

**The Distribution of Rental Assistance
Between Tenants and Landlords:
The Case of Students in Central Jerusalem[^]**

Doron Sayag* and Noam Zussman**

Abstract

Students living in rental apartments in central Jerusalem were provided grants in 2006–11 in order to encourage urban renewal, which led to a marked increase in the number of students in the area. This study examines the distribution of the benefit between the tenants and the landlords. It relies predominantly on rental advertisements as well as on actual rents in 2000–12, and on administrative data of the rent paid by grant recipients. The research method was based on hedonic estimations of rent using a difference-in-differences method.

The research indicates—subject to the assumption that actual rents moved in tandem with those quoted in rental notices—that in the periods around the start of the grant program and around its cancellation, the share of the grants reaching the recipients' landlords ranged from one-fifth to two-fifths. The grants led to an increase in rents in the center of the city for nonrecipients as well, so that the overall additional rent is equivalent to four-fifths of the grant amounts. These rates are within the broad range of findings worldwide.

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A. Introduction

Affordable housing is a major objective of government socioeconomic policy (see, for example, Government of Israel, 2014). In Israel, it has become more important in the past several years, following sharp increases in housing prices, and the government allocates considerable resources each year to housing assistance (Agmon 2013). In recent years, these resources amounted to more than NIS 3 billion a year—about 5 percent of direct social expenditure.

Housing assistance in Israel is provided through different channels, such as public housing, open-market rental assistance (140,000 beneficiaries at an annual cost of NIS 1.4 billion¹ [Zeira, 2014]), mortgage grants to eligible borrowers, and the institution of limited duration programs such as soft loans and grants for home purchasers and the subsidizing of contractors' development costs, all for specific localities, most of which are in the periphery. (Examples include "The Great Housing Opportunity Program" ["The Sharansky Plan"] in 2001, "The Atias Plan" of 2011–12, and a grant for the purchase of a first home in Jerusalem in 2013). A government bill has also recently been debated to apply zero VAT to new first-time homebuyers under certain circumstances. Additionally, large local authorities such as Jerusalem, Tel Aviv-Yafo and Be'er Sheva have instituted open-market rental assistance programs for students choosing to live in certain neighborhoods, with the aim of encouraging urban renewal processes (Vurgan, 2012).

When considering a housing assistance program, one of the issues to take into account is its effect on home prices and rents of the beneficiaries and others—in particular, its effect on housing solutions for the target population and the general public. As such, it is important to examine whether, and to what extent, the assistance to beneficiaries ultimately reaches sellers/landlords.

Government expenditure on housing assistance programs in Israel is, as noted, in excess of NIS 3 billion annually; however, to date, the distribution of the assistance between the sellers/landlords has not been examined.² Several studies have been carried

¹ The average exchange rate was NIS 3.5779/\$ in 2014.

² In the Bank of Israel Annual Report for 2002 (Bank of Israel, 2003) the results of a gross examination of the effect of "The Sharansky Plan" on home prices were presented. The conclusion was that they increased by a similar amount to the discounted value of the assistance. Zussman et al. (2007) examined the rollover rate of changes in indirect taxation to consumer prices. They found that changes in the VAT rate had no effect on prices, at least in the short term, but an increase was found in the probability of price changes in the same direction as the change in VAT (see also Ribon and

out worldwide, examining the extent to which rental assistance reaches beneficiaries' landlords. Fack (2006) found that in France, 78 percent of the expansion of the application of rental assistance ultimately reached landlords; based on district variance in the level of housing assistance in France, Letremy and Trevien (2014) discovered that the vast majority reaches landlords. Gibbons and Manning (2005) showed that in the UK, 60–66 percent of a national reduction in the subsidy to (new) tenants was rolled over to landlords. Studies from Finland (Kangasharju, 2010; Viren, 2013) indicate that 30–70 percent of the increase in the national rental assistance ceiling ended up in the landlords' hands. In the US, Collinson and Ganong (2013) found that a nationwide increase of one dollar in the rental assistance ceiling led to an increase of 13–20 cents in rents. Susin (2002) showed that expanding the national rental assistance voucher system in the US led to a rent increase that was higher than the value of the voucher for those not eligible for the program.

The wide range of estimations in the literature is apparently a consequence of different market structures and of the elasticities of supply and demand.

The present study focuses on grants given to students who rented accommodations in the center of Jerusalem between the 2005/06 and 2010/11 academic years, and examines the distribution, between tenants and landlords, of the grant. The database for the study includes information for 2000–12, primarily from rental notices, as well as from the Central Bureau of Statistics Survey of Rents and from administrative data on grant recipients and the rents they paid. Hedonic estimations of rents (i.e., after adjusting for the characteristics of the dwelling) were made through a difference-in-differences method—comparing the difference between rents in the city center during the grants period and rents there in other periods, to this difference, in the same periods, in other Jewish neighborhoods in the capital or adjacent to the city center.

The main finding of the study is that in the periods around the introduction of the grant program and around its cancellation, the share of the grant that ultimately reached recipients' landlords varied from one-fifth to two-fifths. The increase in rental income of all the landlords in the city center (including those renting to tenants who did not receive grants) was estimated at four-fifths of the amount of the grants. These rates are broadly within the range of findings worldwide. It should be noted that though we were

Sayag, 2013). Approximately two-thirds of the reduction in the purchase tax rate was rolled over into a reduction in consumer prices.

compelled by a lack of data to rely mainly on rental notices the correlation between actual rents and rents asked is extremely high.

The rest of this paper is organized as follows: Section B describes the student grant program and recipient characteristics; Section C presents the database, a schematic theoretical framework, the estimation method and how the distribution of rental assistance between tenants and landlords was calculated; Section D exhibits stylized facts; Section E presents the results of the estimations; Section F discusses alternative explanations for the results, and Section G concludes.

B. The grant program for students renting accommodations in the center of Jerusalem

The city center of Jerusalem has long suffered from physical deterioration and declining activity (Tibi-Maimon and Efron, 2004; Ramon et al., 2011). Since 2001, the Jerusalem Development Authority, through its subsidiary Eden—The Jerusalem Center Development Company, has been implementing a comprehensive plan for urban renewal in the city center. The plan includes laying track for a light railway, making other traffic system changes such as closing streets to private vehicular traffic, and approving extensive building plans. The plan also includes providing building grants to developers, for the rehabilitation of public spaces, cleaning building facades, assisting with the production of cultural events (Ramon et al. 2011; Naim 2012).

Under the urban renewal plan, from the 2005/06 through the 2010/11 academic years, the Jerusalem Development Authority gave an annual grant to students living in rented accommodations in the city center (Figure 1), with the aim of encouraging a vigorous population to take up residence there. Those qualifying for the grants were undergraduate students (90.6 percent), graduate students (6.6 percent), and a smaller percentage of doctoral students, at institutes of higher education funded by the Council for Higher Education or in a multiyear program in post-secondary art schools sponsored by the Ministry of Culture and Sport (Table 1). Eligibility for the grant was given to Israeli citizens living in rented accommodation (not belonging to a first-degree relative) in the city center for at least half a year, and at least 70 percent engaged in studies. The period of eligibility for the grant was restricted to three years and was not conditional on

any income test. In the case of an apartment with a number of students living in it (Table 2), each of them was eligible for a grant.

The grant declined over the years (Table 3). About 85 percent of recipients were given a full grant; the others received a partial grant because their rental period was shorter than a year (Table 4). In the 2009/10 academic year, the grants averaged 23 percent of the annual rent paid by recipients. The distribution of the grant as a percentage of rent (Figure 2) was broad, due to differences in the level of the rents and the grants. However, for 80 percent of those who obtained grants, the grant covered 10–30 percent of annual rent.

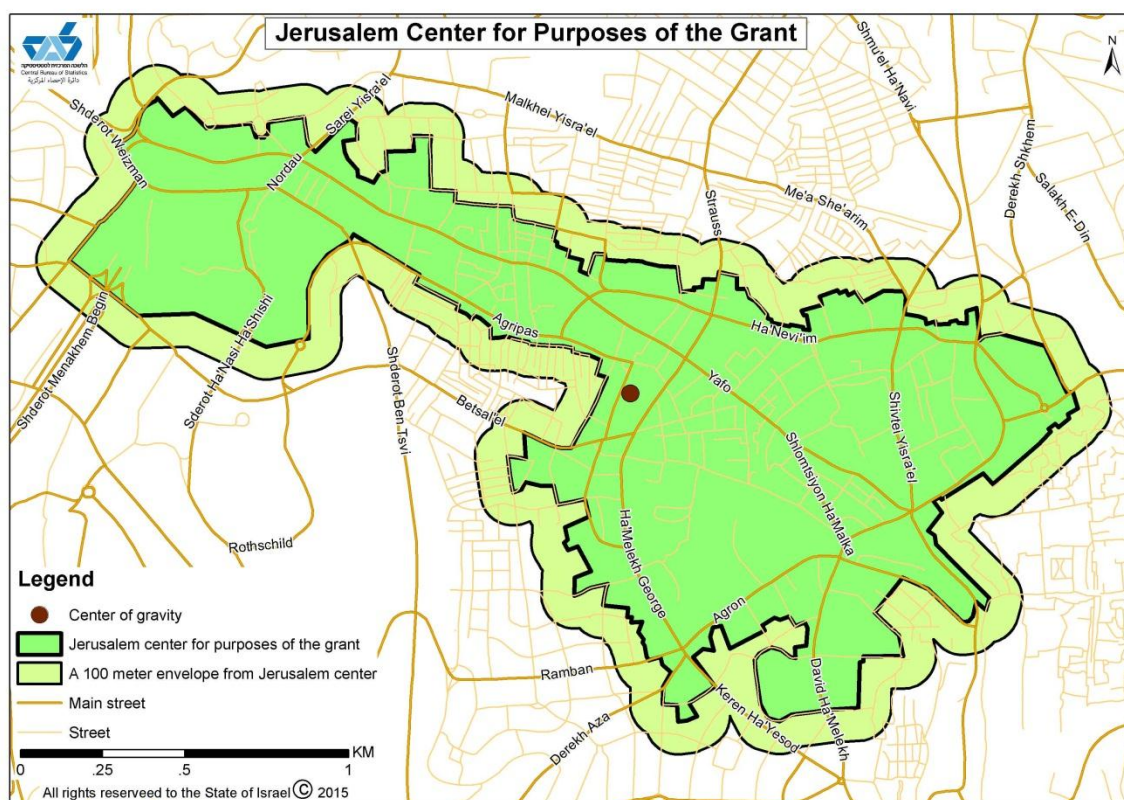
In the first year of the plan's implementation (2005/06), the number of grants was small, apparently because the plan only took effect towards the end of the year: While Government Decision 3696 to strengthen Jerusalem—including revitalizing the city center and encouraging students to live there—was passed on June 6, 2005, it took several months to make the necessary arrangements, and the academic year began on October 30, 2005.

