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The Effect of a Spatial Market Concentration on Retail Prices: The Case of Mega in Israel[1]

Master's thesis for M.A in Public Policy and Economics

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Abstract

Mega was the second largest retail chain in Israel. In the second half of 2015, after running into financial difficulties Mega closed many of its stores, abruptly. This paper is aimed to learn how the competitors of Mega adjusted their prices as a response to this change. While using detailed and accurate data regarding the prices of goods in all of the retail chains in the country, a model which relies on a difference-in-differences approach was constructed. The results show that on average, stores which had a Mega store in their area had raised their price level by 0.6 percent. It also shows that discount sub-chains have raised their prices more than others by 1.5 to 15.4 percent. This paper uses a large quasi-natural experiment in order to examine changes in competition, thus its reliable results can serve policy makers while regulating market-based competition in the retail market.

1. Introduction

In 2011 there were nationwide mass demonstrations in Israel about the high cost of living, which have raised awareness of this topic. As a response, the government set up a national committee (the Kedmy committee) in order to lower the price of food in Israel. One of the main conclusions which appears in the report is that the concentration in the retail market in Israel is too high. Considering that 60% of the household expenditure on food in 2011 was from large retail stores (The Israeli National Bureau of Statistics, 2013), the committee has stated that some drastic measures need to be taken.

As part of the Kedmy committee, the Food Law was legislated in 2014 which states several actions that need to be taken in order to promote the competition in the retail market (The State of Israel, 2014). One of those actions was a model, developed by the Israeli Antitrust Authority, aimed at evaluating the spatial layout of the retail concentration. Moreover, the larger retail chains were obligated to upload the prices of all the products in each one of their stores daily to their online website. This paper will use the aforementioned unique daily data in order to understand how the abrupt closing of stores which belong to the large retail chain Mega, following its financial difficulties, has affected the prices in its neighboring stores.

Mega was the second largest retail chain in Israel with 128 stores nationwide in 2015. According to the Dun and Bradstreet rank its revenue was 5.3 billion Shekels (about 0.88 billion GBP at the time) which was roughly 19% of the retail market in Israel. In 2011 the company ran into financial difficulties and by 2015 it officially applied to settle its debt. In the second half of 2015 Mega has decided to shut down dozens of its stores – some were sold to other competitors while others were closed with no replacement. A year later, Mega sold the rest of its stores to a different competitor, Yinot Bitan, who kept the stores with their original name of Mega (Alon Blue Square, 2016).

The abrupt closing of Mega stores is a fantastic opportunity to examine how changes in the level of competition in small regions has affected the general pricing level in the short term. This paper will focus only on the stores which closed in the second half of 2015 as those have either changed their names and owners or shut down completely, unlike the stores which closed in 2016 which stayed and kept their original name. In the second half of 2015, 18 stores closed and 37 have changed their name and ownership, the latter usually closed for a few weeks or months prior to the change due to reconstruction work.

This work uses data collected by the Bank of Israel, complemented with data from the Israeli Antitrust Authority in order to examine the price changes in each store on a weekly basis due to the closing of Mega stores, while relaying on the spatial layout of the stores. To my knowledge, this is the first work which investigates the effect of changes in the competition level in different regions on the prices of goods in Israel, while relying on a well-established and wide database. The results of this paper correspond with the literature, once a Mega store closed, its neighboring stores increased their average price level by 0.6%. It was also shown that discount sub-chains have raised their prices more than others, by 1.5-15.4%. These results can influence decision makers as to the restrictions imposed on the spatial layout of retail stores in order to enhance competition and reduce prices.

This paper is structured as follows: Section 2 gives an overview of the literature in this field; Section 3 elaborates on the data used and gives some descriptive statistics; Section 4 defines the

methodology which will be used; Section 5 shows the results obtained; Section 6 discusses the results and their limitations; Section 7 concludes.

2. Literature Review

Some papers investigated the relationship between the prices and the level of regional competitiveness in different fields. Some of those have focused on the entry of a new retail chain on the prices of the other competitors in the same region. For example, Basker (2005) examined the entrance of Wal-Mart in the U.S. and found that it led to a 1.5% to 3% average decrease in prices of the competing retail chains in the next quarter. Hausman and Leibtag (2007) followed the household expenditure using ACNielsen Homescan all across the U.S. and found that when new retail stores open in their living area, the household expenditure on food has decreased in five percent on average, probably due to the average decrease in prices. Jia (2008) builds an empirical model to assess the impact of chain stores on the profitability and entry/exit decisions of discount retailers, while relaxing the common assumption that entry in different markets is independent. She finds that Wal-Mart's expansion explains about forty to fifty percent of the net change in the number of small discount retailers, and a similar percentage for all other discount store. Basker and Noel (2009) examined 175 cities in the U.S. and found that when a new retail store opens, its competitors reduce the average price level by 1%, while larger stores have reduced only half as much as the smaller stores. Arcidiacono *et al.* (2020) found through weekly transactions, together with exact locations of Walmart stores and opening dates, that the entry of the competitor Supercenter did not have any causal effect on prices and revenues at incumbent supermarkets. Even though these results stand in contrast to previous work done in the field, the results were robust across prices of individual product and across brands. Eisenberg, Lach and Yiftach (2016) examined the price differences in various neighborhoods in Jerusalem, Israel and found that they are higher in stores located further away from a commercial area, as the level of competition in those areas is lower. Hastings (2004), examined the effect of the conversion of 260 independent Thrifty gasoline stations to ARCO stations in California and found that the presence of independent retailers acts to decrease local prices, which vary across stations, cities and time.

