How much unaffordable dwelling can I afford?
Evidence from the Israeli Housing Market

Larisa Fleishman
Doron Sayag
Israel Central Bureau of Statistics
Alla Koblyakova
Nottingham Trent University UK

Housing Affordability

General definition

– the ability of HHs to buy or rent adequate housing without impairing their ability to meet basic living costs (OECD, 2021)

Housing Affordability measures

– evaluate the changes in the ability of a targeted population (HHs/individuals) to achieve housing of defined characteristics, under the certain market conditions

Affordability parameters

- Two main parameters which are crucial for assessing housing affordability:
  - Dwelling price (representing the supply side)
  - HHs' income (representing the demand side)
- The additional important parameter related to the HHs' ability to purchase a home:
  - access to home financing: mortgage loan (mortgage-payment-to-income ratio, the length of a mortgage contract, mortgage interest rate, down-payment ratio)

Examples of affordability indices

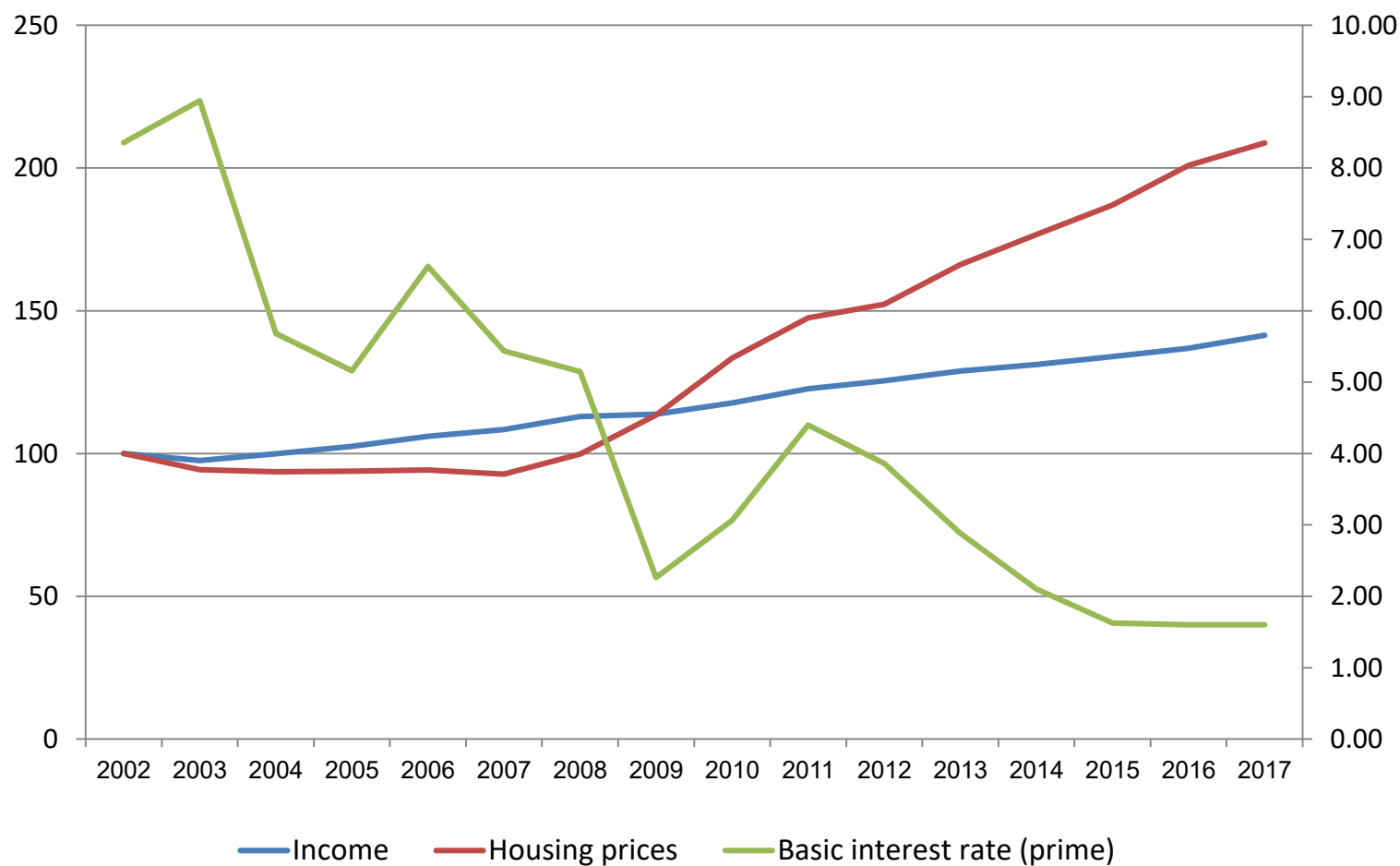| Approach	Meaning and interpretation	Country
Income affordability approach	Price-to-income ratio: between mean/median housing prices and the HH's mean/median income; number of annual salaries needed to purchase a home.	OECD, Italy, Belgium, Australia, Israel, UK
Purchase and Repayment affordability approaches	Housing Affordability Index: measures whether or not a typical family earning the national median/average income is able to afford the monthly mortgage payments based on effective rate on loans, on a median/average-priced home. Measures the ratio of the annual median/average family's income to the annual necessary income.	USA, Sweden, Italy, Canada
	The quarterly produced index examines HHs' ability to purchase typical 4-rooms dwelling in 12 big cities, considering home prices, household income, and the mortgage cost. Two sub-indices: • Monthly repayment index • Equity index	Israel (Alrov Institute for Real Estate Research)