There is no doubt that the grants program led to a considerable increase in the number of students renting apartments in the center of Jerusalem, and consequently to the achievement of the main aim of the Jerusalem Development Authority. Assuming that the overwhelming majority of students who lived in the city center received a grant, the number of students in the city center increased by close to 900 between the 2005/06 and 2010/11 academic years (as the number of grants increased in the same period from about 650 to about 1,510—see Table 3 below). Furthermore, calculations based on the 2008 population census indicate that there were 17,500 students renting an apartment on the open market (not in dormitories) in Jewish neighborhoods in Jerusalem (with 2,100 of the students in the city center)³, and as such the percentage of students who moved into the city center was more than 5 percent.

In the peak years of the program, students with grants occupied three-fifths of the apartments rented in the city center. It may be that the increase in rents in the center of Jerusalem following the introduction of the grants program—as will be shown later—encouraged owners of homes in the area to make them available for rent, leading to an even greater increase in the flow of students there and helping to achieve the aims of the Jerusalem Development Authority.

³A total of 13,600 households—a third of the households renting in Jewish neighborhoods in Jerusalem.

Figure 1: The center of Jerusalem for grant purposes (darker green)¹



1) The area in light green indicates the area outside the area in the city center that is eligible for a grant, up to a distance of 100 meters from the center (the city center "envelope"). The brown square near the middle of the map is the city's center of gravity.

Source: The Jerusalem Development Authority and the Central Bureau of Statistics.

Table 1: Grants according to institutions of higher education, 2009/10 academic year

Educational institution	Number of recipients	Distribution (percent)
The Hebrew University	700	45.2
Bezalel – Academy of Art and Design	397	25.6
Hadassah Academic College, Jerusalem	247	16.0
Azrieli – College of Engineering	63	4.1
The Academy of Music and Dance	43	2.8
Religious educational institutions ¹	35	2.3
The Open University	9	0.6
Other ²	54	3.5
Total	1,548	100

1) Haredi College—Jerusalem, the Lev Academic Center, Emuna College, Lifshitz College of Education.

2) The Musrara School of Art, the School of Visual Theater, the Sam Spiegel Film and Television School, the David Yellin Academic College of Education, the Center for Classical Oriental Music and Dance, the Lander Institute, Nissan Nativ Acting Studio, the Vertigo Dance School.

Source: The Jerusalem Development Authority and the authors' calculations.

**Table 2: Distribution of grant recipients' apartments,
by number of recipients and size of apartment,
2009/10 academic year**

Number of rooms in the apartment	Number of recipients sharing the apartment				
	1	2	3	4+	Total
1-1.5	132	37	2	-	171
2-2.5	148	132	6	-	286
3-3.5	106	121	67	5	299
4-4.5	20	31	46	3	100
5+	3	7	8	3	21
Not known	24	10	3	-	37
Total	433	338	132	11	914

Source: The Jerusalem Development Authority and the authors' calculations.

**Table 3: Full amount of the grant and
the number of recipients**

Academic year	Amount of the full grant (Current NIS)	Number of recipients (approximately)
2005/06	6,600	650
2006/07	5,400	1,027
2007/08	5,004	1,278
2008/09	4,200	1,345
2009/10	3,800	1,550
2010/11	3,400	1,510

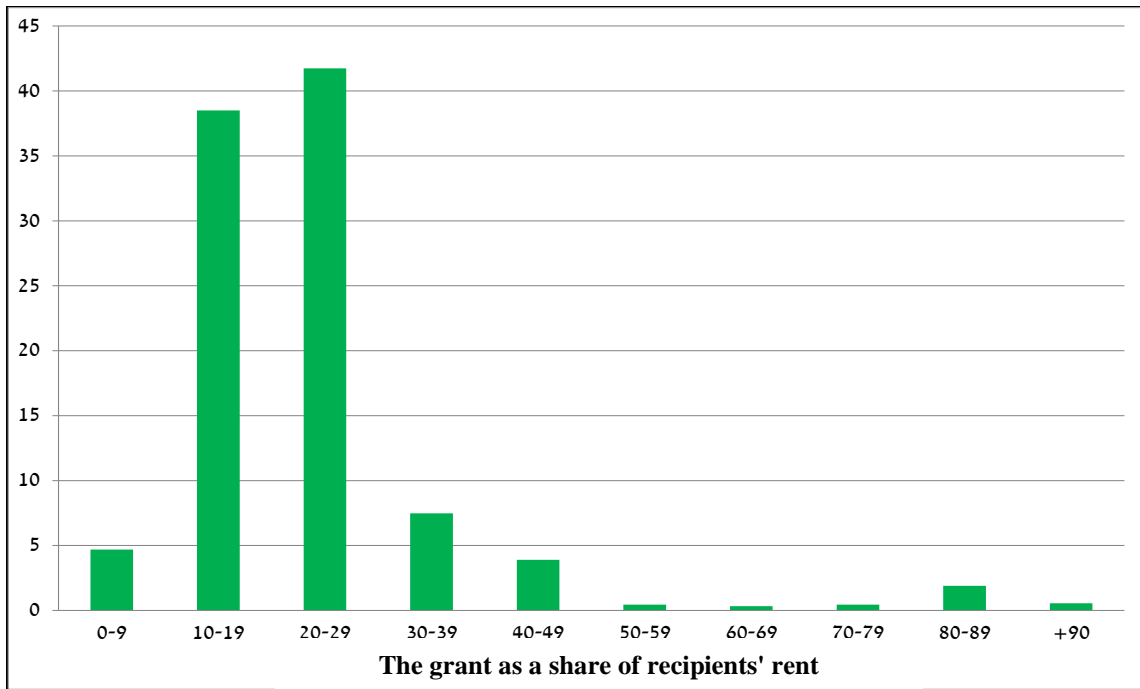
Source: The Jerusalem Development Authority.

Table 4: Distribution of partial grants, 2009/10 academic year

Percentage of grant	Range of the grants (Current NIS)	Average grant (Current NIS)	Number of recipients (approximately)	Distribution (percentage)
Full	3,800	3,800	1,288	83.0
Partial (76–96%)	3,662–3,008	3,450	197	12.5
Partial (51–75%)	2,850–2,058	2,500	42	3.0
Partial (50%)	1,900	1,900	25	1.5

Source: The Jerusalem Development Authority and the authors' calculations.

Figure 2: Distribution of the grant as a share of the rent paid by recipients,¹ 2009/10 academic year (percent)



1) The sum of the grants given to those living in an apartment divided by the annual rent paid by the recipients in the apartment. Percentages greater than 70 relate to those renting rooms in one of the monasteries in Jerusalem.

Source: The Jerusalem Development Authority and the authors' calculations.

C. Database, theoretical framework and estimation method

Database

The database for the study comprises three information sources:

- a) *Rental notices* – These were collected by a private company from newspapers, Internet sites, information banks and so forth. For each notice, the publication date, the apartment address, the number of rooms and the rent being asked on the publication date are known.
- b) *Central Bureau of Statistics Survey of Rents* – A sample of a panel of rented apartments in urban areas. (For more details, see Burck, 1999). For every apartment, the contract start date, the apartment address, the number of rooms and the actual rent are known.

c) *Students renting in the center of Jerusalem who received a grant in the 2009/10 academic year*⁴ – The file was obtained from the Jerusalem Development Authority and contains the contract start date, the contract termination date, the address of the property, the number of rooms in the apartment, the number of people sharing the apartment, the size of the grant, the monthly rent, and general information on the students, including degree, the year of studies, the educational institution and the area of study.

The data files were supplemented with geographical information in order to obtain the precise location of each apartment (hereinafter, anchoring), the statistical area (neighborhood, according to the 2008 population census), the socioeconomic rating of the area according to the census, the distance to the center of gravity of the city center (near the Ben Yehuda pedestrian mall—the brown dot in Figure 1), an outline of the boundary line of the city center, and the distance to it. In the years 2000–12, a total of 73,400 apartments were anchored from rental notices (94.2 percent) and 4,420 apartments from the Survey of Rents (91.5 percent), of which 2,690 and 95 apartments, respectively, were in the city center. Due to the limited number of apartments in the center of Jerusalem that were included in the Survey of Rents, the study is based almost solely on rental notices. There were 1,549 grant recipients in the city center in the 2009/10 academic year, living in 914 apartments.⁵

A large proportion of the non-anchored apartments are in Arab neighborhoods in Jerusalem. Since the apartments in those neighborhoods are not an alternative for students in the Jewish neighborhoods, they were omitted from the study (about 10 percent of the notices that were anchored). In the end, the study included approximately 78,000 apartments in Jewish neighborhoods in Jerusalem in the years 2000–12, predominantly apartments offered for rent as well as rented apartments. To these were added apartments in which grant recipients were living in the city center in the 2009/10 academic year.

⁴ We did not have similar data on grant recipients in the previous academic years.

⁵ By way of comparison, at the time of the 2008 population census, 2,053 students (in 1,381 households) were living in the city center and 1,550 students received grant. The number of households living in rented accommodations in the city center at that time was 2,254.

A schematic theoretical framework

The following is a brief and schematic description of the equilibrium in the rental market in the center of Jerusalem (Figure 3a) and in the other neighborhoods (Figure 3b)—prior to the award of the grant (Period 0) and during it (Period 1)—assuming that similar apartments in the city center and in the other neighborhoods are not perfect substitutes. As for the rental market in the center of Jerusalem, prior to the award of the grants, at the intersection of the demand curve for apartments D_o and the supply curve for apartments S , the number of rented apartments was Q_o (q_o^s students and q_o^{ns} others) and the rent was P_o . Following the award of the grants, demand from students for rental apartments in the city center increased (demand curve D_1), and a new equilibrium was created at a higher rent P_1 , both for students (whose net rent is less than the amount of the grant) and for others, assuming that the landlords do not engage in price discrimination. (The alternative case is described later.) The number of apartments rented by students increased to q_1^s and the others declined to q_1^{ns} . With higher grants, more flexible demand, more rigid supply, and greater students' share in total demand for apartments in the city center, the increase in rents there following the award of grants is expected to be steeper.⁶

An analysis of the rental market in the other neighborhoods provides the following insights⁷: Following the award of the grants, student demand for rental apartments outside of the city center declined, and demand there among nonstudents increased (since rents in the city center rose and the rental apartments in the city center and in other neighborhoods are not perfect substitutes). It is unclear what happened in the short term to aggregate demand but it apparently increased, and a new equilibrium was created at a higher rent P_1 .⁸ Those who were not students were pushed out of the city center into the other neighborhoods, and the number of apartments they rented increased to q_1^{ns} .