3. Database

This paper uses two main databases – daily retail prices and information regarding the spatial dispersion of the different retail chains, including Mega, and the index to the level of competitiveness, as received from the Antitrust Authority.

1. As stated above, after the Food Law was legislated, the largest retailers in Israel[2] had to upload daily the prices of all their goods for each store. If the price of a good changed throughout the day, it had to be updated within two hours. This data has been collected by the Bank of Israel, which had kindly allowed me to use it. This paper will use the following

[2]According to article 2 of the Food Law, large retailers are defined as one of the following two definitions: 1. A retailer which holds at least three stores and the total revenue of all the stores is 250 million NIS or more; 2. A retailer which holds an online store in which the total revenue in Israel from all its stores (including those that are not online) is 250 million NIS or more. As to 2016 there were 21 chains which followed those definitions. (Israeli Antitrust Authority, "List of Large retailers", 28.7.2016, retrieved from: http://www.antitrust.gov.il/subject/190/item/34168.aspx [last access: 10.4.2018])

information: the name of the chain and the sub-chain, the address of each store, the name of the product, the product's unique catalogue number, the price of the product and the date it was uploaded. Overall, there were 496 stores which appeared at least once between May 2015 and March 2016.

2. In order to conduct this research, a knowledge of the spatial layout of the stores is needed. Following the results of the Kedmy committee, the Israeli Antitrust Authority has built a model which states the extent to which the different retail stores are dominant in their market (the Antitrust Authority, 2014). In this model, the Antitrust Authority defined the level of competitiveness index for each store as that store's revenue share out of all the stores in its competition group. The competition group of a certain store is defined by all the stores which even have a slight overlap with its demand area, which is defined for each store individually by its location and the average driving time to the store, depending on the density of the area[3]. I was kindly imparted this information for each one of the larger retail stores in the country on an annual level from the Israeli Antitrust Authority. The paper uses the following information: the competition group of each store and its level of competitiveness index.

The data contains all of the large retail chain stores in the Israel besides the Mega stores which closed, as they might have acted differently prior to their closing.

3.1 Products chosen

In order to examine how the change in the number of competitors affected the prices of the goods in the stores, I chose to focus on a bundle of products[4]. Choosing a bundle and not all of the products the stores have has two main reasons – first is a time constraint, as working with that all the products would take an abundant amount of time; second, not all stores sell the same products, which then makes it impossible to compare. Therefore, the bundle had to be carefully chosen.

The following are the criteria of choosing the products in the bundle: First, the products must be packaged identically – they all share the same catalogue number[5] in order to be fully comparable; second, they cannot be seasonal; third, the goods are not supervised for their prices in any way, including minimum and maximum prices; fourth, they should be popular products that exist in almost all stores and amongst households which are from varied categories; finally, they cannot be a part of the Israeli National Bureau of Statistics (2015) CPI measure. The latter is due to the fact that the CPI bundle of goods is well known to all chains, which might lead them to treat it differently.

Many papers in the field have used loss leader products as their bundle of goods. For example, Lal and Matutes (1989) discuss how loss leader goods tend to be the products that their price competition is the fiercest with a high dispersion in prices. It is believed that firms offer loss leaders to provide incentives to customers to shop in their store. As it would be ideal to choose only loss leader products in the bundle, they are not easy to identify in practice. Therefore, the bundle chosen contains only products for which the price variation across stores was large. The full list of products

[3] For example, customers in less dense areas will be allowed to drive longer and therefore the stores will have larger demand areas.
[4] From this point onwards the bundle of goods refers to the group of all the products which were chosen for this work.
[5] This means they are identical in their shape, weight and size

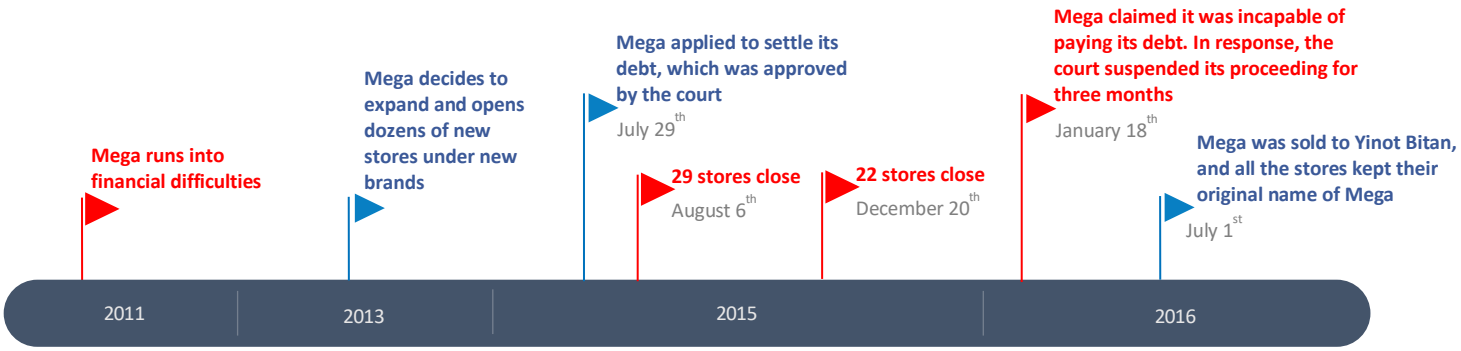
chosen could be found in Table a1 at the appendix. The price variations of the goods can be observed at Table 1 in section 3.3.