Examples of affordability measures in Israel

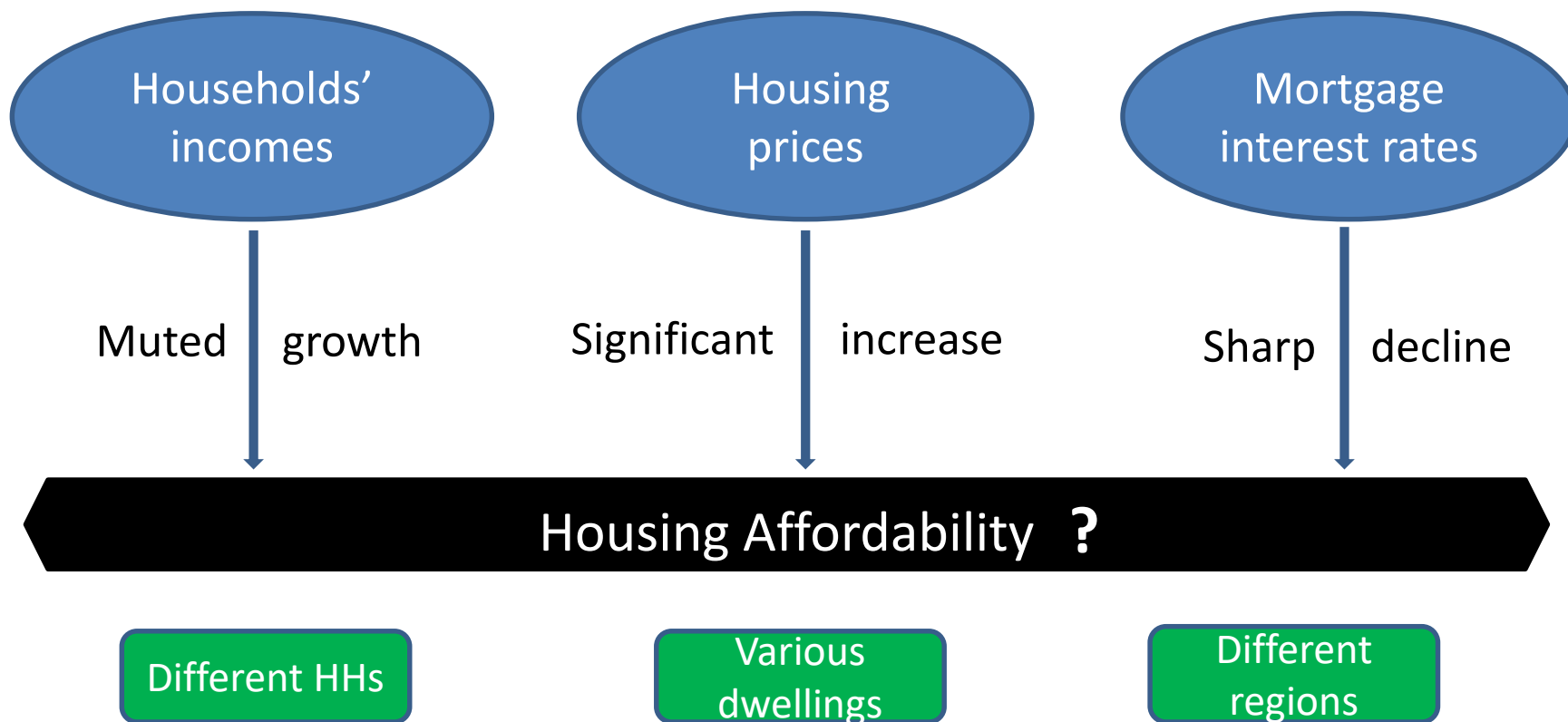| Organization/research performing the test	Meaning	Main results
Bank of Israel *Price-to-Income Ratio*	Ratio of average home prices to the net income of HHs (2004-2016)	• The ability to purchase a home declined prominently by 2016 • The number of years needed to purchase a dwelling was found to be the highest in Jerusalem area (11.1 years in 2012)
Ministry of Construction and Housing *Price-to-Income Ratio*	Ratio of average home prices to the net income of HHs (2016-2019)	The ability to purchase a home was improved: the ratio between housing prices and HHs' income fell from 7.92 in 2016 to 7.43 in 2018
Azary-Viesel S., Ben-Shahar D. and Hananel R. (2021) *Purchase and repayment approaches*	Using the micro-data on housing prices, HHs' income distribution and interest rate, the study examined housing affordability in Tel Aviv compared to 11 big cities in Israel (2002-2020)	In the second quarter of 2020, housing affordability in Tel Aviv was very low. • HHs of all incomes deciles cannot afford purchasing of typical 5-room apartment. • Typical 4-room apartment purchasing can be afforded by HHs from 10th income deciles only • Typical 3-room apartment purchasing can be afforded by HHs from 9th and 10th income deciles
Levhari and Pines (2018)	Proportion of HHs living in normative dwellings (fixed legal standards of housing quality and services). Examine the effect of the decline in mortgage interest rate on this measure	The reduction in mortgage interest rate may increase the proportion of HHs that can afford to live in normative dwellings, thus improving the affordability levels.

Dynamics of the main parameters effecting affordability

So, what 's the main goal?

Households' incomes — Muted | growth

Housing prices — Significant | increase

Mortgage interest rates — Sharp | decline

Housing Affordability ?

Different HHs

Various dwellings

Different regions

It is important to develop a model enabling accurate estimation of housing affordability index for different types of households, under the dynamic economic trends mediated by spatial resolution.
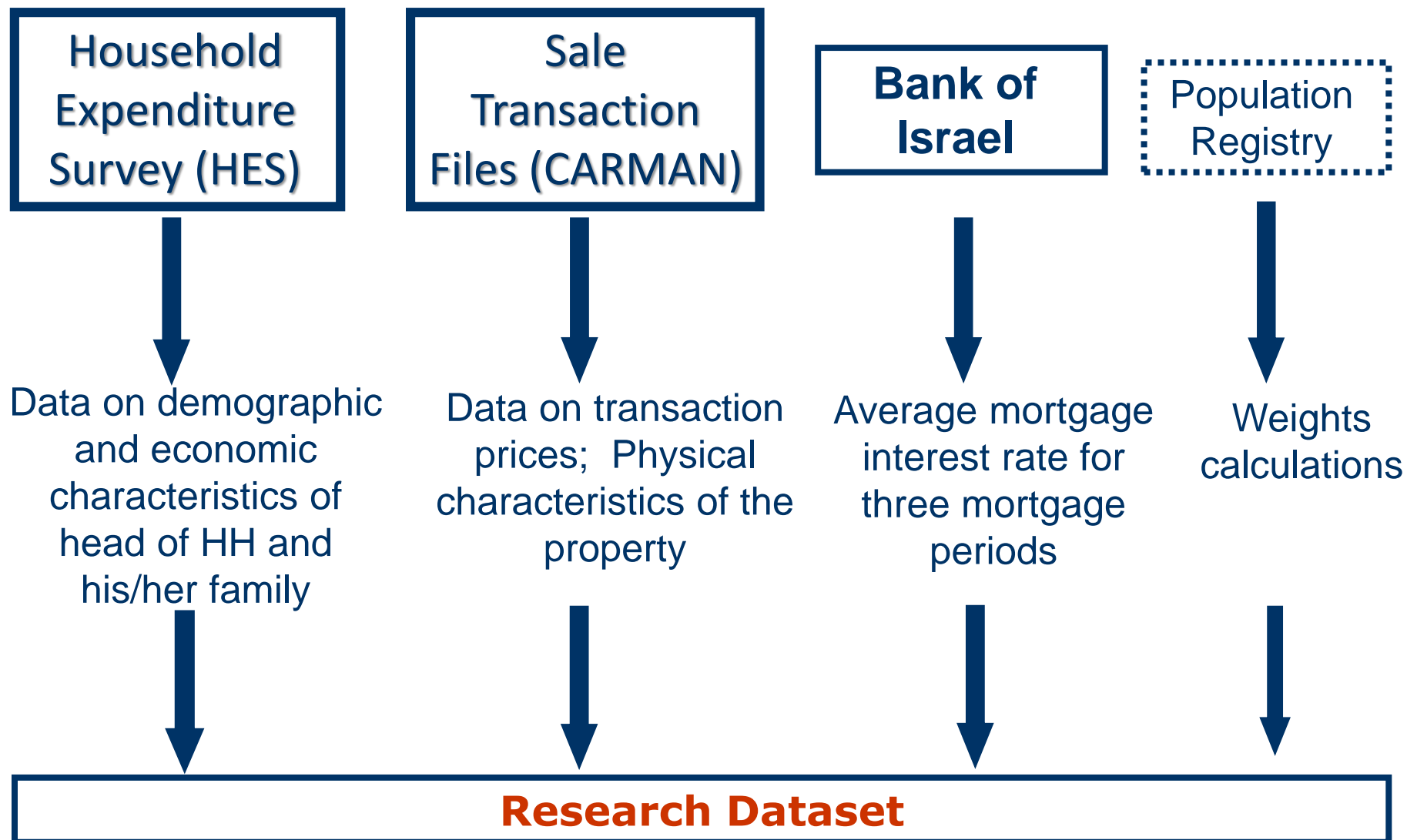
Suggested novel approach

- Affordability Housing Matrix (AHM)
  - takes into consideration three main parameters: HHs' incomes, house prices and borrowing costs
  - is based on the empirically estimation of the discrepancy between the dwelling price that certain HHs can afford (accounting for a maximum loan available under the bank's regulations and the HHs' income ability) and the average price of an adequate dwelling

- AHM approach aims to develop new affordability index assessing the ability of various population groups (differentiated by economic and demographic characteristics), to obtain the needed financing for purchasing an adequate residential property (size of dwelling), in various locations (districts)

- This index has been constructed and analyzed for 5-year-laged time points during the 16-year time span (2002, 2007, 2012, and 2017).