An alternative model to that of the competitive market is based on the differential bargaining power in negotiation (for more details see Gibbons and Manning, 2005): The

⁶ Students receiving grants may also upgrade their accommodations, so that their consumption of housing services would increase whereas those not receiving grants would decrease their consumption (see Fack, 2006).

⁷ For reasons of simplicity, we used the same symbols as in the analysis of the rental market in the center of Jerusalem. This does not mean that the values (Q , q and P) are identical to the ones above.

⁸ Even if the accumulated demand outside the city center increased, the rise in prices should be contained since the percentage of nonstudents pushed out of the city center (net of the students who came into it) is much smaller than the total tenants outside the city center.

student grant is a benefit that can be divided between the students and the landlords, and consequently the rent paid by students in the city center may possibly be higher than that paid by others for the same apartment. It is generally assumed that the rents are uniform (law of one price); otherwise the competition between those not eligible for grants over apartments in the city center would lead to an increase in the rents they pay until they reach the rents paid by the recipients. Viren (2013) found this to be the case.

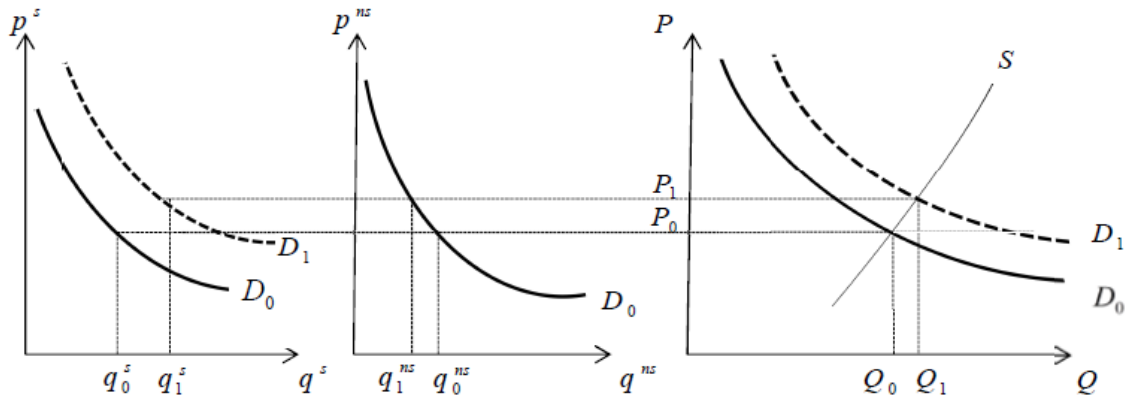
The above analysis is a schematic presentation of the rental market prior to the introduction of the grant program and immediately thereafter, and is therefore static. We shall now consider in general terms the dynamic over time.⁹ As part of the grant program, the level of the grant was gradually reduced; the number of grants approached the peak in 2008, long before the end of the program (Table 3 above), and was far from exhausting the full potential for renting in the city center. Consequently, the difference between rents in the city center and rents in neighborhoods outside the center should have narrowed during the period of the grants. For this reason it is advisable to concentrate the study on the time periods around the inception of the grant program and around its cancellation.

⁹ We will ignore changes over time in the number of potential tenants and in the supply of rental apartments (see Section F).

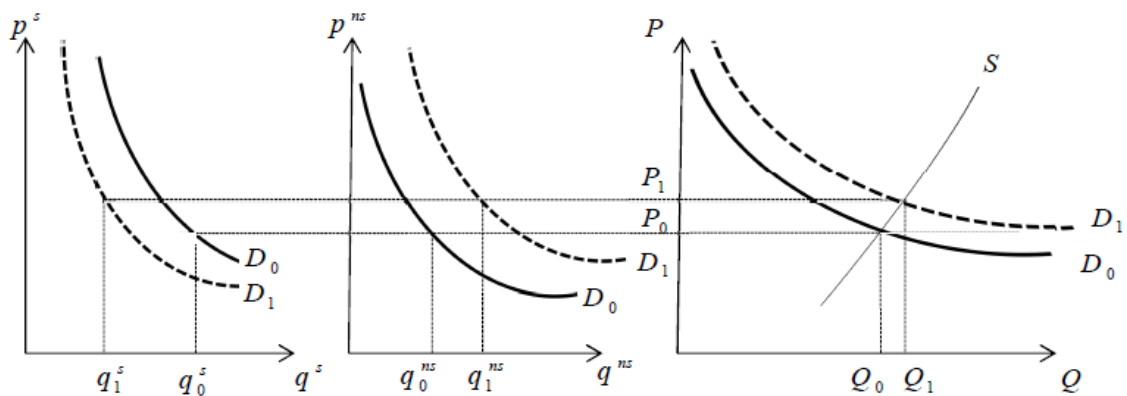
Figure 3: Demand for rented apartments in Jerusalem before and after the award of the grants

Students Nonstudents Total

a. Jerusalem center



b. Other neighborhoods



Estimation method and calculation of the percentage of rent reaching landlords

Estimation method

The awarding of grants to students living in rented accommodation in the center of Jerusalem (the treatment group) in the 2005/06 to 2009/10 academic years (the treatment period) was a kind of quasi-natural experiment, allowing use of the difference-in-differences (Diff-in-Diffs) method, as had been done in other studies on the topic—comparison of the difference between rents in the treatment group during the treatment period and rents before and after with this difference in other neighborhoods in Jerusalem (the control group) in the same period.

The estimation can't differentiate between rental apartments in the city center in which grant recipients lived (whether they comprise all the tenants or some of them) and other apartments in the city center; Consequently we assume that there is no price discrimination—rents in the city center are the same for the recipients and others. This argument is even more applicable in the case of rental notices. Hedonic equations were estimated, in line with those reviewed in Section A:

$$(1) \quad \log(P_{ilt}) = \beta_0 + \beta_1 X_i + \beta_2 ADS_i + \beta_3 TP + \sum_{l=1}^L \delta_l N_l + \beta_4 TP \cdot N_c + \sum_{t=1}^T \lambda_t T_t + \varepsilon_{ilt}$$

Where:

- P_{ilt} – Monthly rent asking price (in shekels)/ actual rent for apartment i in neighborhood l on the date of publication of the notice / contract start date t ;
- X_i – Vector of features of apartment i : the number of rooms and the socioeconomic rating of the statistical area in which the apartment is located (during the 2008 population census). The ranking is from 1 to 20 (where 20 is the highest rating);
- ADS_i – A dummy variable for apartment i offered for rent (compared with a rented apartment);
- TP – The treatment period (details below);
- N_l – A dummy variable for neighborhood l (not including Arab neighborhoods), where N_c ($N_c \in N_l$) is the city center area in which the grant was given (the treatment group);
- T_t – A dummy variable for period t (the year/yearXquarter – details to follow);
- ε_{ilt} – Random error.

The estimator β_4 expresses the change (as a percentage) in the average rent in the city center relative to rent in the other neighborhoods as a result of awarding the grants. It should be emphasized that the estimation method does not allow for possible changes in rent—attributable to the grants—in neighborhoods outside the city center.

Calculation of the percentage of rent that reached landlords

The percentage of rent that ultimately reached the landlords renting to recipients was calculated in the following manner (for more details, see Fack 2006), assuming that in the city center there is no price discrimination between recipients and other tenants:

- a) The absolute change (in shekels) in the average monthly rent (ΔP) is a multiple of β_4 and the average monthly rent in the city center.
- b) The proportion of recipients in the total of those renting apartments in which recipients are living is α .
- c) The level of the student grant is S shekels per month. Assuming that the average number of recipients per apartment is n , the average level of the grant for a benefiting apartment is nS shekels per month.
- d) The percentage of the grant that finds its way into the hands of those renting to recipients is: $(\alpha\Delta P)/(nS)$.

Awarding the grants led to an increase in rents in the city center during the period the grants were awarded, both for recipients and for other tenants (assuming, as previously stated, that there is no price discrimination), whether they were living in shared accommodation with recipients or in rented accommodation in apartments with no recipients. The ratio between the increase in income from rent and the amount of the grants can be calculated in the following manner¹⁰: ΔP times (the number of households renting in the city center) divided by (the total payments of monthly grants).

D. Stylized facts

The development of rents in Jerusalem is shown in Figure 4a. In general, it is similar to the development of rents throughout Israel, which are mainly affected by macroeconomic factors. (Nagar and Segal, 2011).

Despite the Palestinian uprising (Second Intifada), rents in the capital increased considerably during 2002 (details in Section F), due to a sharp devaluation of the shekel against the dollar, since most of the rental contracts were drawn up in dollars. In 2003–07, rents declined in line with the appreciation of the shekel and a marked increase in the supply of apartments in the first half of the decade. In 2008, there was a sharp increase

¹⁰ The grants may also led to an increase in rents in neighborhoods outside the city center. In the absence of a reliable comparison group for those neighborhoods (for example neighborhoods outside Jerusalem) it was impossible to measure the extent of the increase in rents there.

in rents following an accelerated depreciation of the shekel. During that year there was a steep drop in the percentage of rental contracts drawn up in dollars, and since then the link between the exchange rate and rents has been extremely weak.¹¹ From 2009 on, rents have increased (in real terms).

The development of the rent asking prices (on the date of publication of the notice) in the city center, in comparison with that in the other non-ultra-Orthodox Jewish neighborhoods in Jerusalem, is shown in Figure 4b. The graph is based on two calculations. One (the hatched lines in the figure) is a weighted average of the rents stated in the notices, in accordance with a distribution of notices by number of rooms in the center of Jerusalem in 2004; in the case of notices in other neighborhoods (Jewish, non-ultra-Orthodox), weighted according to the distribution of the number of notices by neighborhood, as well, in 2004. The other calculation (the solid lines in the figure) is based on the years dummy variables estimators in estimations of the log of rent asking prices (separately for the city center and the other neighborhoods) as dependent on the number of rooms, the socioeconomic rating of the statistical area in which the apartment is located, dummy variables for the neighborhood and dummy variables for the years.

