-0.06
					(0.00)	(0.16)
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	0.00	-0.05	-0.10	-0.10	-0.05	-0.10
	(0.85)	(0.03)	(0.41)	(0.41)	(0.02)	(0.38)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	0.01	-0.01	-0.26	-0.26	0.02	-0.11
	(0.88)	(0.50)	(0.05)	(0.05)	(0.82)	(0.31)
Change in avg. no. of rooms	0.18	0.20	0.18	0.18	0.12	0.15
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change in marriage rate	0.38	0.14	0.18	0.18	0.14	0.19
	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)
Change in avg. no. of breadwinners	0.20	0.12	0.20	0.20	0.14	0.18
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change in avg. no. of members of household	0.01	0.06	0.11	0.11	0.07	0.11
	(0.78)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change in share of immigrants	-0.23	-0.23	-0.32	-0.32	-0.26	-0.32
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change in share of members of middle–upper cluster	0.05	-0.00	0.02	0.02	-0.00	-0.02
	(0.50)	(0.96)	(0.82)	(0.82)	(0.93)	(0.79)
Change in share of members of upper cluster	0.11	0.26	0.20	0.20	0.23	0.15
	(0.29)	(0.00)	(0.03)	(0.03)	(0.00)	(0.09)
Change in real 1Y interest rate at 1-period lag	-0.00	-0.03	-0.01	-0.01	-0.03	-0.00
	(0.91)	(0.04)	(0.78)	(0.78)	(0.01)	(0.91)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01
	(0.28)	(0.48)	(0.49)	(0.49)	(0.48)	(0.70)
Observations (and groups), N	264	515	497	497	534	520
	(8)	(16)	(16)	(16)	(16)	(16)
Wald Chi-square	233.2	481.3	417.5	417.5	496.4	416.0

* In parentheses: P-value of coefficient.

Table A-7: Cells parsed by ownership, age, and region— house prices and rent prices, different definitions *

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Population	Total	Total	Total	Total	Total	Total
Constant	-0.01 (0.00)	-0.00 (0.16)	-0.01 (0.01)	-0.01 (0.01)	-0.00 (0.00)	-0.01 (0.08)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.42 (0.00)	0.45 (0.00)	0.42 (0.00)	0.42 (0.00)	0.45 (0.00)	0.43 (0.00)
Change in rent income, 2-qtr. avg.	0.02 (0.01)	0.02 (0.00)	0.02 (0.02)	0.02 (0.02)	0.02 (0.01)	0.02 (0.01)
Change in **house prices by region only (CBS),** 4-qtr. avg. at 2-period lag	0.21 (0.11)					
Change in **house prices by region only, adjusted for quality,** 2-qtr. avg. at 1-period lag		0.27 (0.03)				
Change in **average house prices (CBS),** 4-qtr. avg. at 2-period lag			0.05 (0.77)			
Change in **house prices according to survey (CBS, adjusted for quality),** 4-qtr. avg. at 2-period lag				0.08 (0.69)		
Change in **house prices by region and rooms relative to avg. house prices (CBS),** 4-qtr. avg. at 2-period lag					0.13 (0.01)	
Change in **house prices by region only (adjusted for quality) relative to avg. house prices according to survey (CBS),** 2-qtr. avg. at 1-period lag						0.26 (0.08)
Change in **rent prices by region and rooms (CBS),** 2-qtr. avg. at 1-period lag		-0.44 (0.11)			-0.32 (0.00)	-0.32 (0.00)
Change in **rent prices by region only (CBS),** 4-qtr. avg. at 1-period lag	-0.35 (0.11)					
Change in **average rent prices (CBS),** 4-qtr. avg. at 1-period lag			0.45 (0.04)	0.41 (0.11)		
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	-0.03 (0.00)	-0.03 (0.00)	-0.03 (0.00)	-0.03 (0.00)	-0.03 (0.00)	-0.03 (0.00)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	0.03 (0.46)	-0.00 (0.92)	0.02 (0.57)	0.02 (0.53)	-0.03 (0.42)	0.03 (0.31)
Change in avg. no. of rooms	0.17 (0.00)	0.21 (0.00)	0.17 (0.00)	0.17 (0.00)	0.20 (0.00)	0.18 (0.00)
Change in marriage rate	0.16 (0.00)	0.16 (0.00)	0.16 (0.00)	0.16 (0.00)	0.16 (0.00)	0.16 (0.00)
Change in avg. no. of breadwinners	0.13 (0.00)	0.12 (0.00)	0.13 (0.00)	0.13 (0.00)	0.13 (0.00)	0.13 (0.00)
Change in avg. no. of members of household	0.04 (0.00)	0.04 (0.00)	0.04 (0.00)	0.04 (0.00)	0.04 (0.00)	0.04 (0.00)
Change in share of immigrants	-0.23 (0.00)	-0.23 (0.00)	-0.23 (0.00)	-0.23 (0.00)	-0.23 (0.00)	-0.23 (0.00)
Change in share of members of middle–upper cluster	0.04 (0.13)	0.04 (0.07)	0.04 (0.12)	0.04 (0.12)	0.04 (0.12)	0.04 (0.08)
Change in share of members of upper cluster	0.19 (0.00)	0.19 (0.00)	0.19 (0.00)	0.19 (0.00)	0.19 (0.00)	0.19 (0.00)
Change in real 1Y interest rate at 1-period lag	-0.02 (0.00)	-0.01 (0.00)	-0.02 (0.00)	-0.02 (0.00)	-0.01 (0.01)	-0.01 (0.00)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.02 (0.00)	-0.01 (0.07)	-0.02 (0.00)	-0.02 (0.00)	-0.01 (0.08)	-0.01 (0.05)
Observations (and groups), N	2606 (80)	2686 (80)	2606 (80)	2606 (80)	2596 (80)	2686 (80)
Wald Chi-square	1639.1	1693.1	1635.5	1835.8	1657.1	1667.3