Data sources

Household Expenditure Survey (HES)	Sale Transaction Files (CARMAN)	Bank of Israel	Population Registry
Data on demographic and economic characteristics of head of HH and his/her family	Data on transaction prices; Physical characteristics of the property	Average mortgage interest rate for three mortgage periods	Weights calculations

Research Dataset

Criteria for relevant HHs

- **HHs' "splitting up" (disaggregation)**
  - Children over the age of 21 with income from work over NIS 1000 and live with their parents;
  - Married children over the age of 21 living with a spouse at their parents' place;
  - Divorced spouses living within the same HH.
- **Relevant HHs**
  - Single adults (21 years and older), couples and couples with children
- **Not relevant HHs**
  - Singles and couples under the age 21
  - HHs consisted of pensioners only

Dwellings' crowding rates

- Matching between the HH's size and dwelling size (fit-to-needs dwelling size).

- P*ersons-per-bedroom* (PPB) measure:
  - 'under-occupied' dwelling (PPB<1)
  - 'balanced' dwelling (PPB=1)
  - **'crowded' dwellings (1<PPB≤1.5)**
  - **'overcrowded' dwellings (PPB >1.5)**

  The affordability results in the current presentation refers mainly to crowded dwellings

AHM measures

Two measures were calculated for each slot in the AHM:

1. *Difference* between the affordable dwelling price and the mean dwellings price **-** Absolute Affordability Gap (AAG)

$$AAG = P_{ml}^{max} - \bar{P}_{ml}$$

P_{ml}^{max} – price that HHs of a certain demographic characteristics (m) in a location (l) can afford considering the maximum Loan-to-Value ratio (LTV), interest rate and monthly mortgage payment to income limits

$\bar{P}_{ml}$ – mean price of dwellings of a certain size matching the needs of those HHs.

The AAG demonstrates the extent of the affordability gaps for various HHs varying by age, family status and income, applied for different types of properties and across different locations

2. Ratio between the same components - Housing Affordability Rate (HAR)

$$HAR = \frac{P_{ml}^{max}}{\bar{P}_{ml}}$$

$P_{ml}^{max} = (IMPL * I_m) / LTV$

P_{ml}^{max} - affordable dwelling price

I_m - HHs' annual income

LTV - Loan-to-Value ratio

IMPL - income multiplier; indicates number of annual mean HHs' salaries it takes to buy a mean priced house conditional upon no more than a third of the monthly HHs' income spent on mortgage repayment. IMPL is usually calculated at the national level

The HAR presents the "amount of appropriate dwelling" that various HHs in different locations could afford: "How much unaffordable dwelling can I afford?"

Findings

The AHMs were calculated for different types of HHs and for different size of dwellings. First, at the districts' level and then, at the national level – bottom up approach

Example for 2017, National level

National					Number of rooms				
					1-2	2.5-3	3.5-4	4.5-5	5.5-6
HHs (No.)	HHs (%)	Age of HH's head	Number of children in HH	MHP Mean HHs Income	1,021.1	1,167.9	1,509.0	1,956.5	2,483.6
1,626	20.2	21-34 (30-years mortgage loan period)	no children	7,857	0.66 (-346.0)	0.58 (-492.8)			
597	7.4		1-2 children	14,919		1.10 (113.9)	0.85 (-227.1)		
245	3.0		3-4 children	13,491			0.77 (-349.8)	0.59 (-797.4)	
84	1.0		5 or more	12,859				0.56 (-851.7)	0.44 (1,378.8)
875	10.9	35-54 (25-years mortgage loan period)	no children	12,533	0.98 (-20.4)	0.86 (-167.3)			
1,679	20.9		1-2 children	18,145		1.24 (280.8)	0.96 (-60.3)		
1,070	13.3		3-4 children	20,453			1.08 (124.0)	0.83 (-323.5)	
283	3.5		5 or more	16,358				0.67 (-650.5)	0.53 (-1,177.6)
1,304	16.2	55-61/66 (15-years mortgage loan period)	no children	16,750	1.01 (8.0)	0.88 (-138.8)			
241	3.0		1-2 children	18,938		1.00 (-4.4)	0.77 (-345.4)		
36	0.4		3-4 children	17,650			0.72 (-424.6)	0.55 (-872.1)	

Note: MHP stands for Mean Housing Price; Grey tone colour numbers are HAR (Housing Affordability Rate); Numbers in brackets are AAG (Absolute Affordability Gap) presented in thousands NIS

1 2 3

Affordability ranks matrix at the district level

Living space

Unaffordable ranks

Severely Unaffordable (below 0.5)	1
Seriously Unaffordable (0.5-0.69)	2
Moderately Unaffordable (0.7-0.89)	3

Borderline Affordability (0.9-1.1) | 4 |

Affordable ranks

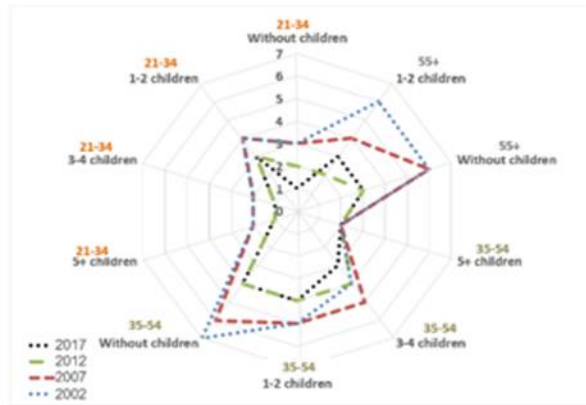| Moderately Affordable (1.11-1.3) | 5 |
| Affordable (1.31-1.5) | 6 |
| Most Affordable (above 1.5) | 7 |