The products chosen are inspired by the paper of Eisenberg, Lach and Yiftach (2016), as they examined a bundle of goods between different stores in Jerusalem. But unlike this paper, I chose to not include fruits and vegetables, as they are not completely identical between different stores. In order to examine vertical differences between the products, the bundle contains a variety of products such as cheaper and more expensive substitutes.

3.2 Mega and its sub-chains

Mega was the second largest retail chain in the country, with 128 stores nationwide in 2015 which are roughly 23% of all the larger retail stores and 19% of the retail market. In 2011, the company run into financial difficulties but managed to recover; in 2013 Mega decided to expand and opened two more sub-chains *You* and *Mega Bul*; in the middle of 2015 Mega applied to settle its debt which was approved by the court on the 29th of June 2015. A week later, on August 6th, Mega closed 29 stores overnight; at the very end of 2015 Mega closed 22 more stores. In between Mega closed four more stores[6]. Only in the middle of January 2016 Mega wrote in its financial statements that it might not be able to commit to the settlement that was agreed upon in June 2015, which brought them into court; in the middle of 2016 Mega was sold to Yinot Bitan, a different chain. This chain of events can be followed in Figure 1.

Figure 1. Mega's Corporate History



As to the beginning of 2015, Mega had different kinds of sub-chains under its ownership: *Mega* – 17 large retail stores; *Mega Bair* – 111 smaller, inner cities stores; *Zol Beshefa* and *Tachles* – 16 stores, sub-chains mainly aimed for very orthodox buyers (food with high Kosher standards); *You* – 19 large discount retail stores, which was previously known as *Mega Bul*. The Mega stores which closed belong to all sub-chains, as can be seen in Table a2.

[6] The full list of Mega stores which closed, their location and whether and when they reopened could be found in Table a2. It can be noticed that even the stores that reopened did so after weeks or months after being closed. A representation of the spatial layout of the stores which closed can be found in Figure a3 in the appendix, where it can be seen that the stores which closed were located all around the country.

3.3 Descriptive Statistics

Table 1 shows the bundle of goods chosen, their average price and the price variation across different stores over time.

Table 1. Bundle of goods (prices at NIS)[7]

Name of Product	Observations	Avg. Price	Std. Dev.	Min	Max
Baby Food	23,903	20.62	4.14	3.27	28.30
Black Tea	25,424	7.10	1.08	1.84	8.60
Cereal - Branflakes	35,356	20.80	4.65	3.41	28.90
Cereal - Frosties	22,397	19.45	7.27	3.27	34.10
Chocolate Pudding	38,422	2.66	0.28	1.11	3.10
Coca Cola	39,496	6.43	0.66	1.69	7.60
Coffee (Elite)	39,308	19.89	3.14	3.54	24.90
Coffee (Taster's Choice)	37,386	32.22	4.05	5.13	37.90
Cottage Cheese	36,440	5.59	0.36	1.64	6.00
Diapers	13,953	73.18	13.10	12.27	84.90
Dishwasher Tablets	24,348	24.20	6.70	3.56	39.90
Frozen Peas	8,191	10.72	1.80	2.41	15.30
Hard Cheese	1,400	9.46	3.55	5.60	17.50
Hummus	20,370	10.42	2.06	2.49	12.90
Ketchup (Heintz)	39,433	11.07	1.68	2.41	12.90
Ketchup (Osem)	741	6.02	2.31	5.00	9.90
Laundry Detergent	4,318	34.95	4.80	25.50	44.50
Liquid Dish Soap (Fairy)	1,771	12.58	3.78	3.11	15.20
Liquid Dish Soap (Neka 7)	10,039	9.71	1.37	4.95	18.90
Mayonnaise	34,381	10.81	1.78	2.41	17.40
Milk Chocolate	36,914	5.56	1.04	1.40	7.50
Mineral Water	31,433	3.92	1.05	1.07	5.20
Pasta (Macaroni no. 3)	5,362	3.69	1.11	3.30	4.50
Peanut Snack	25,330	8.92	1.72	2.27	12.50
Pickles	4,197	10.67	3.96	2.56	15.90
Rice	37,386	8.38	1.72	2.07	10.90
Self-Rising Flour	35,308	5.31	0.63	1.57	5.90
Shampoo	36,276	9.59	2.51	2.13	17.30
Shaving Cream	17,330	15.00	2.19	2.99	18.90
Sunflower Oil	33,603	15.55	2.33	3.27	19.40
Toothpaste	36,357	10.53	1.98	2.78	17.90
Tuna Cans	4,104	6.44	1.72	3.49	8.00
Waffles	2,925	11.57	4.92	4.90	15.30

As one can observe, the price variation for each product is quite high (a range that moves between 14% and 184% of the average price). In addition, each product has many observations – most of them have tens of thousands of appearances, while the least common one of all has 741 appearances.