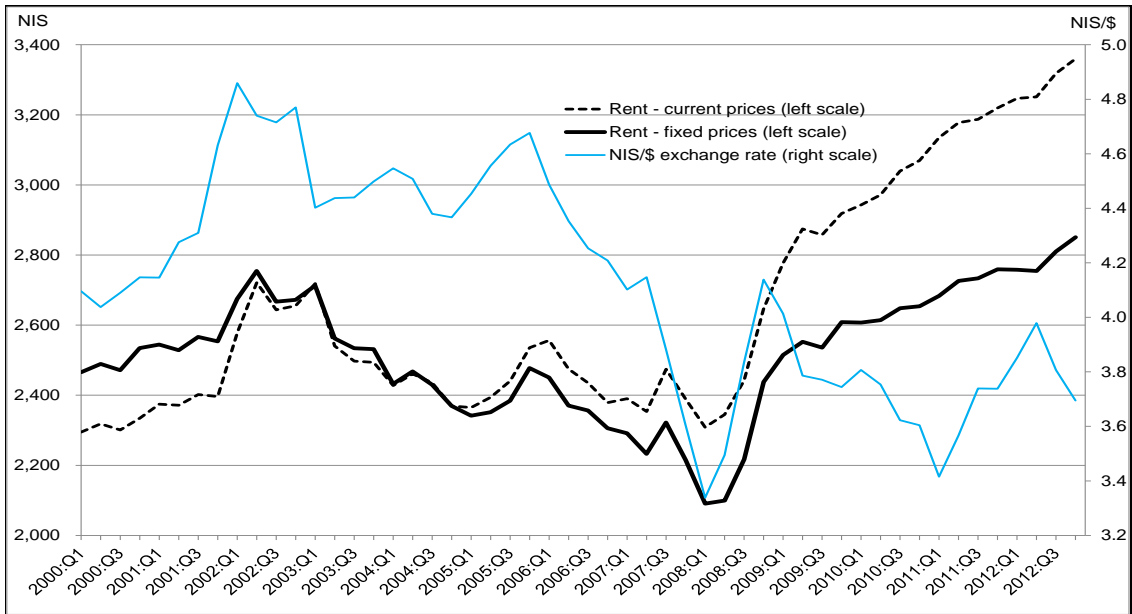
The figure shows that in the period preceding the award of the grants, the development of rent asking prices in the city center was similar to the development in the other neighborhoods. In 2006–08, the first complete years of the grants (which declined with the years), rent asking prices in the city center rose more rapidly than in the other neighborhoods, and in 2009–10 the rates of increase were similar. In the transition from 2010 to 2011, during which the grants were cancelled, rent asking prices in the city center declined, while in the other neighborhoods they rose slightly. Overall, from 2004 to 2012—in other words, from the period before the grants were awarded until the period after they were awarded—the aggregate change in the level of rents in the Jerusalem city center (about 40 percent according to the results of the estimations) was similar to this change in the other Jewish non-ultra-Orthodox neighborhoods in the city.

The index of average rent asking price for the Jerusalem neighborhoods is shown in Figure 5. The rent asking price in the city center is almost in the highest tertile (Figure 5a). The correlation between the actual rents and the rent asking prices, at the

¹¹ The percentage of rental contracts and rent notices in which the rents are stated in dollars in the center of Jerusalem was very similar to the percentages in the other Jewish neighborhoods in each of the years 2000–2012. On the transition from rent prices in dollars to those in shekels, see Goldberg and Katz, 2014.

neighborhood level, is approximately 0.9 (Figure 5b), and the correlation between the annual change in actual rent and the change in the rent asking price (after adjusting for the apartment and neighborhood features) is also around 0.9. Thus the development of actual rent was very similar to that of the rent asking price. However, due to the small number of observations of actual rents in the center of Jerusalem, it is not possible to conclude from the high correlations that the relation between the rent asking price in the city center and the actual rent is similar to that in other neighborhoods in the capital.

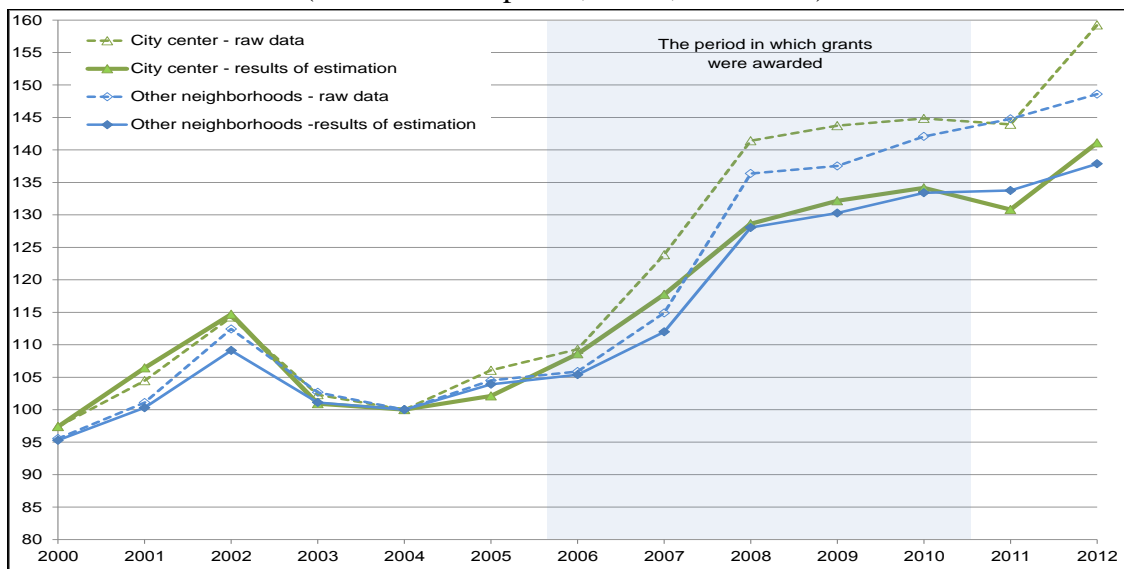
Figure 4a: The development of monthly rent in Jerusalem, 2000–12¹



1) The rent for 2.5–3 room apartments. Constant prices—adjusted to the Consumer Price Index excluding housing (in 2004:Q4 prices).

Source: The Central Bureau of Statistics, the Bank of Israel and the authors' calculations.

**Figure 4b: The development of monthly rent asking prices in Jerusalem:
The city center compared with other neighborhoods,¹ 2000–12
(NIS at current prices; Index, 2004=100)**

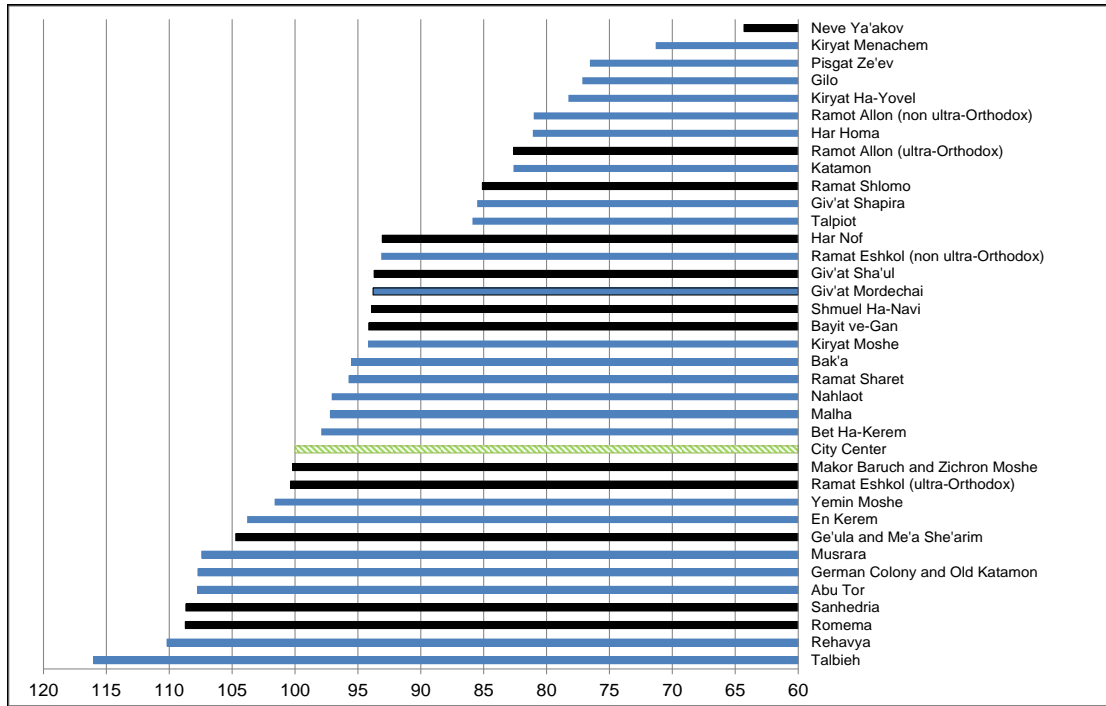


1) The hatched lines of the raw data are a weighted average of the prices on the notices, according to a distribution by group size in the center of Jerusalem in 2000, and in the case of notices in other neighborhoods (non-ultra-Orthodox Jewish)—according to a distribution of the number of notices by neighborhood, as well, in 2004. The solid lines are based on estimations, once for the city center and once for the other non-ultra-Orthodox Jewish neighborhoods combined, of log the rent asking price (when the notice was posted) as dependent on the number of rooms, on a socioeconomic ranking of the statistical area, dummy variable for the neighborhoods and dummy variable for the years. The estimations were made in respect of notices for apartments of up to 4 rooms. The estimators for the years are shown in the figure.

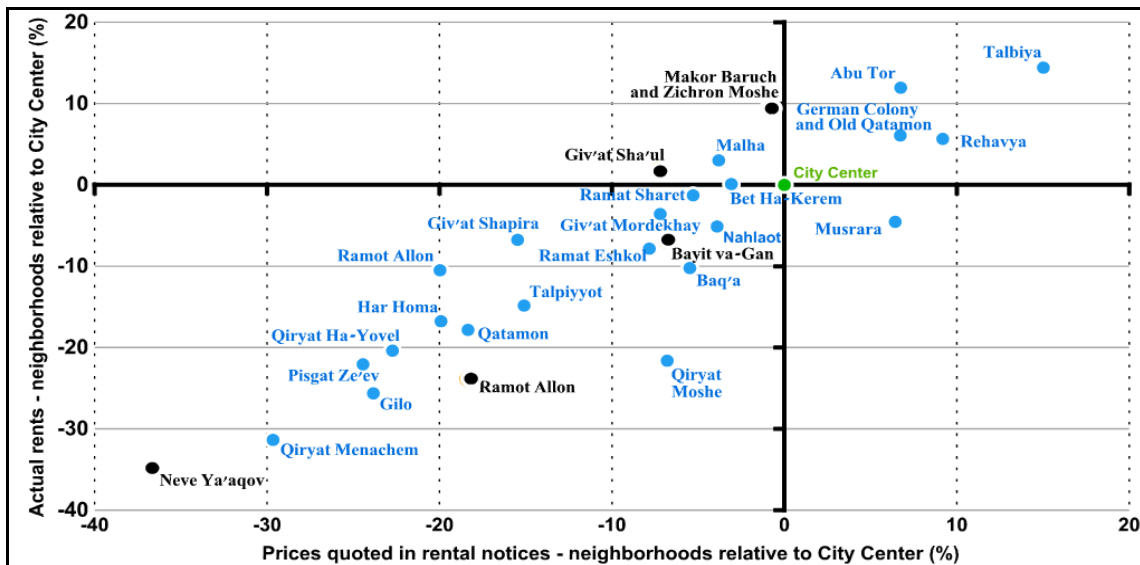
Source: The Central Bureau of Statistics and the authors' calculations.