1st statistical product
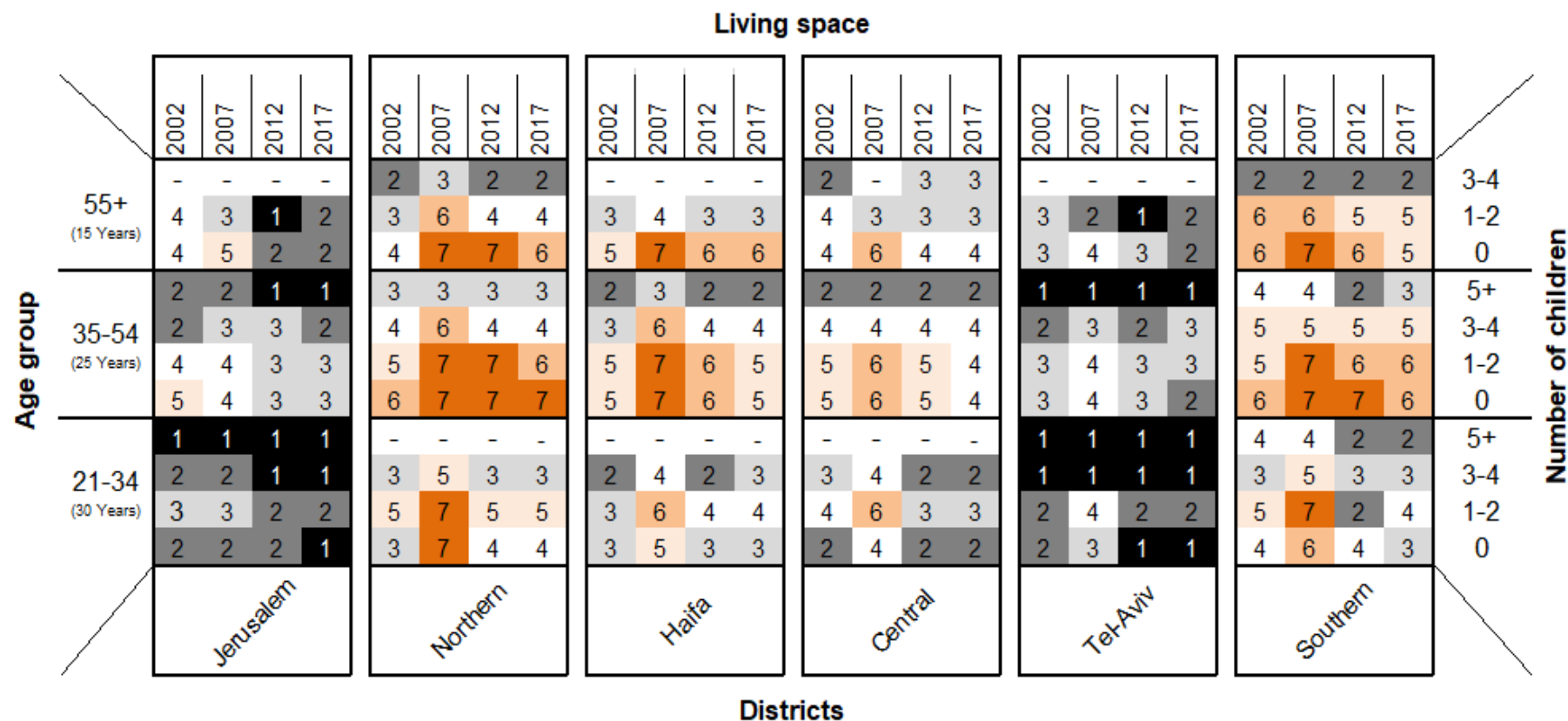
Radar charts for affordability level by districts and years
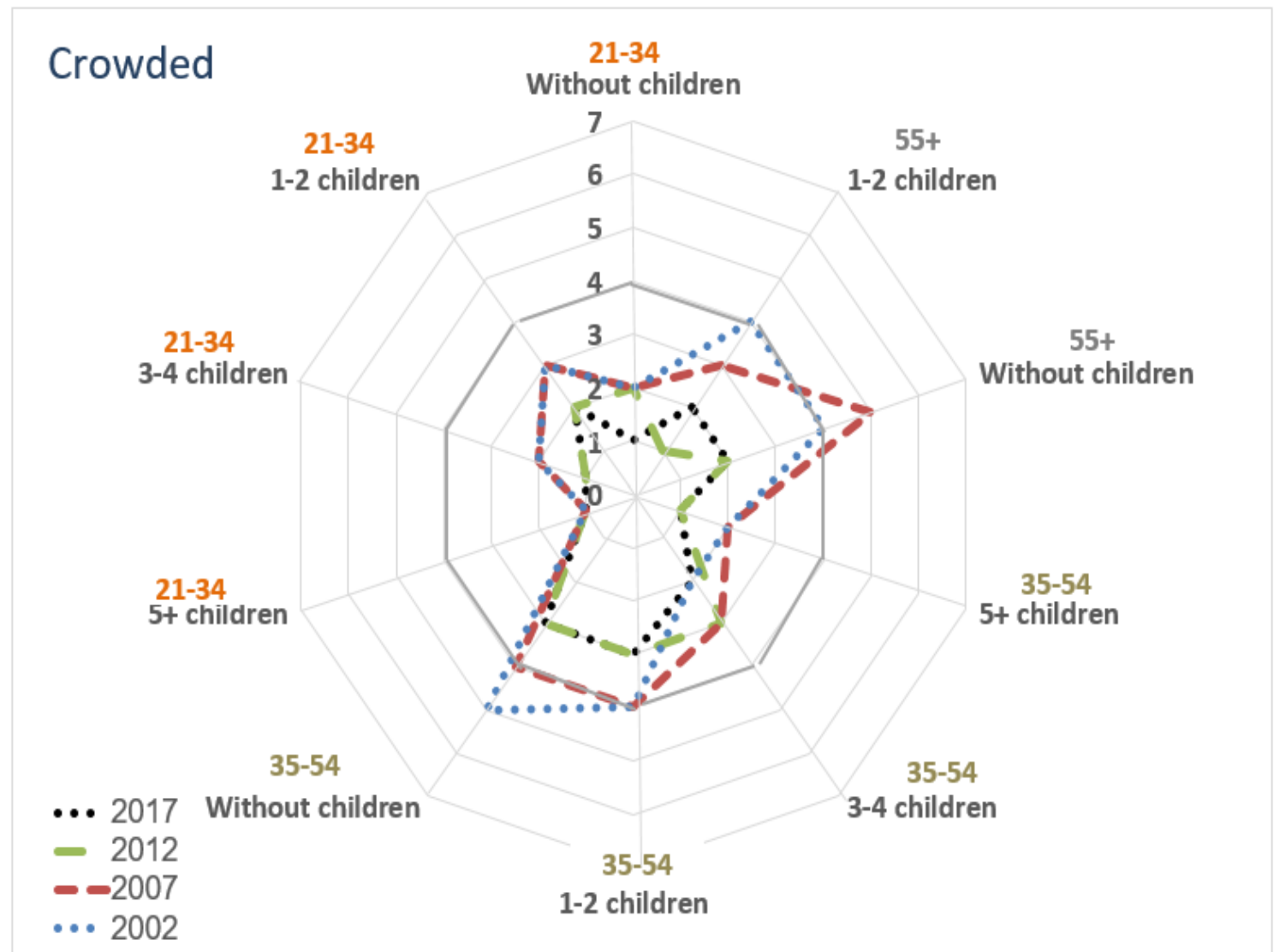
1st statistical product