Since most of the Mega stores closed on two dates (6th of August and 20th of December 2015), we can think of those as two different treatment groups. Each treatment group would be the stores that had in their area a Mega store that closed in that particular date. Let us define treatment group 1 and treatment group 2 in that chronological order. The control group would be the rest of the stores in the country that did not have any Mega store that closed in their area. In Figure 2, one can observe the price trends between both treatment groups and the control. The area of each store is determined by its competition group, as defined in section 3. In addition, one can think of treatment group 2 as the control of treatment group 1, and vice versa. This is a good comparison, as even if the decision

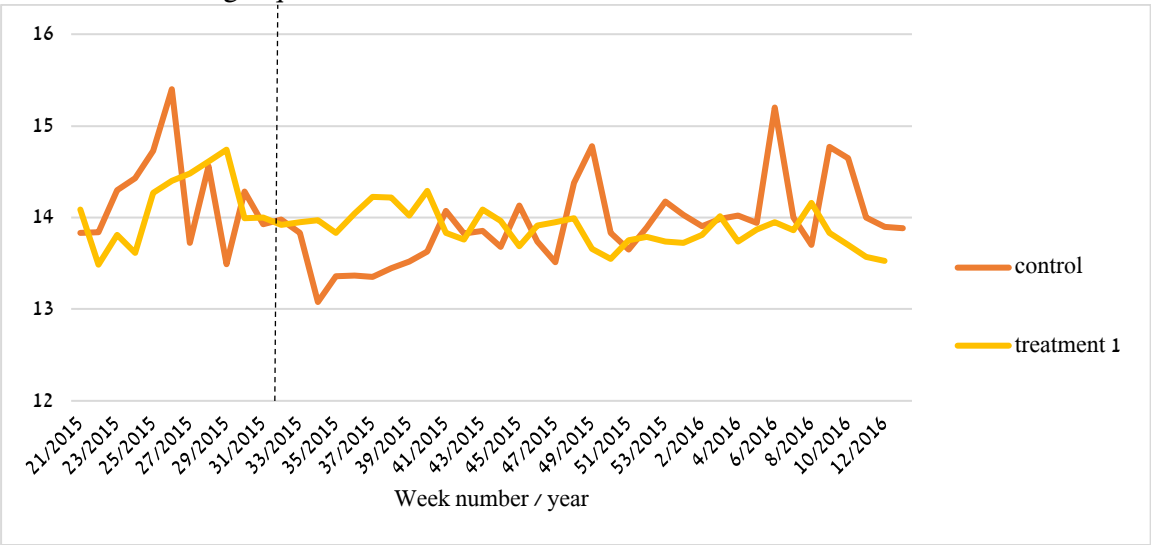
[7] The average exchange rate of USD to NIS at the second half of 2015 is on average 3.88 NIS for USD. The full information can be found here: https://www.boi.org.il/en/Markets/ExchangeRates/Pages/Default.aspx

to close a Mega store is not random, all of the stores in the treatment groups share these unobserved characteristics and therefore can be controlling each other between the two treatment groups.

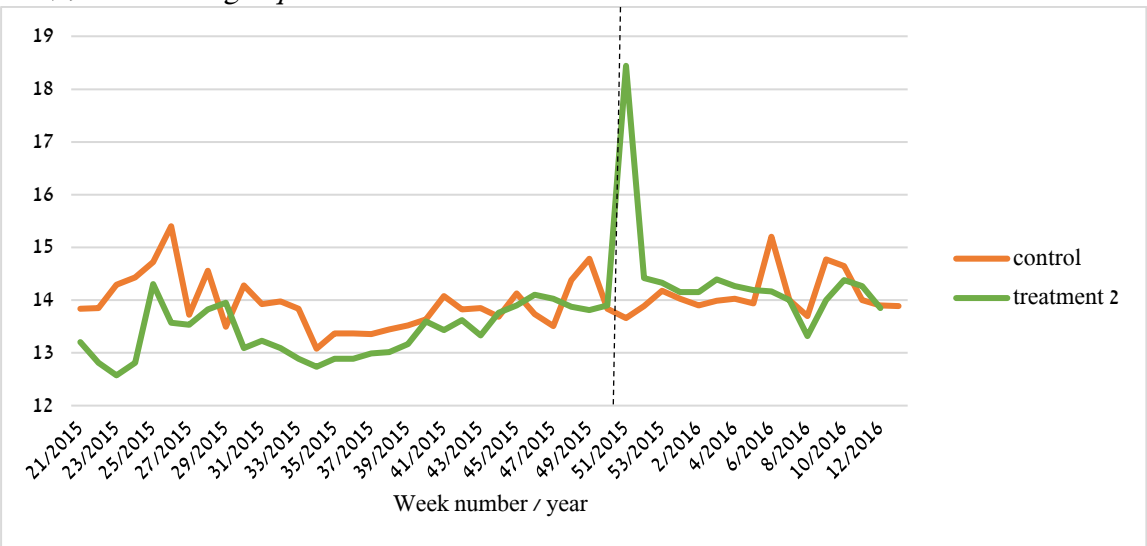
In order to examine the general change in prices, I chose to focus on the basket of goods for both the treated and control groups. This basket is a weighted average of all the goods, based on their weight from the Israeli household expenditure survey as given the National Bureau of Statistics (2015). The weights and their respective categories can be found in table a1.

Figure 2. Average weekly price of the basket of goods (NIS)

(a) Treatment group 1 and the control



(b) Treatment group 2 and the control



(1) The black dotted lines indicate the time when the stores in the treatment groups closed.

(2) Please note that the control group in both figures is identical, but the scale of the vertical axis is different.