* In parentheses: P-value of coefficient.

Table A-8: Cells parsed by ownership, age, and region—durables and non-durables consumption, home owners and renters*

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: rate of change in:	**Non-durables (excl. housing)**	**Durable goods**	**Non-durables (excl. housing)**	**Durable goods**	**Non-durables (excl. housing)**	**Durable goods**
Population	Total	Total	Home owners	Home owners	Renters	Renters
Constant	-0.01 (0.02)	-0.02 (0.05)	-0.01 (0.03)	-0.02 (0.11)	-0.00 (0.42)	-0.02 (0.30)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.42 (0.00)	0.61 (0.00)	0.40 (0.00)	0.56 (0.00)	0.43 (0.00)	0.62 (0.00)
Change in rent income, 2-qtr. avg.	0.02 (0.02)	-0.00 (0.91)	0.01 (0.09)	-0.02 (0.58)	0.03 (0.07)	0.06 (0.39)
Change in **house prices by region and rooms (CBS), <u>home owners only</u>,** 2-qtr. avg. at 2-period lag	0.14 (0.02)	0.52 (0.04)	0.16 (0.01)	0.54 (0.03)		
Change in **actual rent payments, <u>renters only</u>,** 3-qtr. avg. at 1-period lag	-0.13 (0.00)	-0.25 (0.17)			-0.12 (0.00)	-0.19 (0.26)
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	-0.03 (0.01)	-0.03 (0.48)	-0.05 (0.02)	0.01 (0.88)	-0.02 (0.12)	-0.06 (0.30)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	0.00 (0.85)	-0.1 (0.17)	0.03 (0.34)	-0.10 (0.46)	-0.00 (0.99)	-0.19 (0.41)
Change in avg. no. of rooms	0.19 (0.00)	0.30 (0.00)	0.20 (0.00)	0.34 (0.00)	0.13 (0.00)	0.25 (0.00)
Change in marriage rate	0.15 (0.00)	0.50 (0.00)	0.07 (0.11)	0.19 (0.25)	0.17 (0.00)	0.65 (0.00)
Change in avg. no. of breadwinners	0.13 (0.00)	-0.01 (0.80)	0.10 (0.00)	-0.00 (0.95)	0.16 (0.00)	0.02 (0.86)
Change in avg. no. of members of household	0.04 (0.00)	-0.01 (0.87)	0.02 (0.01)	-0.02 (0.60)	0.07 (0.00)	0.02 (0.61)
Change in share of immigrants	-0.23 (0.00)	-0.10 (0.35)	-0.19 (0.00)	-0.11 (0.52)	-0.27 (0.00)	-0.13 (0.36)
Change in share of members of middle–upper cluster	0.04 (0.12)	0.02 (0.86)	0.04 (0.15)	-0.03 (0.83)	0.01 (0.78)	0.00 (0.98)
Change in share of members of upper cluster	0.21 (0.00)	-0.19 (0.15)	0.19 (0.00)	-0.21 (0.18)	0.19 (0.00)	-0.22 (0.28)
Change in real 1Y interest rate at 1-period lag	-0.02 (0.01)	-0.06 (0.00)	-0.02 (0.00)	-0.06 (0.00)	-0.01 (0.13)	-0.03 (0.45)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.01 (0.05)	-0.08 (0.00)	-0.01 (0.08)	-0.06 (0.07)	-0.02 (0.25)	-0.15 (0.01)
Observations (and groups), N	2596 (80)	2477 (80)	1320 (40)	1318 (40)	1326 (40)	1204 (40)
Wald Chi-square	1661.0	165.2	692.1	72.0	1068.1	105.2

* In parentheses: P-value of coefficient.