Radar charts for affordability level by districts and years

a. Jerusalem
b. Northern
c. Haifa
d. Central
e. Tel-Aviv
f. Southern
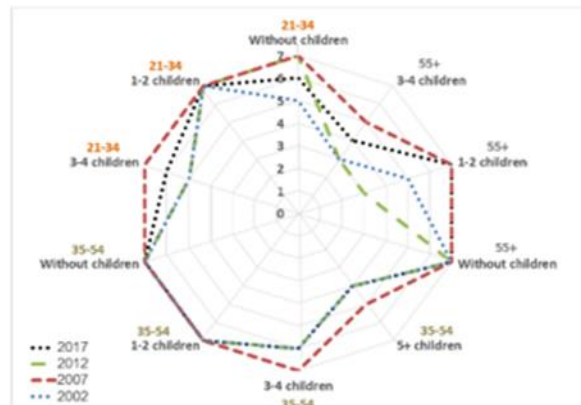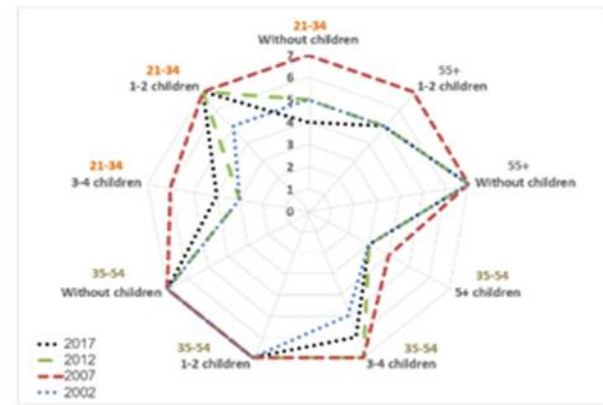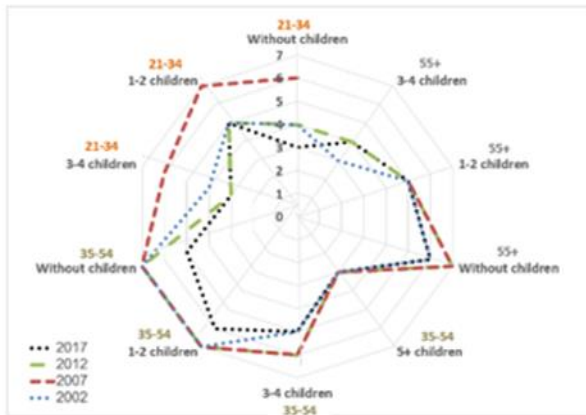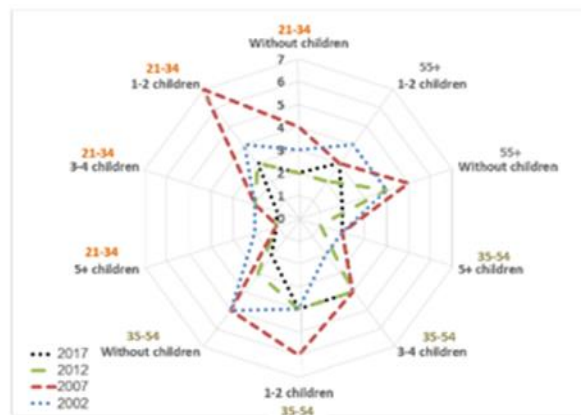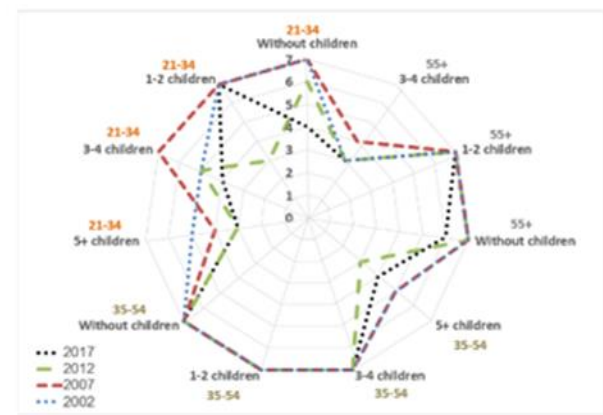
Affordability ranks matrix at the national level
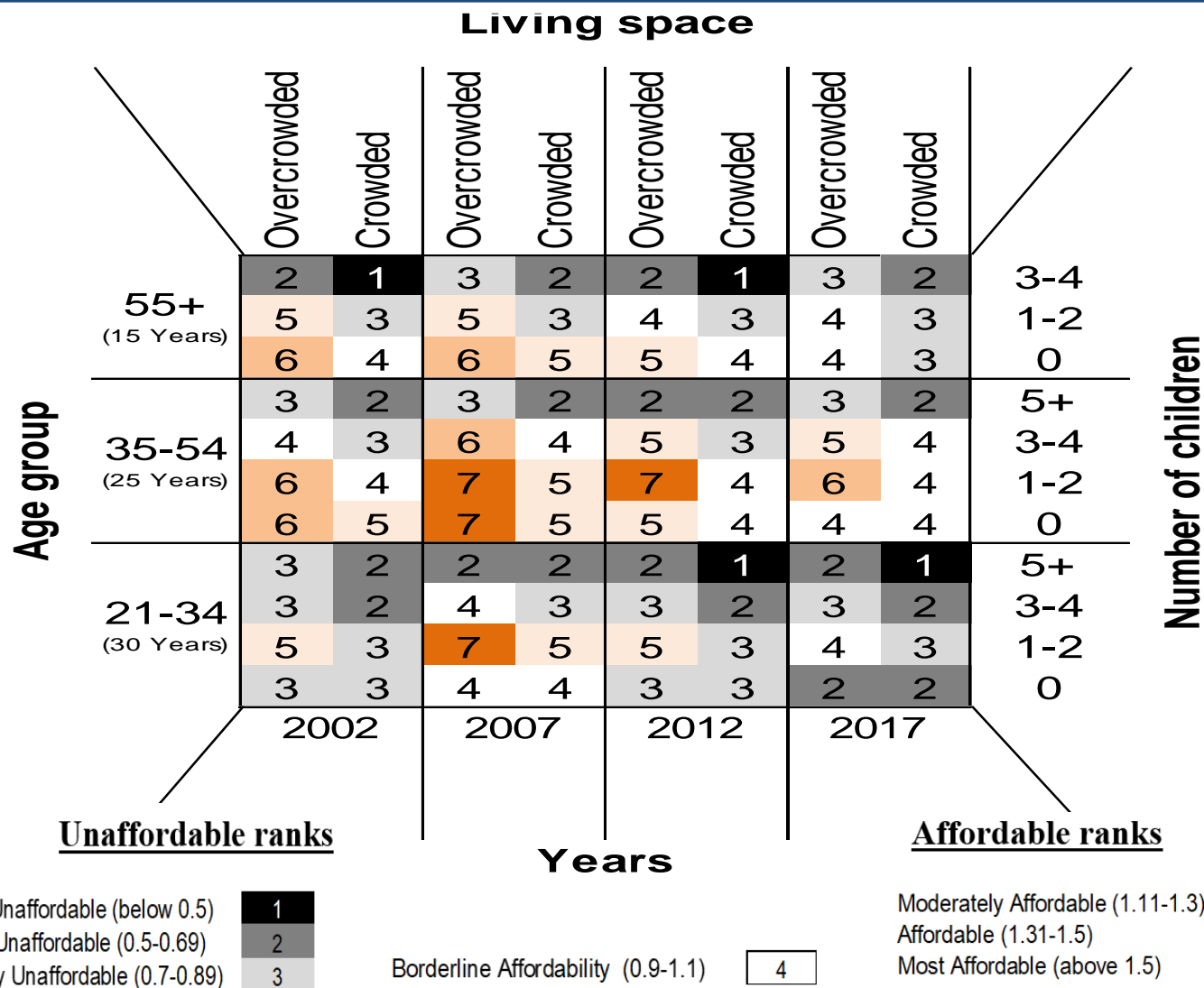
Housing affordability at the national level
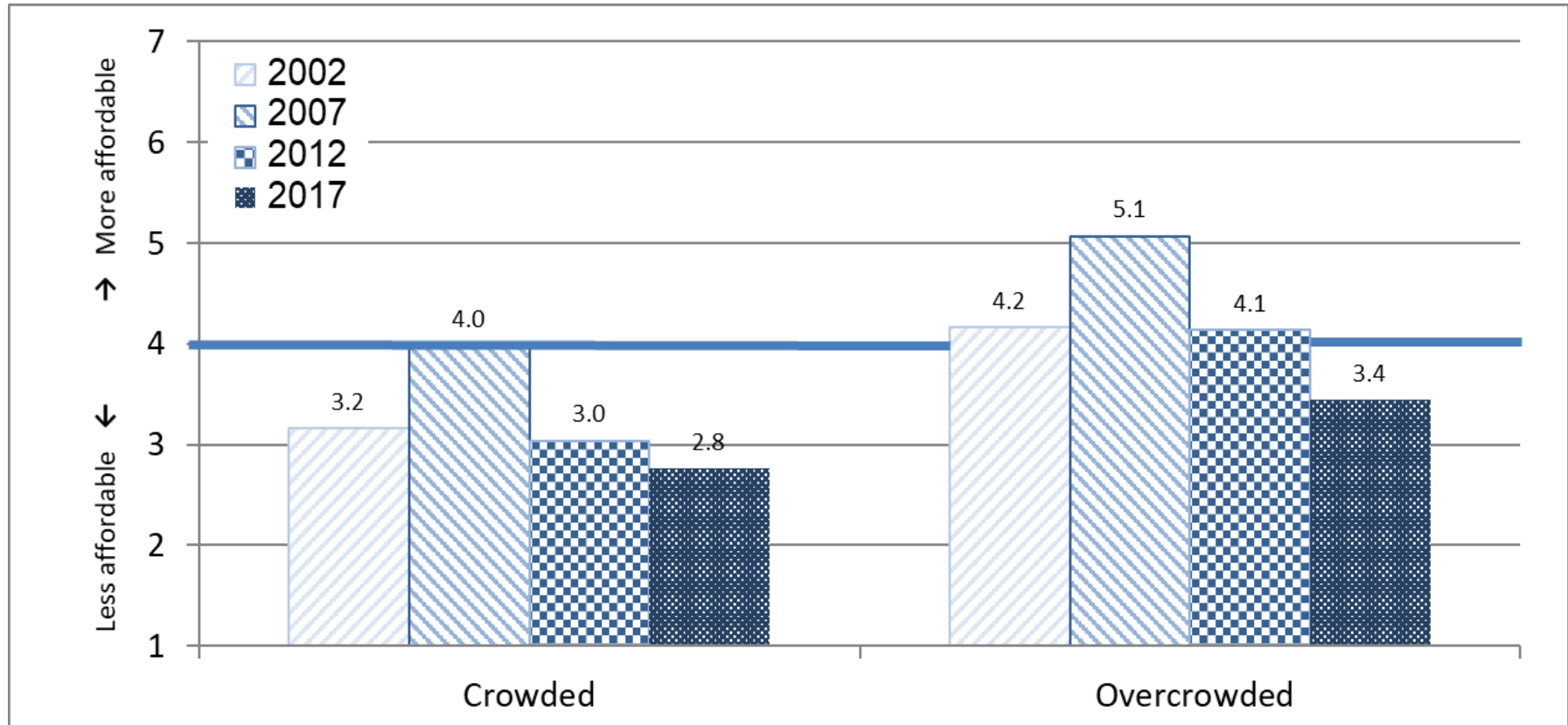
HHs distribution over the affordability ranks