In Figure 2(a) one can observe that when a Mega store closed, the average price level of the treatment group kept higher while the control group experienced a general drop. That gap between the price levels was kept for roughly two months. As seen in Figure 2(b), prices spiked in treatment group 2

during the week Mega stores closed[8], however, this time it was only temporary since in the following week the prices returned to their country-wide level. In addition to these figures, an estimation was made in order to examine the statistical difference between the price levels of the treatment groups and the control. The results can be found. The results support the common trends assumption as will be further discussed in section 4 and in in Table a6 in the appendix.

One can observe that the price varies over the year, due to seasonality. In particular, the food prices usually fluctuate around the Jewish high holidays. More information regarding the seasonality and the change of prices over time can be found in Figure a1 in the appendix.

So far, we have observed the products in the bundle, but it is important to observe the different stores as well in order to examine the price variation between them, which strengthens the validity of the results. In order observe the variation within and between each store, the price and the standard deviation of the bundle in each store was examined over the period. The cheapest bundle was with the average price of 11.6 NIS, and the most expensive was 16.7 NIS over the whole period. The standard deviations vary between 0.6 and 4.22 from the store with the least amount of fluctuations in price to the store with the most. Since the stores belong to different chains and are located in different areas, it is reasonable to believe the price variation between them is indeed large.

The stores included in this paper are all the stores in the country which had all of the products in the bundle of goods at all of the timeframe. These stores are from all over the country and belong to both treatment and control groups.

Even though the figure might look messy, it shows how varied the prices are between different stores in the country. While some stores are fluctuating around the average price of 12 NIS for the item in the basket of goods, others fluctuate around the price of 15 NIS – a 25% difference in the average price level.

As one can observe, some stores are significantly cheaper than others. In fact, the difference between the cheapest and the most expensive store is 2.5 times the average price. This price variation over time and between stores helps us to identify the effect of closing Mega stores on its neighboring competitors.

4. Methodology

The estimation is based on the prices of the products in the bundle of goods in both treatment and the control groups while controlling for the competitiveness of the store, in the second half of 2015 and the first quarter of 2016.

Ideally, in order to test the causal effect of a change in the levels of competition on the prices, we would need a random assignment of retails stores to close. Since this method is not applicable here, it is better to use a discrete change in order to identify the effect. Therefore, the treatment group would be any store that had a Mega that closed in its area.

I will use the weekly average prices for each product in every store in order to neutralize the different demand shift within each week.

The estimation will take the following forms:

(1) $$\log(P_{ijkt}) = \beta_0 + \beta_1 NS_{jt} + \beta_2 D_i + \beta_3 D_j + \beta_4 D_k + \beta_5 D_t + \varepsilon_{ijkt}$$

[8] It is important to note that December 20th was a Sunday, which is the first regular working day in Israel of the week, after which the stores could have responded in that same week. This probably explains the response of the second treatment group in such a short notice.

(2) $$\log(P_{ijkt}) = \beta_0 + \beta_1 NS_{jt} + \beta_2 MC_{jt} + \beta_3 D_i + \beta_4 D_j + \beta_5 D_k + \beta_6 D_t + \varepsilon_{ijkt}$$

Where:

P_{ijkt} - The average price of product i in store j (in sub-chain k) in week t

NS_{jt} – The number of stores in the area of store j at week t[9]

MC_{jt} – Dummy variable if a Mega store closed in the area of store j before week t[10]

D_i - Dummy variable for product i

D_j - Dummy variable for store j

D_k - Dummy variable for sub-chain k

D_t - Dummy variable for week t, aimed to control time trends

ε_{ijkt} – Measurement error

The area of the store could be defined in several ways – first, the estimation will be based on the amount of stores which are in a certain radius away from the store. In Basker (2005), the author examined the effect in the county level in the US and defined different radii of 5, 10 and 25 miles between different counties. Hastings (2004) used 1 mile radius. Since Israel is a small country, I would use 2, 4 and 8 kilometers radius as a robustness check[11]. Second, the estimation would be based on the competition groups, as defined in section 3.

Using fixed-effect estimators would be the only consistent estimators assuming the expected value of the store-specific error component, conditioned on the observables, differs across stores. This approach is similar to the one chosen by Hastings (2004), who used gas station specific fixed effects and city-time effects, all controlling for unobserved characters. Using the product, store, sub-chain and time fixed effects will control for all unobserved characteristics of the analysis that are constant over time.

Another estimation which will take place is in the form of:

(3) $$\log(P_{ijkt}) = \beta_0 + \beta_1 H_{jt} + \beta_2 MC_{jt} + \beta_3 D_i + \beta_4 D_j + \beta_5 D_k + \beta_6 D_t + \varepsilon_{ijkt}$$

Where:

H_{jt} – The competition index of the Israeli Antitrust Authority for store j in time t

All the estimations above use variance cluster by Arellano on a store level, as was done by Hastings (2004). Since it is reasonable to think that there is a serial correlation within the prices of each store, the Arellano clustering allows for that, and corrects the variance for homoscedasticity according to the number of observations per store.

As stated above, the equations are based on difference in differences estimator. We examine the treated versus the control groups, both before and after the change. The variable MC_{jt} is in fact the interaction between a dummy for the treatment group and a dummy for the post-treatment period. Therefore, its coefficient (β_2 in all equations) would be the estimated effect on the prices (in

[9] The number of stores is included in the equation, as there were 70 stores that closed (55 belong to Mega) and 45 stores that opened all over the country in the timeframe. Therefore, NS_{jt} is there to control for these changes on a weekly basis.