Table A-9: Cells parsed by ownership, age, and region— expected and unexpected changes in house prices, home owners only *

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Population	Home owners	Home owners	Home owners	Home owners	Home owners
Constant	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.00)	-0.02 (0.00)	-0.02 (0.00)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.41 (0.00)	0.41 (0.00)	0.41 (0.00)	0.41 (0.00)	0.41 (0.00)
Change in rent income, 2-qtr. avg.	0.01 (0.04)	0.01 (0.07)	0.01 (0.08)	0.01 (0.07)	0.01 (0.08)
Change in **house prices by region and rooms (CBS),** 2-qtr. avg. at 2-period lag	0.10 (0.03)				
Change in **house prices by region and rooms (CBS), avg. in past 3 years** at 2-period lag		0.61 (0.01)			
Change in **house prices by region and rooms (CBS), deviation of 2-qtr. avg. from avg. in past 3 years,** at 2-period lag		0.16 (0.02)			
Change in **house prices by region and rooms (CBS), avg. in past 5 years** at 2-period lag			0.76 (0.03)		
Change in **house prices by region and rooms (CBS), deviation of 2-qtr. avg. from avg. in past 5 years,** at 2-period lag			0.16 (0.02)		
Change in **house prices countrywide (CBS), avg. in past 3years** at 2-period lag				1.27 (0.00)	
Change in **house prices by region and rooms (CBS), deviation of 2-qtr. avg. from total avg. in past 3 years,** at 2-period lag				0.18 (0.01)	
Change in **house prices countrywide (CBS), avg. in past 5years,** at 2-period lag					1.55 (0.02)
Change in **house prices by region and rooms (CBS), deviation of 2-qtr. avg. from total avg. in past 5 years,** at 2-period lag					0.17 (0.01)
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	-0.04 (0.03)	-0.04 (0.02)	-0.04 (0.02)	-0.04 (0.02)	-0.04 (0.03)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	0.02 (0.60)	0.02 (0.53)	0.02 (0.55)	0.02 (0.63)	0.04 (0.32)
Change in avg. no. of rooms	0.21 (0.00)	0.21 (0.00)	0.22 (0.00)	0.22 (0.00)	0.22 (0.00)
Change in marriage rate	0.07 (0.11)	0.07 (0.09)	0.07 (0.10)	0.07 (0.10)	0.07 (0.10)
Change in avg. no. of breadwinners	0.10 (0.00)	0.09 (0.00)	0.09 (0.00)	0.09 (0.00)	0.09 (0.00)
Change in avg. no. of members of household	0.03 (0.01)	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)
Change in share of immigrants	-0.18 (0.00)	-0.18 (0.00)	-0.18 (0.00)	-0.18 (0.00)	-0.18 (0.00)
Change in share of members of middle–upper cluster	0.04 (0.23)	0.04 (0.17)	0.04 (0.18)	0.05 (0.15)	0.04 (0.17)
Change in share of members of upper cluster	0.16 (0.00)	0.17 (0.00)	0.17 (0.00)	0.18 (0.00)	0.17 (0.00)
Change in real 1Y interest rate at 1-period lag	-0.01 (0.02)	-0.02 (0.00)	-0.02 (0.00)	-0.02 (0.02)	-0.02 (0.00)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.02 (0.03)	-0.02 (0.02)	-0.02 (0.02)	-0.01 (0.09)	-0.02 (0.04)
Observations (and groups), N	1280 (40)	1320 (40)	1320 (40)	1320 (40)	1320 (40)
Wald Chi-square	653.8	676.1	675.3	681.1	676.5

* In parentheses: P-value of coefficient.