Percentage of HHs of different types falling into three categories:

1. HHs for whom purchasing dwelling was affordable (ranks 5-7)

2. HHs for whom purchasing dwelling was unaffordable (ranks 1-3)

3. HHs falling in borderline category of affordability (rank 4)

Percentage of HHs in unaffordable category, 2017

a. Total population

b. By age groups

①②③ 2nd statistical product
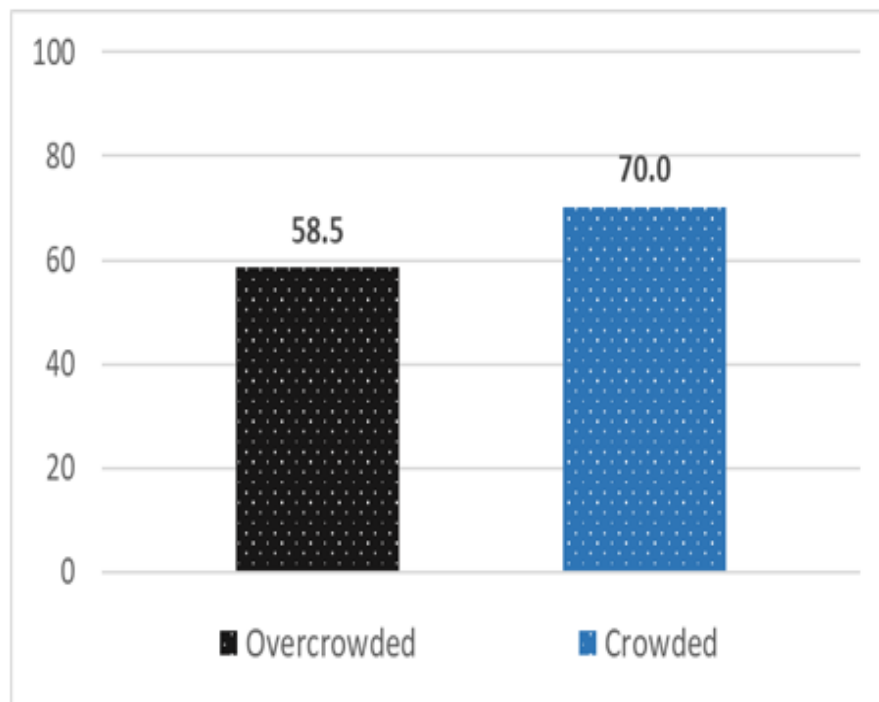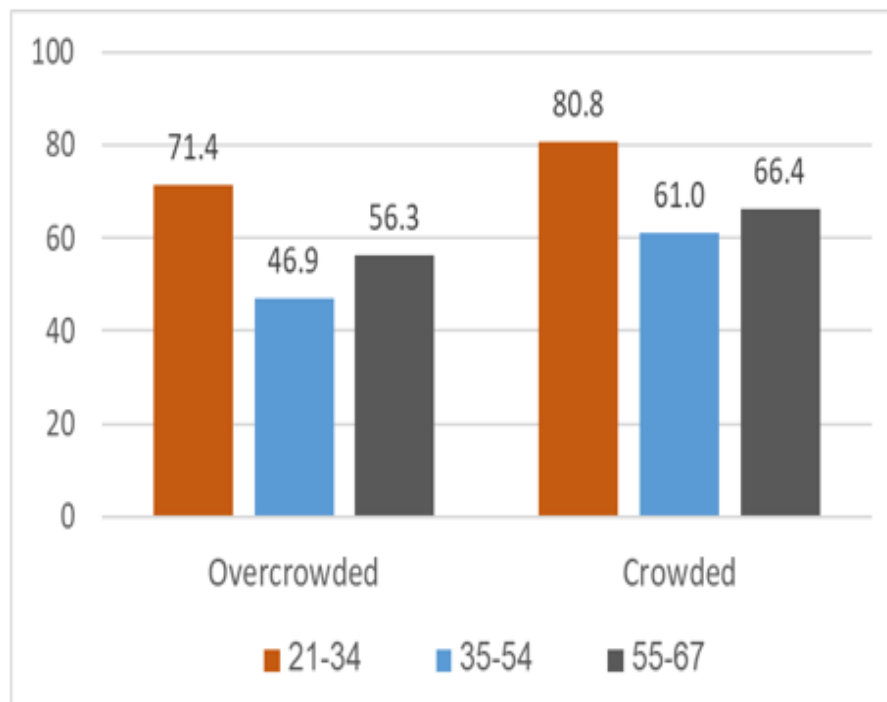
Distribution of HHs over the affordability categories, by types and years