[10] In order to clarify, the variable MC would get the value 1 if one of the 55 Mega stores which closed in the second half of 2015 was in its area, for all week t after the closing date. Otherwise, it would get the value 0.

[11] Estimations using radii of 1 and 10 km was made, however since the results were robust it is not included in this paper.

percentage points) of the incidence of the treatment. Using store and time fixed effects allows the treated and control groups to have different price intercepts. Given the time we are looking at, we can find different coefficients for each treatment group.

The key assumption in order to perform a difference in differences estimation is common trends. This means that prior to the change, the price trend between the treated and control groups was similar, but not necessarily of the same level. As it can be observed from Figure 2, for both treated and the control groups the price level prior to the change is similar. This assumption was later tested empirically in Table a6, where it is shown the price differences between the treatment and control groups were not statistically significant. The common trends are consistent with the exogenous shock on the store level, as will be elaborated in section 6.1. The exogeneity is necessary in the difference in differences approach, as we need to prove that the error term is uncorrelated with the treatment group.

My Hypothesis is that the coefficient of MC_{jt} would be significantly positive. I believe that this is due to the reduction in the number of competitor stores. This hypothesis is consistent with the results obtained by Basker (2005).

5. Results

The results for the different equations as defined in section 4 can be observed in Table 2.

Table 2. The effect of closing Mega on the price of goods at its neighboring stores

Variables	equation 1 competition groups	equation 2 radius 2km	equation 2 radius 4km	equation 2 radius 8km	equation 2 competition groups	equation 3
NS	0.0005***	0.0005***	0.0004***	9.52e-05	0.0002*	
	(0.0001)	(0.0001)	(0.0001)	(5.99e-05)	(0.0001)	
MC		0.004	0.003	0.002	0.006*	0.006*
		(0.005)	(0.005)	(0.006)	(0.003)	(0.003)
H						-0.004
						(0.023)
Observations	223,907	296,177	428,400	460,471	223,907	222,120
R-squared	0.978	0.978	0.983	0.985	0.976	0.976

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(1) All of the estimations include product, store, sub-chain and time fixed effects.

The first robust result is that the number of stores is significant in almost all of equations. Adding one more store to the area around the store raises the average price level by 0.02%-0.05% on average. This result is not intuitive; however, it makes sense that chains will open a new store in more expensive areas. This is an acceptable result, as was mentioned in Basker (2005). Since the amount of stores is somewhat a proxy to the attractiveness of the area, it can be assumed that this variable captures the characteristics of an area and is indeed a good control.

One can observe that the value of β_2 changes as we define the areas differently. As the (aerial) distance from the closed Mega stores increase, the lower is the coefficient, as the effect is less noticeable. Nonetheless, all of the coefficients for the aerial distances are not statistically significant.

In fact, the only coefficients which are statistically significant are those of the competition group (equation (2) with competition group and equation (3)). The results show an average price increase of 0.6% when a Mega store closed. This result is similar to the one obtained by Basker and

Noel (2009), who found that an entry of a new store reduces the average price level by 1%.[12] This is not very surprising, considering the fact the latter is calculated individually for each store. It is reasonable to believe that a 2 kilometers radius around a store in the heart of Tel Aviv or Jerusalem, would not have the same effect as a store in the countryside. Therefore, those are more accurate measures of the area, as defined in section 4. The R-Squared for all the equations is very high, which indicates they have managed to capture most of the variation within the prices.

It is important to note, that this result of 0.6% increase in the average price level is temporary, as can later be seen in Table a6. In fact, the effect right after the closure of the stores was much higher, and was on average 1.3%-1.9%, which then decreased over time. This is reasonable, as the stores would react immediately to the change, and adjust the prices again over time.

Another important note is that this change in the average price level happened in a time of very low and even negative inflation in Israel (Bank of Israel, 2017). Therefore, this change of prices is very significant to the Israeli consumer.

As for equation 3, one can observe that the coefficient of the level of competitiveness index is not significant. This is quite surprising as it is, however, since the index is annual[13] we can believe it does not capture the intertemporal (weekly) changes in the competitiveness of the area of the store.

In addition to equations (1)-(3) as shown in Table 2, a separate estimation was made for each of the treatment groups. Those can be found in Table a3 in the appendix. Overall, it seems as if the effect between the two treatment groups was similar, a 0.7%-0.8% increase in the average price level when using competition groups, even though the impression from Figure 2 might have indicated otherwise. The R-Squared was kept high.

In order to examine the effect for each product and sub-chain individually, regressions with the interaction between *MC* and the dummy for each product and between *MC* and the dummy for each sub-chain were made, when considering the area of the store as its competition group. The results can be found in Table a4 and Table a5 respectively in the appendix. Table a4 indicates that for most products there was no significant change in prices compared to their average change. In Table a5, it can be seen that many different sub-chains raised their prices between 1.8 and 15.4 percentage points compared to the average effect. Interestingly, most of them are the cheaper and discount sub-chains. Most of the sub-chains which operate exclusively in urban areas have not changed their price level significantly, probably due to a high competition level. The only sub-chain which had lowered its prices due to the change was Mega itself. It is reasonable to believe that those Mega stores knew about the stores that will be closed and lowered their prices to attract more consumers.

Another measure which might affect the results is the definition of NS. One might think that it might behave differently when NS includes the Mega stores, and when it does not. Therefore, another regression was run, where NS_{jt} – The number of stores which are not Mega in the area of store j at week t. The results of this regression appears in Table a7. It can be seen that neither the effect of NS nor of MC change. Therefore, including or removing the Mega stores does not seem to affect the results.