Table A-10-1: Cells parsed by ownership, age, and region—house and rent prices separately, different periods*

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Population	Total	Total	Total	Total	Total
Sample period	**2003–2011**	**2003–2009**	**2003–2007**	**2005–2011**	**2007–2011**
Constant	-0.01 (0.02)	-0.01 (0.00)	-0.02 (0.01)	-0.01 (0.04)	-0.01 (0.09)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.43 (0.00)	0.46 (0.00)	0.50 (0.00)	0.42 (0.00)	0.41 (0.00)
Change in rent income, 2-qtr. avg.	0.02 (0.01)	0.02 (0.01)	0.02 (0.12)	0.02 (0.01)	0.02 (0.03)
Change in **house prices by region and rooms (CBS), home owners only,** 2-qtr. avg. at 2-period lag	0.17 (0.03)	0.17 (0.03)	0.09 (0.28)	0.19 (0.01)	0.17 (0.02)
Change in **actual rent payments, renters only,** 3-qtr. avg. at 1-period lag	-0.13 (0.00)	-0.10 (0.01)	-0.14 (0.00)	-0.17 (0.00)	-0.20 (0.00)
Change in payments on housing loans, 4-qtr. avg. at 1-period lag	-0.03 (0.00)	-0.04 (0.00)	-0.01 (0.57)	-0.04 (0.00)	-0.03 (0.03)
Real change in Tel Aviv 100 index, 2-qtr. avg. at 1-period lag	-0.01 (0.96)	0.05 (0.18)	0.20 (0.06)	0.00 (0.95)	-0.01 (0.74)
Change in avg. no. of rooms	0.17 (0.00)	0.17 (0.00)	0.18 (0.00)	0.17 (0.00)	0.18 (0.00)
Change in marriage rate	0.16 (0.00)	0.16 (0.00)	0.15 (0.00)	0.17 (0.00)	0.18 (0.00)
Change in avg. no. of breadwinners	0.13 (0.00)	0.15 (0.00)	0.17 (0.00)	0.10 (0.00)	0.09 (0.00)
Change in avg. no. of members of household	0.04 (0.00)	0.04 (0.00)	0.02 (0.02)	0.04 (0.00)	0.05 (0.00)
Change in share of immigrants	-0.23 (0.00)	-0.24 (0.00)	-0.30 (0.00)	-0.21 (0.00)	-0.14 (0.00)
Change in share of members of middle–upper cluster	0.03 (0.17)	0.05 (0.03)	0.06 (0.04)	0.03 (0.27)	-0.02 (0.58)
Change in share of members of upper cluster	0.19 (0.00)	0.21 (0.00)	0.23 (0.00)	0.19 (0.00)	0.17 (0.00)
Change in real 1Y interest rate at 1-period lag	-0.02 (0.01)	-0.02 (0.00)	0.00 (0.91)	-0.02 (0.00)	-0.00 (0.45)
Change in regional unemployment rate, 3-qtr. avg. at 1-period lag	-0.02 (0.03)	-0.01 (0.12)	-0.02 (0.05)	-0.02 (0.02)	-0.02 (0.00)
Observations (and groups), N	2596 (80)	1967 (80)	1336 (80)	2201 (80)	1574 (80)
Wald Chi-square	1637.2	1405.9	1042.1	1452.2	1070.6

* In parentheses: P-value of coefficient.

Table A-10-2: Cells parsed by ownership, age, and region—home owners only, different periods, partial presentation*

Dependent variable: rate of change in private consumption net of housing	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Population	Home owners	Home owners	Home owners	Home owners	Home owners
Sample period	**2003–2011**	**2003–2009**	**2003–2007**	**2005–2011**	**2007–2011**
Constant	-0.01 (0.02)	-0.01 (0.01)	-0.02 (0.07)	-0.01 (0.03)	-0.01 (0.08)
Change in income net of compulsory payments and imputation of housing and rent income, 2-qtr. avg.	0.41 (0.00)	0.43 (0.00)	0.44 (0.00)	0.40 (0.00)	0.39 (0.00)
Change in rent income, 2-qtr. avg.	0.01 (0.07)	0.02 (0.03)	0.02 (0.07)	0.01 (0.20)	0.00 (0.70)
Change in **house prices by region and rooms (CBS), <u>home owners only</u>,** 2-qtr. avg. at 2-period lag	0.19 (0.00)	0.18 (0.02)	0.14 (0.12)	0.22 (0.00)	0.22 (0.00)
Observations (and groups), N	1320 (40)	1000 (40)	680 (40)	1120 (40)	800 (40)
Wald Chi-square	671.4	569.7	399.2	598.3	448.8

* In parentheses: P-value of coefficient.

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