A. Young HHs

a. Without children | b. With 1-2 children | c. With 3-4 children | d. With 5+ children

B. Middle-aged

a. Without children | b. With 1-2 children | c. With 3-4 children | d. With 5+ children
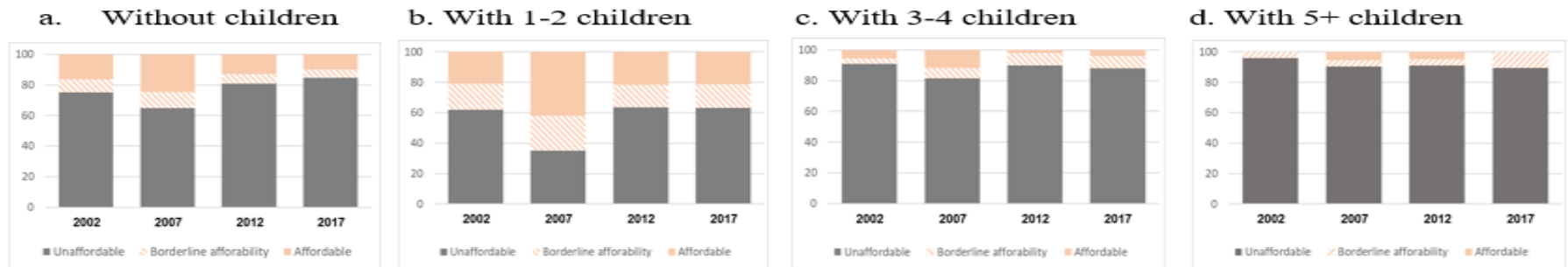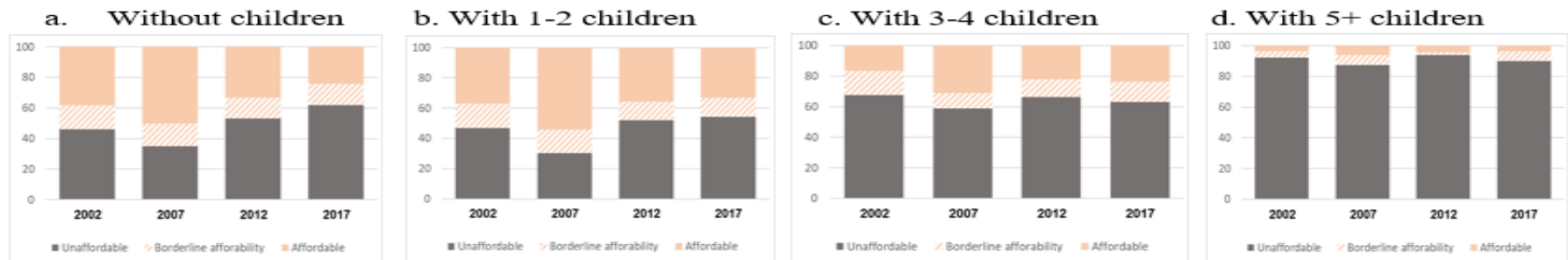
C. HHs of pre-retirement age

a. Without children | b. With 1-2 children | c. With 3-4 children
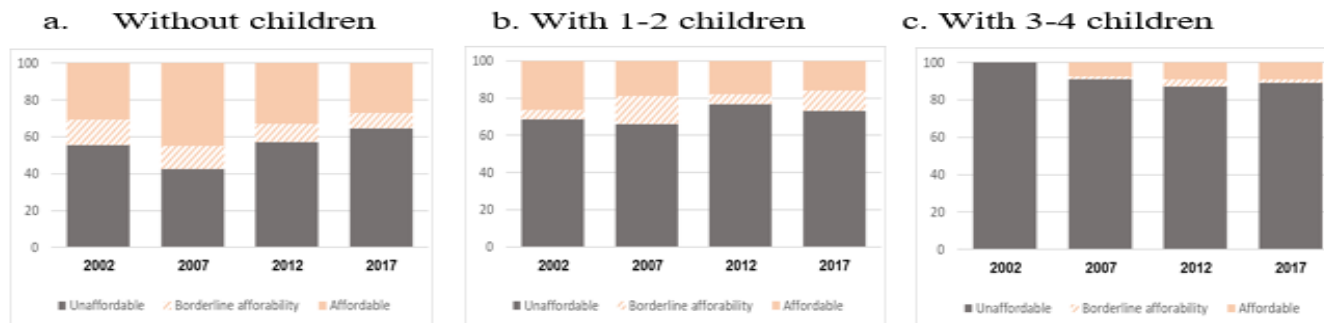
■ Unaffordable   ⁄ Borderline afforability   ■ Affordable