[12] It is important to note that Basker and Noel (2009) found this percentage change as a decrease in the average price level due to new entry of stores, whereas in this paper it is an increase in the average price level due to closure of stores. As these effects are opposites, it makes sense they will be similar in magnitude and opposite in sign, as this is a linear model and has one coefficient which captures the change in price associated with the opening and closing of surrounding stores.

[13] Therefore, each store has only two different indices – one for 2015 and one for 2016.

In addition, three more robustness tests were made: first for the Mega stores which reopened later on as another chain against Mega stores which completely closed (as can be seen in Table a2). The results did not show any significant difference between the two groups and were not included in this work. Second, an examination of the difference between stores in the control group which had a Mega store around them which stayed open and stores which did not have Mega at all around them. However, since 98% of the stores in the control group had a Mega store around them (as this was the second largest retail chain in the country) there were not enough observations to run this test. Third, a regression using equation (2) for competition groups was made for the basket of goods[14]. The results of this regression were not significant for β_2, and were not included in this work. Since only a few items are significant, as can be seen in table a4, so while looking at the whole basket of goods their effect on the whole basket is minor.

6. Discussion

The results of this work are robust, but nonetheless, there are different issues which arise while analyzing them. This section is aimed to claim the validity of these results.

6.1 Endogeneity

In order to infer the results as indicating for a causal relationship, one needs to argue for the exogeneity of the dependent variables with respect to the error term. First, let us examine the decision to shut down the Mega stores and whether it was an exogenous shock to the other stores. In the industry of retail chains, the different competitors knew that Mega had been in financial difficulties. However, as mentioned above, in 2015 Mega had applied to settle its debt which was then approved by court in June. However, settling a debt does not indicate shutting down any store, let alone it was settled with the investors at the same month. This is supported by the fact that prior to this date, Mega had shown the last sign of financial difficulties only in 2011, as was elaborated in section 3.2, after which it recovered quickly. In fact, it had decided to expand afterwards and open dozens of new stores. As for this work, the time frame focused is the second half of 2015, where Mega did not show any official sign of bankruptcy or of severe financial difficulties, (The Administrator General and Official Receiver, 2016). We can argue that the shutting down of its stores was not anticipated by the other stores and can be regarded as an exogenous shock to them. The same approach was taken by Hastings (2004) when Thrifty sold the gas stations to ARCO. In addition, when looking at the dates, 51 out of the 55 stores closed in two days. Since it was not spread out throughout the timeframe but rather happened at once, it seems as if it is reasonable to believe it was not anticipated by the other competitors. In addition, the stores that were shut down were all over the country and not in a specific area – geographically and socio-economically (this can be further seen in Figure a3 and Table a2). Therefore, even if the competitors have suspected that some of the stores might be closing, they had no way of knowing which ones it would be and their timing. One could claim that for the first closing date (August 6th) it was an exogenous shock, but for the other dates the competitors have already anticipated something which would make it less of a shock. In this case, we can look at the estimates for these separate treatment groups in Table a3, however,

[14] Rather than using the price of each product in a store, there was one price for each store of the basket of goods weekly.

it shows the coefficient of MC_{jt} is similar for both groups. In addition, the common trends assumption is supported empirically for both treatment groups, as can be seen in Table a6. Therefore, I believe it is reasonable to assume the shock was indeed exogenous to the competitors of Mega at all times.

Another issue that might lead to a concern of endogeneity is selection bias within the data. As Mega chose to close 55 of its stores in 2015, while it kept the rest of the stores open for another year, one could argue that those chosen stores were the least profitable ones, hence, the decision as to which store to close was not random. However, since this work is looking at the effect of how other stores which are not Mega reacted to this change, we can argue that for these stores it was probably an exogenous shock, as stated above. A similar argument was made by Olley and Pakes (1996), who examined the Telecommunication industry. First, they estimated the parameters of a production function, while later used these estimates to analyze its productivity. Their concern was that the exit and entry of some firms is due to their productivity level, which generates a selection bias and a simultaneity problem while estimating the first production function. The authors argued that by using their full sample, which is an unbalanced panel data, they would expect to eliminate much of the selection problem. Since in this work the data is an unbalanced panel and it aims to examine the reaction of other stores to change in competition, the selection bias problem is dealt with. Since the average price level and trend for the bundle of goods was similar in both treatment groups ceteris paribus, we can assume that the stores in our treatment groups acted similarly. It means that even if those stores assumed something will happen to the Mega stores around them, they did not know when and if it will happen, therefore they did not act strategically prior to the closing date.

Finally, the last source of concern is reverse causality, which states that Mega might had located its stores in non-random locations in the first place, but rather in areas where the average price level is initially high. As this could be true, we need to remember that our coefficient of interest is of MC_{jt}. Therefore, even if the initial assignment of stores was not random, we care about how the competitors reacted after the shock. Therefore, if we were to examine the effect of the general presence of Mega stores on prices, that would be a problem, but since we care about the change after the shock, it should not be a problem. Moreover, being the second largest retail chain in Israel, Mega had stores in the vast majority of the populated areas in Israel– richer and poorer areas as well as country-side and urban. In addition, as shown in table a2 and in Figure a3, Mega closed its stores all over the country and not just in specific areas where the average price levels were higher than others. Therefore, it is possible to say that is not a problem for exogeneity.