Figure 5: Monthly rent in Jerusalem by neighborhood, 2000–12¹

a. Index of rent *asking prices*²
(Jerusalem center³=100)



b. The difference between the rent asking price and the actual rent⁴
in the city center and that in the other neighborhoods (percentages)



The figures are based on the neighborhoods' dummy variables estimators in estimation for the years 2000–12 of log rent (separately for the rent asking price and the actual rent) as dependent on the number of rooms and dummies for the year and the neighborhood.

Part of the differences observed in the rent between the neighborhoods may be attributable to the age of the apartments and other physical features, about which we have no information.

- 1) Black columns (points) indicate ultra-Orthodox neighborhoods.
- 2) Opening rent asking prices in rental notices.
- 3) The central Jerusalem area qualifying for the award of a grant.
- 4) In some of the neighborhoods no information was collected in the Rent Survey.

Source: The Central Bureau of Statistics and the authors' calculations.

E. Results of the estimations

The results of the hedonic estimations of the development of rents in the center of Jerusalem during the period of the grants compared with other periods, in comparison with the parallel development of rents in other Jewish neighborhoods in the capital—using the difference-in-differences method (equation 1)—are shown in Tables 5–9. The estimations primarily include apartments offered for rent, about which only the rent asking price is known, and apartments, for which the actual rent is known, in the years 2000–2012, unless otherwise stated.¹² The results of the estimations will allow the percentage of the grants that ultimately reached landlords to be calculated, assuming that the change in the actual rent was identical to the change in the rent asking price in the rental notices. The following is the order of presentation of the estimations' results:

- 1) The development of rents in apartments, of all sizes, in the center of Jerusalem in the period of the grants vis-à-vis all the other periods combined, compared with the rent in all the apartments in all the other Jewish neighborhoods in the capital during the same period (Table 5);
- 2) An estimation similar to that in paragraph (1) but focusing on up to 4-room apartments—in which almost all the students live—and restricting the comparison group to Jewish non-ultra-Orthodox neighborhoods, since these provide alternative student accommodations in the city center (Table 6);
- 3) An estimation similar to that in paragraph (2) but in a timeframe around the introduction of the grants program, and separately in a timeframe around its cancellation (Table 7);
- 4) An estimation similar to that in paragraph (2), with a comparison group of apartments near the town center (Table 8);
- 5) Estimation in the timeframes (such as in paragraph (3)) with a comparison group of apartments near the town center (as in paragraph (4))—Table 9.

In estimations that include the years 2000–12 (estimations 1, 2 and 4), the unit of time is a year; in estimations 3 and 5, it is a quarter.

¹² Estimations from which the observations of actual rent (from the CBS Survey of Rents) were omitted produced results very similar to those obtained in the estimations presented below, since the great majority of the observations in the database came from rental notices. It is not possible to make estimations based only on the actual rent data due to the paucity of observations.

1) All the apartments in the center of Jerusalem compared with all the apartments in the other Jewish neighborhoods

The results of the estimations of rent in the city center in 2000–12 compared with the rent in other Jewish neighborhoods in the capital are shown in Table 5. We begin with a description of the contribution of the control variables to rents in Jerusalem. Table 5 (Model 1) shows that every additional room increases the rent by 24 percent. An increase of one unit in the socioeconomic rating of the statistical area (on a scale of 20 units) adds about 1.5 percent to the rents.^{13,14} By way of comparison, the parallel value relating to apartment prices in Jerusalem in the years 1999–2009 is 1.9 percent (Sayag 2012, Table 19). Every kilometer further from the city center reduces the rent by 6 percent. Rents are about 8 percent higher in the ultra-Orthodox neighborhoods¹⁵ than in the non-ultra-Orthodox neighborhoods, all else being equal, including the socioeconomic rating of the neighborhood.¹⁶ The rent asking price in notices is about 12 percent higher than the actual rent.¹⁷ When a fixed effect for the neighborhood (Model 2)¹⁸ is added to the hedonic estimation, the estimations remain almost unchanged, apart from an intensification of the effect of the socioeconomic rating, and the explained variance is 0.68.

The development of rents in the city center in the years before the grants were awarded was similar to its development in the other neighborhoods (Table 5, Model 3).¹⁹ The dynamic over time of the effect of awarding the grant on the level of rents in the city center was affected by two factors—increased awareness of the program and with it an increase in the number of grants, and a marked decline in the size of the grant—so that

¹³ The lowest socioeconomic rating (on a scale of 1–20) is in the ultra-Orthodox neighborhoods. For example, Ge'ula and Me'a She'arim have the lowest rating—less than 3. The Bet Ha-Kerem neighborhood, the German Colony and Old Katamon have the highest rating—around 15.

¹⁴ The replacement of the socioeconomic rating explanatory variable by the median annual income from salary and self employment per capita in the statistical area leaves the other estimators almost unchanged.

¹⁵ Identification of an ultra-Orthodox neighborhood by the Central Bureau of Statistics, as of 2009, is based on the voting patterns in Knesset election (Gurovitz and Cohen-Kastro, 2004).

¹⁶ In an estimation that does not include the socioeconomic rating, rent in the ultra-Orthodox neighborhoods is similar to rent in other Jewish neighborhoods.

¹⁷ Some of the difference can be explained by the fact that the Survey of Rents focuses on contract renewals and in many cases the changes in the rent at the time of renewal are smaller in absolute terms than those of new tenants because of the tenants' and landlords' concern about transaction costs. In contrast, among those renewing contracts there was a phenomenon of fixed rent (or rent linked to the Consumer Price Index) for a long period, and they were revised once every few years depending on the situation of the rental market.

¹⁸ It should be remembered that the socioeconomic rating is on a statistical area level and for the most part a neighborhood combines several statistical areas.

¹⁹ In 2001, rents rose in the center of Jerusalem relative to the rents in other neighborhoods. No satisfactory explanations for this were found.

ultimately the total payments of grants reached a peak in 2007/08 and subsequently declined. In 2005, no clear effect of the grants on rents in the city center was identified—an expected result, since distribution of the grants began only at the end of the year. In the first two full years of the grant, relative rents rose by 4–6 percent. The grant as a percentage of rent was much higher, and so the students' rents net of the grant declined relative to the rents in the other neighborhoods. In the following years, rents in the city center increased at a slower rate than in the other neighborhoods. Although the number of grants reached a peak in that period, the grant reduced considerably, and the total of grants paid declined. When the grant was cancelled in 2011, rents in the city center fell by 7 percent relative to the other neighborhoods. It should be remembered that few students began to rent apartments during the first half of the year and it was expected that the cancellation of the grant in the middle of the year would lead to a reduction in relative rents in the city center in the second half of the year. Consequently, the relative reduction in rents in the city center can be explained by the weakening of the landlords' bargaining power with the cancellation of the grant and the concern that there would be a mass exodus of students who accounted for more than half of the tenants in the city center.

An additional estimation (not shown) was made for the years in which the grant program was in operation, in order to check the effect of the changes in the level of the grant on rents in the city center in comparison with rents in the other neighborhoods. The estimation was similar to that shown in Model 3, but instead of the interaction variables year X dummy for the city center, an explanatory variable of the level of the full grant in each year was included. The value of the variable is the level of the full grant for rented apartments in the city center in each year and 0 for apartments rented in other neighborhoods. It turns out that every thousand shekels of grant—above the level of the average grant in the city center during the grants program—increases the rents there by 1.6 percent relative to the rents in the other neighborhoods. (The estimator is significant at 1 percent.)²⁰

In total, during the period when grants were awarded, rents in the city center were of 2.3 percent higher, on average, than in the other parts of the city, compared with the difference in another period (Table 5, Model 4).

²⁰ Similar estimations were made relying on those in Model 1 in Table 6, and the parallel values obtained there are 1.2–1.3 percent. (The estimators have a significance of 1 percent.) In Model 1 in Table 8 (the right-hand part) a non-significant value of 1.5 percent was obtained (p=18%).

The vast majority of observations used for the estimations were taken from rental notices and not from the Survey of Rents, but we are first and foremost interested in the effect of the grants program on actual rents. To counter a possible claim that the difference between the rent asking price and the actual rent there may not be the same in the city center and the other neighborhoods, in particular during the grants program, Model 4 was estimated with the addition of the interaction variables notice x center, notice x period of the grant program, and notice x period of the grant program x city center; the estimator of the three-way interaction variable shows whether during the period of the grant program the difference between the rent asking price and the actual rent in the city center was different from that in the comparison neighborhoods. It transpired that the three-way interaction estimator isn't statistically significant (not shown).²¹ The result should be treated with caution due to the small number of observations of actual rent in the city center.

2) Apartments of up to 4 rooms in the center of Jerusalem compared with similar apartments in Jewish non-ultra-Orthodox neighborhoods

Since more than 90 percent of the students receiving grants lived in rented apartments of up to 4 rooms, estimations from this point in will be limited to these apartments. The results of these estimations are shown in Table 6 (the right side), and they are similar to the results above. The estimation based on all the Jewish neighborhoods (Model 1) provides the following picture: From 2006 to 2007, relative rents in the city center increased by 5 percent, from 2008 to 2010 the grant was not identified as having any significant effect on rents in the city center, and in 2011 rents in the city center declined by 7 percent in comparison with the rents in the other neighborhoods.

We calculate the average percentage of the grant that found its way into the hands of their landlord during the period of the grant, as shown in the previous section, assuming that the change in the actual rent was identical to the change in the rent asking price in the rental notices. The estimation of the percentage change in average rents in the city center during the period of the grants is 2.1 percent (Model 2)²², and the average monthly rent for an apartment there during that period was NIS 3,226. Rents thus rose by NIS 65 a month, or NIS 800 a year. The average number of recipients per apartment was

²¹ Similar results were obtained in Table 6, Model 2 and Table 8, Model 2.

²² When the estimations in Table 6 (Model 2) are restricted to observations from the Rent Survey based on the actual rents, the values are not statistically significant, an expected result considering the small number of observations in the city center.