"How much unaffordable dwelling can I afford?"
HAR at the district level, 2017
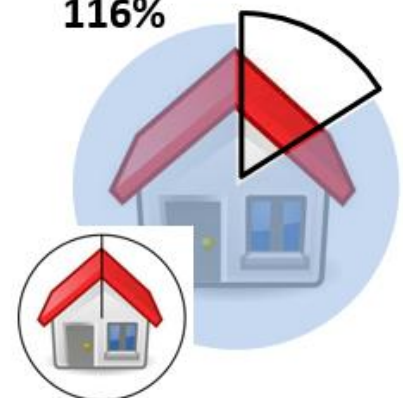
54% — Jerusalem
55% — Tel Aviv
78% — Central
85% — Haifa
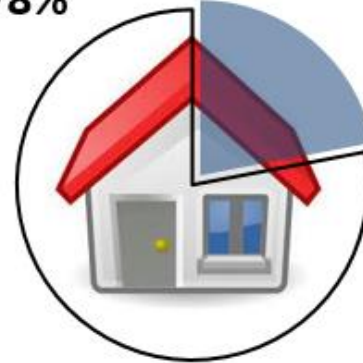
Crowded
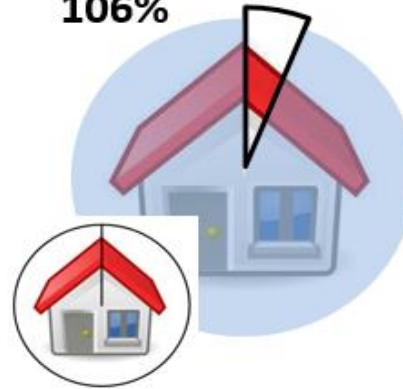
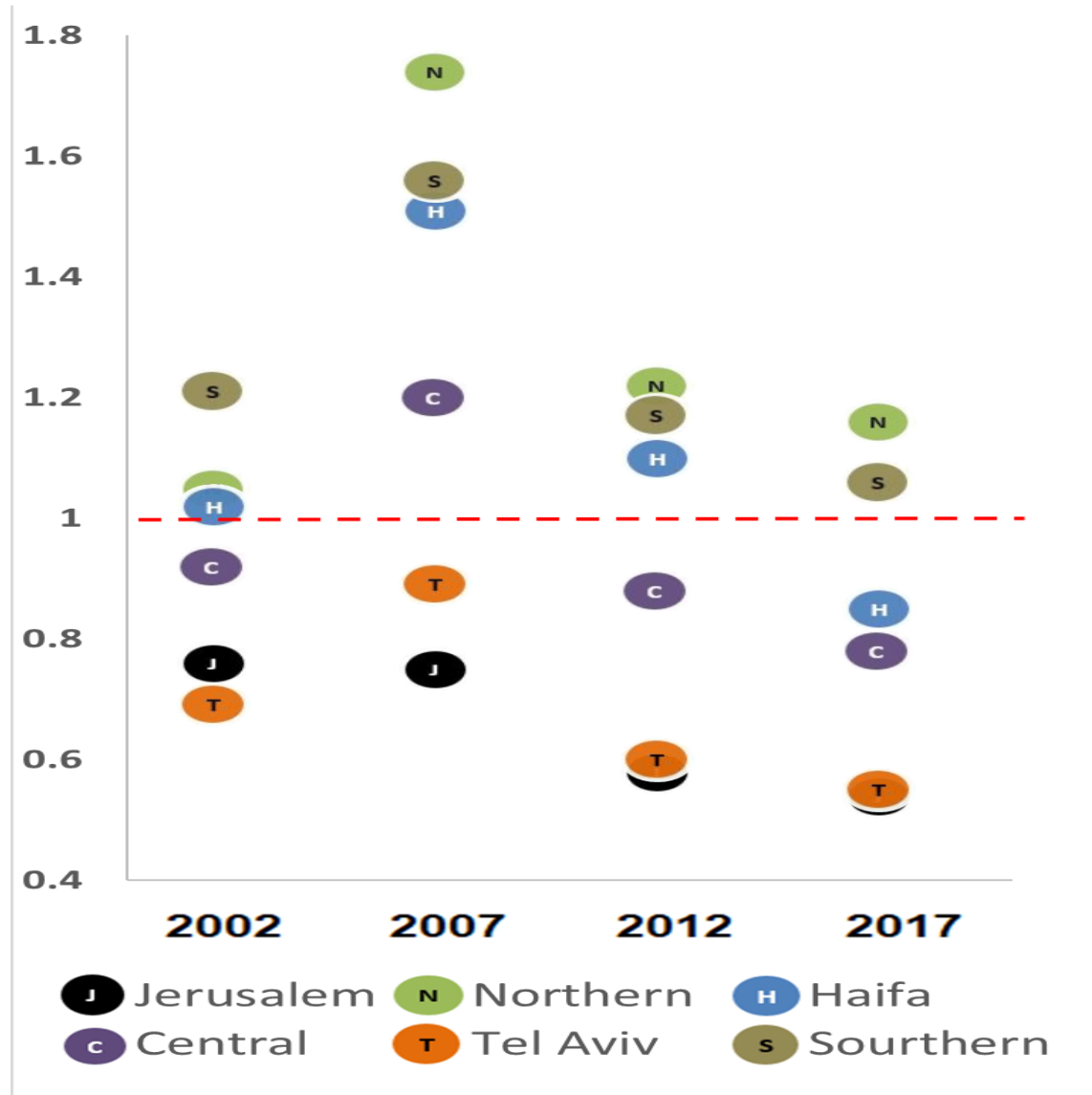106% — Southern
116% — Northern

3rd statistical product

"How much unaffordable dwelling can I afford?" HAR at the district level

Crowded

3rd statistical product
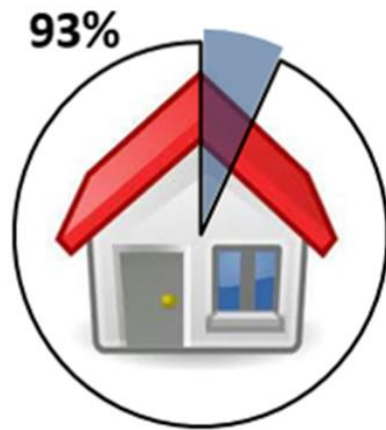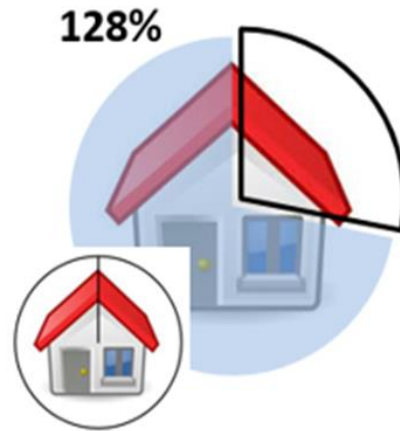
1 2 3

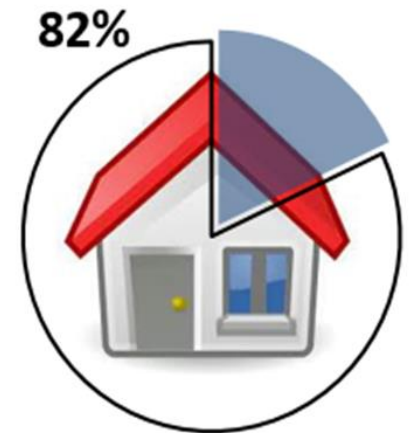# "How much unaffordable dwelling can I afford?" HAR at the national level

93% 2002
128% 2007
92% 2012
82% 2017
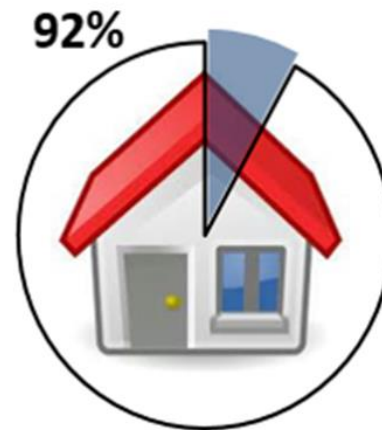
Crowded

Conclusions

- In this paper, we present a novel housing affordability measure taking into consideration the three main components affecting affordability - HHs' incomes, house prices and mortgage borrowing costs;

- According to our results, in 2017, 70% of the HHs population could not afford purchasing crowded dwelling and 58.5% of the HHs population could not afford even an overcrowded dwelling;

- By 2017, young HHs were even in worst situation compared to the middle-aged HHs: more than 80% of them could not afford crowded dwelling, as opposed to 61% of the middle-aged HHs;

- At a district level, our analysis shows that two high-demanded districts (Jerusalem and Tel Aviv) are characterized by rather low affordability level over the whole period, especially in 2012 and 2017;

Conclusions (Cont.)

- Overall, during the research period, housing in Israel has become unaffordable for a large number of HHs of all types, pushing the issue to the forefront of the policy debate receiving considerable public attention.

- For the general public, the HAR data might serve as a basis for home affordability calculator (can be interpreted in terms of "How much house can I afford?")

- Our findings provide a basis for the important policy implications that may assist in implementation of affordable housing schemes and projects

- Furthermore, based on a multi-year series of the AHM data, it is possible to examine housing affordability dynamics; usage of such data enables evaluation of housing policy over time.

larisaf@sbc.gov.il   dorons@cbs.gov.il   alla.koblyakova@ntu.ac.uk