1.7 out of 2.2 living in recipients' apartments, so the increase in the recipients' annual rents was NIS 625. The average level of the grant was NIS 4,170 per year and the annual grant for a benefiting apartment was NIS 7,050. Thus the average share of the grant that reached the landlord was approximately 9 percent.

We calculate the ratio between the increase in rental income of all the landlords in the city center and the amount of the grant. Calculations based on the 2008 census show that there were 2,254 households renting there (and it is assumed that this is also the number during the entire period of the grants). Therefore, the average annual increase in total rents in the city center during the period of the grant was NIS 1.83 million. A total of NIS 5.12 million in grants was paid each year. Therefore, the increase in rental income was 36 percent of the grant payments, with most of it from tenants who did not receive a grant and were asked to pay a higher rent.

On the left side of Table 6, the estimations exclude ultra-Orthodox neighborhoods, since they were only a partial alternative for student accommodation, the great majority of the students not being religiously observant. As evidence of this, calculations based on the 2008 census show that the percentage of students living in free rentals (not in dormitories) in the ultra-Orthodox neighborhoods of Jerusalem was 13 percent of the total number of students living in free rentals in the city. They were 17 percent of the total number of households renting in those ultra-Orthodox neighborhoods, compared with double the percentage in the non-ultra-Orthodox neighborhoods. Moreover, only an insignificant percentage of the students receiving the grant were studying at religious/ultra-Orthodox institutions (Table 1 above).

The estimations that do not include the ultra-Orthodox neighborhoods in the comparison group produce very similar results to those in which all the Jewish neighborhoods were included, both from the point of view of the dynamics of the rents in the center of Jerusalem over time compared with those in the other neighborhoods, and from the point of view of the percentage of the grant that ultimately reached the landlords.

Heterogeneity by apartment size

As a result of the grant, the rent difference between large and small apartments in the city center may increase in comparison with this difference in other neighborhoods, because in larger apartments in the city center the average rent for each lodger is less than in small apartments and it was found that the proportion of grant recipients among

the lodgers was relatively high in the larger apartments; thus the share of the grant in the rent for each lodger is higher and the landlord can demand a higher rent. The results of hedonic calculations (not shown)—like those in the left column of Table 6—made separately for each group of number of rooms, support the supposition. Whereas for apartments of 1–1.5 or 2–2.5 rooms, the value of the period of the grant x city center interaction variable is positive and small but not statistically significant, for apartments of 3–3.5 rooms it is 4.1 percent, and for 4–4.5 room apartments—14.5 percent, and the significance in both these cases is on the level of one percent.

3) Time windows around the introduction/cancellation of the grants—apartments of up to 4 rooms in the center of Jerusalem compared with similar apartments in Jewish non-ultra-Orthodox neighborhoods

The difference-in-differences estimations made until now have examined rents in the city center *throughout the entire* period of the grants compared with the rents prior to and following them *together*, in comparison with the rents in other Jewish neighborhoods (non-ultra-Orthodox) during the same period. We will now focus on the time window around the introduction of the grants program, and separately in a time window around the cancellation of the program. The time window around the introduction of the grants program is defined as the 2004/05 academic year, the year preceding the initiation of the program, together with the 2006/07 academic year, the first full year of its implementation. The time window around the cancellation of the grants program is defined as the first year after its cancellation.²³ It can be seen from Table 7 that rents in the city center increased by 6.4 percent in the first year of full implementation of the grants program relative to rents in the other, non-ultra-Orthodox neighborhoods.²⁴ When the program was cancelled, relative rents declined by 3.9 percent. The percentage of the grant that ultimately reached recipient landlords was 18 percent during the period the program was running, and 22 percent on the eve of its cancellation. The increase in income from rent for each of the property owners in the city center (renting to recipients and others) was 85 percent of the amount of the grants

²³ The cancellation of the grant program was announced in June 2011.

²⁴ A similar estimation was made around a different time window of the introduction of the grant program, including the academic year 2004/05 (as in the original estimation), and the academic year 2005/06 (instead of 2006/07) as the first year of the program, during which there were relatively few grants. As expected, the estimation did not show any statistically significant positive effect of the program on rents in the city center.

during the first period when the program was running, and 71 percent on the eve of its cancellation.

4) Apartments of up to 4 rooms in the center of Jerusalem compared with similar apartments in non-ultra-Orthodox Jewish neighborhoods around the city center

The comparison group for rents in the center of Jerusalem has until now been the Jewish (non-ultra-Orthodox) neighborhoods in the capital. However, it may be that the development of rents in the city center was different than that in the other neighborhoods for reasons unrelated to the grants (see Section F), despite the fact that, as we showed above, during the years preceding the award of the grants, the rents in both areas developed in a similar fashion. Difference-in-differences estimations were therefore made of the rent asking price in the center of Jerusalem in comparison with the rent asking price in the non-ultra-Orthodox Jewish neighborhoods outside the area of the city center qualifying for a grant, and up to 100 meters from it (hereinafter, "the envelope")—Figure 1 above. The envelope includes the following Neighborhoods: Morasha (Musrara), Nahlaot, parts of Talbiye and Rehavya.

Table 8 (the right side) shows that, in general, the results obtained are very similar to the results for the comparison group which included all the non-ultra-Orthodox Jewish neighborhoods in Jerusalem (Table 6 above, the left side). In the period preceding the award of the grants, the development of the rent asking price in the city center was very similar to that in the envelope (Table 8, Model 1). From 2006 to 2007, the rent asking price in the city center rose relative to the increase in the envelope by 6–9 percent, almost double the percentage increase relative to the rent asking price in all the neighborhoods. In 2011, when the grants were cancelled, the rent asking price declined by 6 percent relative to apartments in the envelope, similar to the result above. Overall, the rent asking price in the city center rose during the period of the award of the grants by 2.7 percent relative to the rent asking price in the envelope (compared with 2.1 percent in comparison with all the neighborhoods).^{25,26} The percentage of the grant that reached recipient landlords was 12 percent and the percentage of the grant reaching all the landlords in the city center was 46 percent.

²⁵ When the estimations in Table 8 (Model 2) are restricted to observations from the Survey of Rents based on the actual rents, the estimators are not statistically significant, an expected result considering the small number of observations in the city center.

²⁶ When the ultra-Orthodox neighborhoods are also included, relative rents in the city center increased by 3.0 percent.

The calculation of the effect of the grants program on the increase in rents in the city center through an examination of the development of rents there in comparison with rents in the envelope may be downward biased if the property owners in the envelope increased the rent asking price on seeing that their peers adjacent to them in the city center did so during the period of the grants. Accordingly, the left part of Table 8 shows the results of estimations of the difference-in-differences equations between the rent asking price in the envelope and that in the other non-ultra-Orthodox Jewish neighborhoods in the capital (apart from the city center). There were no real differences between the two areas in the development of the rent asking price, and thus the above calculation is not biased.

5) Time windows around the introduction/cancellation of the grants—apartments of up to 4 rooms in the center of Jerusalem compared with similar apartments around the city center

The results of the estimations of the difference-in-differences equations for the time windows around the introduction of the grants program and around the date of its cancellation, in which the comparison group was the envelope of the city center, are shown in Table 9. In the time window of the introduction, rents in the city center increased by 7.1 percent relative to rents in the envelope, and in the cancellation window they declined by 4.7 percent. The percentage of the grant reaching grant-recipients' landlords was 20 percent at the time the grants program was instituted and 27 percent on the eve of its cancellation. The increase in income from rents to all landlords in the city center (renting to recipients and others) was 94 percent of the amount of the grants at the time the grants program was initiated and 86 percent on the eve of its cancellation. These values are similar to those obtained in the case of estimations in which the comparison group was all the non-ultra-Orthodox Jewish neighborhoods in the capital (paragraph 3 above), although only a small number of observations were included in the current estimations.

Summary

The difference-in-differences estimations can be categorized into several groups, based on the definition of the treatment period and of the comparison group. In some of them, the treatment period included the entire period of the grants program and in others only the time windows around the introduction of the program or its cancellation. The comparison group included all the non-ultra-Orthodox Jewish neighborhoods in the capital or only those around the city center.

Table 10 summarizes the results of the estimations and presents a calculation of the increase in income from rents of all the property owners in the city center (renting to recipients and others) relative to the amount of the grants, all assuming that the change in the actual rent was identical to the change in the asking price in the rental notices. An examination of the table points to the following conclusions: In estimations in which the treatment period was the entire period of the grants program, the increase of rents in the city center relative to the comparison group was considerably less than in the time windows. This result should not be surprising since, as explained in Section C, the grant was reduced over time and the number of recipients did not come any closer to the maximum possible number of tenants in the city center. It was therefore possible to predict that the difference between rents in the city center and rents outside it, which had widened with the grants program going into effect, would gradually be reduced (Figure 4b). Therefore, the estimations around the time windows, and especially those around the introduction of the grants program (when the grant was relatively high), are preferable. It bears mentioning that the results of the estimations and calculations concerning the time window of the introduction are similar to those of the cancellation. The table also shows that there are no substantial differences between the estimations in which the comparison group included all the non-ultra-Orthodox Jewish neighborhoods in the capital and those that focused on the envelope of the city center; in the latter case they are greater (in absolute values).

In conclusion, based on the estimations around the introduction/cancellation windows of the grants program, the percentage of the grants that ultimately reached recipients' landlords was between one-fifth and two-fifths, and the proportion of the grants reaching all landlords was four-fifths.

Table 5. The effect of the grants program for students in the center of Jerusalem on the level of rents¹

The estimated equation : ²	Model 1	Model 2	Model 3	Model 4 ³
$\log(P_{it}) = \beta_0 + \beta_1 X_i + \beta_2 ADS_i + \sum_{y=1}^{13} \lambda_y Year_y + \sum_{l=1}^{37} \delta_l N_l + \sum_{y=1}^{13} (\gamma_y Year_y \cdot N_c) + \varepsilon_{it}$				
2000 X city center			0.063	0.054
2001 X city center			***0.066	**0.056
2002 X city center			0.007	-0.004
2003 X city center			-0.036	-0.004
2004 X city center			0.006	0.016
2005 X city center			0.008	0.009
2006 X city center			**0.040	**0.039
2007 X city center			***0.057	**0.051
2008 X city center			0.022	0.016
2009 X city center			0.014	0.014
2010 X city center			-0.013	-0.014
2011 X city center			***-0.071	***-0.014
Number of rooms	***0.236	***0.236	***0.236	***0.239
Socioeconomic rating	***0.015	***0.018	***0.018	***0.021
Distance to the city center (km.)	***-0.057			
Ultra-Orthodox neighborhood	***0.080			
Notice	***0.116	***0.111	***0.111	***0.110
Neighborhoods FEs		V	V	V
Years FEs	V	V	V	V
Number of observations	77,105	77,268	77,268	62,232
Adjusted R ²	0.657	0.677	0.677	0.643

*, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

- 1) Jewish neighborhoods only. The great majority of observations are the rent asking price in rental notices.
- 2) In Models 3-4.
- 3) Apartments of up to 4 rooms. The comparison group – non-ultra-Orthodox Jewish neighborhoods.

Table 6. The effect of the grants program for students in the center of Jerusalem on the level of rents¹

(Apartments of up to 4 rooms)

The estimated equation: ² $\log(P_{it}) = \beta_0 + \beta_1 X_i + \beta_2 ADS_i + \sum_{y=1}^{13} \lambda_y Year_y + \sum_{l=1}^{37} \delta_l N_l + \sum_{y=1}^{13} (\gamma_y Year_y \cdot N_c) + \varepsilon_{it}$				
	Including ultra-Orthodox neighborhoods		Excluding ultra-Orthodox neighborhoods	
	Model 1	Model 2	Model 1	Model 2
2000 X city center	0.054		0.054	
2001 X city center	**0.059		**0.056	
2002 X city center	-0.007		-0.004	
2003 X city center	*-0.049		-0.004	
2004 X city center	0.003		0.016	
2005 X city center	0.003		0.009	
2006 X city center	*0.035		**0.039	
2007 X city center	**0.050		**0.051	
2008 X city center	0.015		0.016	
2009 X city center	0.015		0.014	
2010 X city center	-0.013		-0.014	
2011 X city center	***-0.067		***-0.014	
The period of the grant X city center		**0.021		**0.020
The period of the grant		***0.057		***0.062
Number of rooms	***0.243	***0.243	***0.239	***0.239
Socio-economic rating	***0.018	***0.018	***0.021	***0.021
Notice	***0.113	***0.112	***0.110	***0.110
Neighborhoods FEs	V	V	V	V
Years FEs	V	V	V	V
Number of observations	71,294	71,294	62,232	62,232
Adjusted R ²	0.640	0.640	0.643	0.643

*, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

1) Jewish neighborhoods only. The great majority of observations are the rent asking price in rental notices.

2) In Model 1. In Model 2 $\sum_{y=1}^{13} (\gamma_y Year_y \cdot N_c)$ is replaced with $\beta_4 TP \cdot N_c$.

Table 7. The effect of the introduction and the cancellation of the grants program for students in the center of Jerusalem on the level of rents¹

(Apartments of up to 4 rooms)

The estimated equation: $\log(P_{it}) = \beta_0 + \beta_1 X_i + \beta_2 ADS_i + \beta_3 TP + \sum_{l=1}^{25} \delta_l N_l + \beta_4 TP \cdot N_c + \sum_{q=1}^4 \lambda_q quarter_q + \varepsilon_{it}$		
	Introduction ²	Cancellation ³
The period of the grant X city center	**0.064	
The period after the cancellation of the grant X city center		***-0.039
The period of the grant	***0.066	
The period after the cancellation of the grant		**0.010
Number of rooms	***0.232	***0.243
Socioeconomic rating	***0.021	***0.022
Notice	***0.066	***0.109
Neighborhoods FEs	V	V
Quarters FEs	V	V
Number of observations	7,526	15,097
Adjusted R ²	0.588	0.505

*, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

- 1) Apartments of up to 4 rooms in non-ultra-Orthodox Jewish neighborhoods. The great majority of observations are the rent asking price in rental notices.
- 2) The period of the grant: 2006:Q3–2007:Q2. The period preceding the award of the grant: 2004:Q3–2005:Q2.
- 3) The period after the cancellation of the grant (treatment period) 2011:Q3–2012:Q2. The period of the grant: 2010:Q3–2011:Q2.

Table 8. The effect of the grants program for students in the center of Jerusalem on the level of the rent asking price:¹

The city center envelope² used as the comparison group
(Apartments of up to 4 rooms)

The estimated equation: ³				
$\log(P_{it}) = \beta_0 + \beta_1 X_i + \sum_{y=1}^{13} \lambda_y Year_y + \sum_{l=1}^5 \delta_l N_l + \sum_{y=1}^{13} (\gamma_y Year_y \cdot N_c) + \varepsilon_{it}$				
	City center in comparison with the envelope		The envelope in comparison with other non-city center areas	
	Model 1	Model 2	Model 1	Model 2
2000 X city center (or envelope ⁴)	0.010		**0.049	
2001 X city center (or envelope ⁴)	***0.084		-0.018	
2002 X city center (or envelope ⁴)	-0.016		-0.018	
2003 X city center (or envelope ⁴)	-0.030		0.004	
2004 X city center (or envelope ⁴)	0.049		-0.005	
2005 X city center (or envelope ⁴)	0.039		-0.003	
2006 X city center (or envelope⁴)	**0.060		-0.004	
2007 X city center (or envelope⁴)	***0.086		-0.017	
2008 X city center (or envelope⁴)	0.022		0.008	
2009 X city center (or envelope⁴)	-0.000		**0.026	
2010 X city center (or envelope⁴)	-0.006		0.011	
2011 X city center (or envelope ⁴)	** -0.061		0.001	
The period of the grant X city center (or envelope⁴)		*0.027		0.006
The period of the grant		*0.052		***0.064
Number of rooms	***0.263	***0.264	***0.240	***0.240
Socio-economic rating	***0.013	***0.014	***0.021	***0.021
Neighborhoods FEs	V	V	V	V
Years FEs	V	V	V	V
Number of observations	5,235	5,235	55,969	55,969
Adjusted R ²	0.520	0.519	0.656	0.656

*, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

1) Non-ultra-Orthodox Jewish neighborhoods. The great majority of observations are the rent asking price in rental notices.

3) The city center envelope—the area outside the city center qualifying for a grant and at a distance of up to 100 meters from it. Model 1 in the right side of the table. In model 2, $\sum_{y=1}^{13} (\gamma_y Year_y \cdot N_c)$ is replaced with

$\beta_4 TP \cdot N_c$. The left part of the table contains the corresponding estimations, where N_c is replaced with the envelope neighborhoods and the envelope neighborhoods are replaced with the non-ultra-Orthodox Jewish neighborhoods.

4) In the left part of the table—interaction between the year (or the period of the grant) and the envelope.

Table 9. The effect of the introduction and the cancellation of the grants program for students in the center of Jerusalem on the level of rents:

The city center envelope¹ used as the comparison group
(Apartments of up to 4 rooms)

The estimated equation:		
	$\log(P_{it}) = \beta_0 + \beta_1 X_i + \beta_2 ADS_i + \beta_3 TP + \sum_{l=1}^5 \delta_l N_l + \beta_4 TP \cdot N_c + \sum_{q=1}^4 \lambda_q quarter_q + \varepsilon_{it}$	
	Introduction ³	Cancellation ⁴
The period of the grant X city center	*0.071	
The period after the cancellation of the grant X city center		*-.047
The period of the grant	*0.050	
The period after the cancellation of the grant		-0.000
Number of rooms	***0.260	***0.240
Socioeconomic rating	*0.014	*0.009
Notice	*0.075	*0.065
Neighborhoods FEs	V	V
Quarters FEs	V	V
Number of observations	593	1,694
Adjusted R ²	0.499	0.324

*, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

- 1) Apartments of up to 4 rooms in non-ultra-Orthodox Jewish neighborhoods. The great majority of observations are the rent asking price in rental notices.
- 2) The city center envelope—apartments in non-ultra-Orthodox Jewish neighborhoods outside the city center qualifying for a grant and at a distance of up to 100 meters from it.
- 3) The period of the grant: 2006:Q3–2007:Q2. The period preceding the award of the grant: 2004:Q3–2005:Q2.
- 4) The period after the cancellation of the grant (treatment period): 2011:Q3–2012:Q2. The period of the grant: 2010:Q3–2011:Q2.

Table 10. Summary of the results

(Comparison group: apartments of up to 4 rooms
in non-ultra-Orthodox Jewish neighborhoods)

Comparison group	Period	Change in rent in the city center compared with the comparison group (%)	The recipients' rent increase as share of the grant (%)	The overall rent increase as share of the grant (%)
Total	The entire period of the grants	2.1	9	36
	<i>Entry</i> to the grants program	6.4	18	85
	<i>Exit</i> from the grants program	-3.9	36	71
The city center envelope	The entire period of the grants	2.7	12	46
	<i>Entry</i> to the grants program	7.1	20	94
	<i>Exit</i> from the grants program	-4.7	37	86

F. Alternative explanations

Identifying the effect of the grants program on rents in the center of Jerusalem in comparison with rents in the other neighborhoods relies on the assumption that during the period under investigation there were no other circumstances that contributed to the differential development of rents between the city center and the other areas. We will briefly discuss possible alternative explanations for the relative increase in rents in the center of Jerusalem during the period of the grants, beginning with the demand for rented accommodation in the city center.

During the second Palestinian uprising (Second Intifada), which broke out in 2000, there were many terror attacks in Jerusalem (Appendix Figure A1). Hazan and Felsenstein (2007) found that rents in Jerusalem declined in the areas where the attacks occurred during the Intifada. Hence the spatial spread of the attacks may have affected rents in the city center compared with those in other neighborhoods. Until the beginning of 2002, most of the attacks occurred in the city center, claiming the lives of many people (all the more so relative to the size of the population living in the area). From then on, the attacks claimed many victims in other parts of the city. (The geographic dispersion of the attacks is described at length in Hazan and Felsenstein, 2007).

However, the attacks in Jerusalem ceased in the first half of 2004, more than a year before the initiation of the grants program.²⁷

The plan for urban renewal in the center of Jerusalem included the building of the light railway that began to carry passengers in August 2011, physical rehabilitation of the public space, production of cultural events and so on. The construction of the light railway on Jaffa (Yafo in Hebrew) Road—and with it the disruption to public transport in the city center—could have led to a decline in rents there during the period of the grants, among other reasons because the proportion of students among those renting in the city center was high and they made a lot of use of public transport. However, the other parts of the urban renewal plan were likely to increase rents. Ultimately the overall effect of the plan on rents in the center of Jerusalem during the period of the grant is unclear.

Changes in the number of students in the institutions of higher education could have affected demand for rented accommodation. In the period that the grants were given, the number of students at institutions of higher education (under the responsibility of the Council for Higher Education) in Jerusalem increased by about 12 percent—from 31,600 in the 2005/06 academic year to 35,200 in the 2010/11 academic year.²⁸ There are two establishments in the center of the city—the Hadassah Academic College of Jerusalem and Bezalel's Department of Architecture.²⁹ The number of students at Hadassah College increased steadily in the years of the grants, from 900 to 1,900. However, the number of grant-recipients at Hadassah College reached only 250 (about one-seventh of the total number of recipients) in the 2009/10 academic year (Table 1 above) when the number of students at the college reached its peak. A calculation shows that the number of students from the college who lived in the center of Jerusalem increased by around 180 from the 2004/05 academic year, just prior to the implementation of the grants program, until the 2009/10 academic year before it was cancelled³⁰, so that the overall effect on demand for

²⁷ Suicide attacks as a share of all attacks in the city center were higher than the comparable percentages in other parts of the capital. This could have had a strong negative effect on rents in the city center. However, Hazan and Felsenstein (2007) found that other types of attacks (such as shootings and throwing Molotov cocktails) had a greater negative effect on rents in the capital.

²⁸ The Council for Higher Education, http://che.org.il/?page_id=6802.

²⁹ The historic Bezalel building in the city center was renovated during part of the grant period but architecture studies continued in alternative buildings in the city center. In any case, the number of students in the Bezalel architecture program increased from 333 in the 2005/06 academic year to 414 in the 2009/10 academic year.

³⁰ The Hadassah College put at our disposal anonymous data of the addresses of students at the college in each of the academic years from 2002/03 until 2011/12, as reported by the students. The reliability of the addresses is somewhat limited, as some of the students apparently reported their parents' addresses (and

accommodation in the city center was apparently limited. It should also be noted that at the peak of the grants program, the number of recipients at all the institutions of higher education in Jerusalem was far from exhausting the full potential of rentals in the city center.

The supply of beds in student dormitories in Jerusalem belongs for the most part to the Hebrew University. In the 1999/00 to 2005/06 academic years, the number of beds in the dormitories remained unchanged—4,562. In the 2006/07 academic year, a student village opened in Giv'at Mordechai (French Hill) in which there were 1,621 beds. Rent there was only slightly lower than in the private market. The opening of the village was expected to make rents in the nearby neighborhoods cheaper, especially in French Hill. Accordingly, the difference-in-differences equations were re-estimated—once for the entire period investigated (Table 6 Model 2) and once for the entry/exit periods of the grants program (Table 7)—where the French Hill observations were taken out of the comparison group to the city center. The results of the estimations remained almost unchanged.

We have no information on changes in supply of apartments for rent in the open market throughout Jerusalem. However, an examination of the development of apartment purchases by local investors—apartments mostly offered for rent—shows that the share of these apartments in the center of Jerusalem out of the total number of apartments purchased by investors in the Jewish neighborhoods in the capital did not register any clear tendency during the period of the grants (Appendix Figure A2), and in any case, only 20–40 apartments a year were purchased in the city center. It should be stressed that we have no reliable information on the sale of apartments purchased by local investors, so that it is impossible to know what happened to the inventory of apartments for investment.

some of the students, also in Jerusalem, live at home and are not renting). In any case, if we assume that the missing coverage percentage of the actual address in the center of Jerusalem in the 2009/10 academic year—the ratio between the number of students from the college who reported living there and the number of those receiving grants from the college in the same year— was also maintained in other years, then the number of students from Hadassah College who were living in the center of Jerusalem in the 2004/05 academic year is estimated at 65.

G. Conclusion

The public sector in Israel provides more than NIS 3 billion a year in housing assistance. To date, there has not been any systematic examination of the question of how the benefits are shared between apartment buyers or tenants and the contractors or landlords, and thus it is also unclear to what extent the benefit helps the target population.

From 2006 to 2011, with the aim of encouraging urban development, the Jerusalem Development Authority awarded grants to students who lived in rented accommodation in the city center. Their number increased greatly and so the Authority's overarching aim was achieved. This study examined the distribution of the grants between the tenants and the landlords. It relied to a very great extent on data from rental notices, as well as on the Survey of Rents by the Central Bureau of Statistics, and on administrative data on the apartments rented by grant recipients. Hedonic estimations were made of the rents using the difference-in-differences method—comparing rents in the city center during the period of the grants to rents during other periods, vis-à-vis this difference in the same periods in other Jewish neighborhoods in the capital or adjacent to the city center.

The main finding is that between one-fifth and two-fifths of the grants ultimately reached recipients' landlords. The grants led to an increase in rents in the city center for recipients and others, so that the increase in income from the rent is equivalent to roughly four-fifths of the amount of the grants. This is all based on the assumption that the change in actual rents was identical to the change in the rent asking price in rental notices.

It may be that the calculation of the share of the grants reaching the landlords is underestimated. Rents outside the city center may have increased to some extent following the award of the grants, so that the estimations of the increase in rents in the city center during the period of the grants relative to the rents in the other neighborhoods are lower than those that would have been obtained had the comparison group been a control group that was not affected by the treatment.

Some limitations of the study should be noted. Due to a lack of information, the study relies for the most part on rental notices, although it would have been preferable to rely only on the actual rents. We have no way of directly examining the increase in the rents of the recipients, and we therefore presume that their rents were identical to those of other tenants in the city center. It was not possible to examine the effect of the grants program on rents outside the city center due to the lack of a suitable comparison group.

We have no reliable information on the supply of apartments for rent and the demand for them throughout the capital during the period examined.

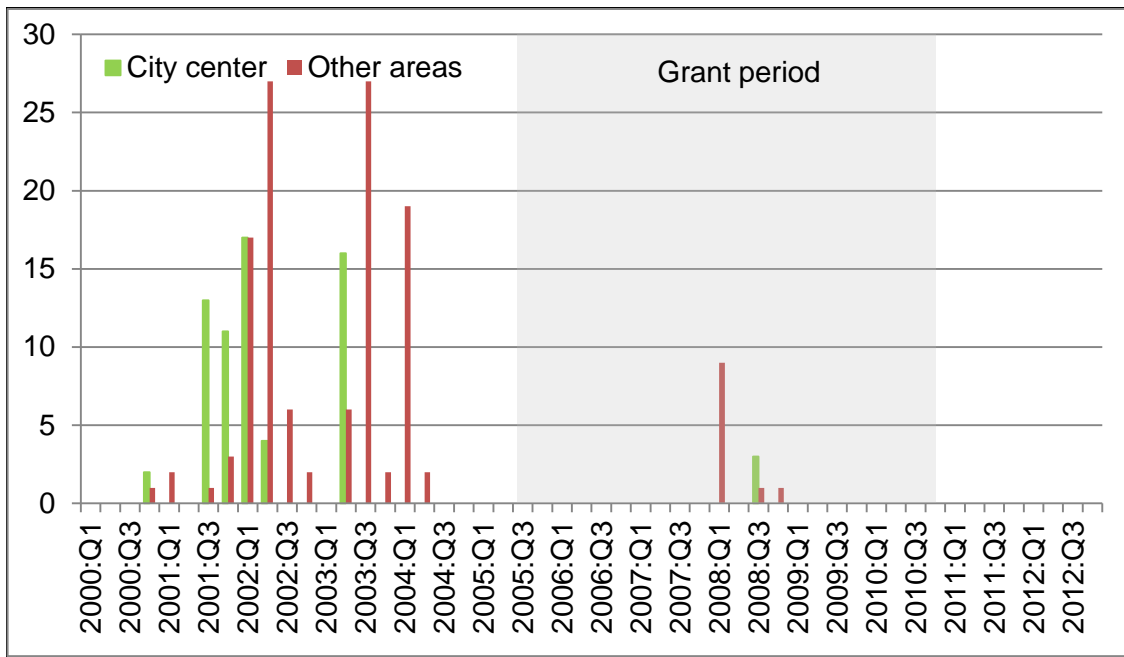
Finally, the grants program concentrated on a specific group of tenants in a restricted geographical area, and a considerable part of the tenants there benefited from it. When trying to estimate the incidence of the housing assistance in other programs, these features should be taken into consideration, as well as other factors—the type of market (sales/rental) and its structure, the population benefiting and its size, the elasticity of supply and demand, and so forth.

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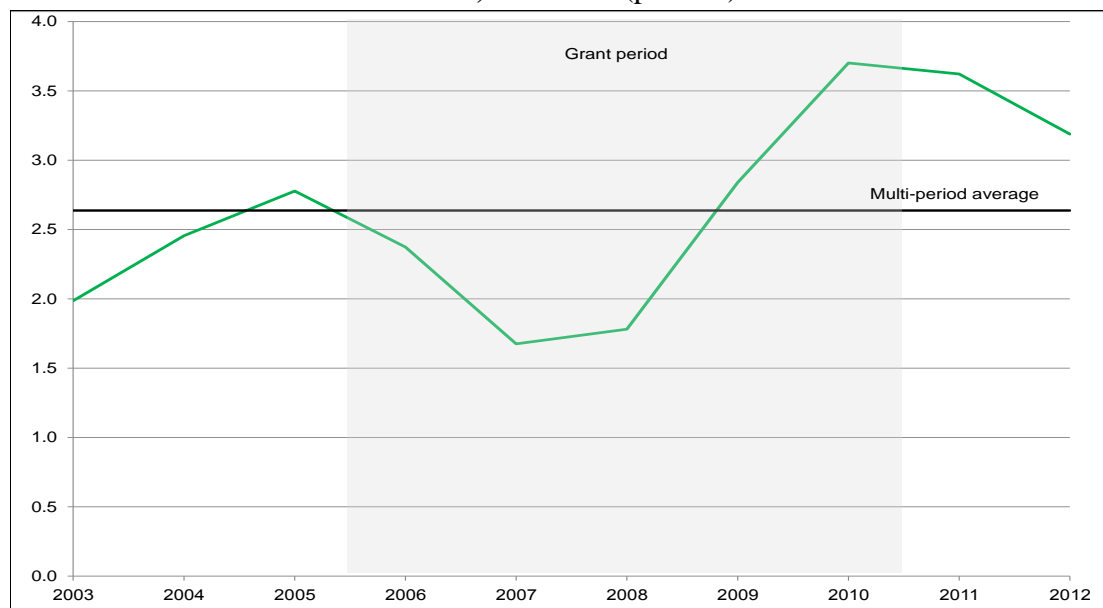
Figure A1: Number of Israelis killed in terrorist attacks in Jerusalem,¹ 2000–12



1) Israelis (civilians and security personnel) murdered in terrorist attacks that took place in the jurisdiction of Jerusalem. City center: the area subject to the student grants.

SOURCE: Israeli Ministry of Foreign Affairs; B'Tselem - The Israeli Information Center for Human Rights in the Territories; International Institute for Counter-Terrorism–Herzliya Interdisciplinary Center.

Figure A2: Homes purchased by local investors in the center of Jerusalem as a share of total homes purchased by local investors in Jewish neighborhoods in Jerusalem, 2003–12¹ (percent)



1) There are no data from before 2003.

SOURCE: Israel Tax Authority and authors' calculations.