6.2 Limitations of the Data

Even though the prices data is very precise and rare in its extent, it has quite a few limitations. The first and main limitation is the fact that the period prior to the first group of stores closed was the very first two months after the Food Law legislation. Since it was just the beginning, many stores had struggled with uploading the prices to their respective internet sites – they would have not done it every day and would not always update their prices within two hours of a change, as they should have done. This is due to the fact it was a new law, and it took a while until it was reinforced.

Second, the data includes prices only and not quantities, as those might give us a better understanding of the effect of reducing the competition level on the average price level (see, for example, Milyo and Waldfogel, 1999).

The third limitation is the length of the timeframe prior to the first Mega stores closing. Since it is only eleven weeks (as there is no more data dating back), one might think it is not enough time in order to observe the common trends prior to the change. Hastings (2004), had only two months' worth of data points prior to the change, which is fewer than this case. There is no way to fix this issue, however, it could be perceived as sufficient for this purpose.

Fourth, as mentioned in section 3, the Food Law was applied only for the large retail chains. Nonetheless, only 60% of the household expenditure on food is from large retail stores (The Israeli National Bureau of Statistics, 2013). Therefore, we do not have the full picture of the changes in the market structure and the prices during the relevant timeframe in the competition groups

Another issue that needs to be acknowledged is the choice of the bundle of goods. The bundle is supposed to be representative of the Israeli consumer, however, it is not unreasonable to believe that a different choice of products for the bundle would yield a different result. I tried to identify products which have a high variation in their prices, as they are usually the ones that are most competed on by the retail stores, but nonetheless, it is impossible to identify all loss leader products as was elaborated in section 3.1, which might have affected the results.

Finally, the last limitation is the price that was posted by the stores. These prices are supposed to show the actual price on the shelf, however, it does not take into account any offers the supermarket might have had (for example, if there was an offer on a product – buy one get one free, then the price shown on the item is the price of just one product, but nonetheless the price is lower if you buy the second item). The Bank of Israel holds the information regarding these offers and tries to include them in its database, however, they are very difficult to deal with as there could be many different types of offers and each one is treated differently.

7. Conclusion

This work examines how closing retail stores affects the average price of a bundle of goods in its neighboring stores, while using a natural quasi-experiment of the closing of Mega stores in Israel. In order to identify this effect, highly detailed data is used which includes the location of the stores in the large retail chains on a weekly basis, the prices of all the goods in those stores and information regarding the stores level of competitiveness. I found, using difference in differences methodology, that the stores surrounding a Mega store that closed have raised their average price level by 0.6 percent after the change. This result is similar to what was found in the literature. In addition, it was shown that discount sub-chains have raised their prices by 1.5 to 15.4 percentage points after the change, while urban sub-chains, where there is fiercer competition, have not changed their prices significantly. The change in the average price level mostly did not occur for certain product more than others.

The results of this paper can be used in order to learn about the pricing decisions of different stores as they respond to an exogenous shock in their competition level. This can influence policy makers such as the Antitrust Authority when examining changes in the market structure.

8. References

Alon Blue Square Inc. (2016). *Financial Results for the First Quarter of 2016*, Yakum, Israel (In Hebrew).

Arcidiacono, P., Ellickson, P. B., Mela, C. F., and Singleton, J. D. (2020). "The Competitive Effects of Entry: Evidence from Supercenter Expansion". American Economic Journal: Applied Economics, vol. 12(3), pp. 175-206.

Basker, E. (2005). "Selling a Cheaper Mousetrap: Wal-Mart's Effect on Retail Prices", *Journal of Urban Economics*, vol. 58(2), pp. 203-229.

Basker, E. and Noel, M. (2009). "The Evolving Food Chain: Competitive Effects of Wal-Mart's Entry into the Supermarket Industry". *Journal of Economics & Management Strategy*, vol. 18(4), pp. 977-1009.

Eizenberg, A., Lach, S. and Yiftach, M. (2016). *Retail Prices in a City,* Memo.

Hastings, J. (2004). "Vertical Relationships and Competition in Retail Gasoline Markets: Empirical Evidence from Contract Changes in Southern California". *American Economic Review*, vol. 94(1), pp. 317-328.

Hausman, J. and Leibtag, E. (2007). "Consumer Benefits from Increased Competition in Shopping Outlets: Measuring the Effect of Wal-Mart". *Journal of Applied Econometrics*, vol. 22(7), pp. 1157-1177.

Jia, P. (2008). "What Happens When Wal‐Mart Comes to Town: An Empirical Analysis of the Discount Retailing Industry". *Econometrica* vol. 76(6), pp. 1263-1316.

Lal, R., and Matutes, C. (1989). "Price Competition in Multimarket Duopolies". *The RAND Journal of Economics*, vol. 20(4), pp. 516-537.

Milyo, J., and Waldfogel, J. (1999). "The Effect of Price Advertising on Prices: Evidence in the Wake of 44 Liquormart". *American Economic Review*, vol. 89(5), pp. 1081-1096.

Olley, S. and Pakes, A. (1996). "The Dynamics of Productivity in the Telecommunications Equipment Industry". *Econometrics*, vol. 64(6), pp. 1263-1297.

The Administrator General and Official Receiver. (2016). "Creditors Arrangement in Mega ltd.". Jerusalem, Israel. (In Hebrew)

The Antitrust Authority. (2014). "The Methodology of Implementing the Spatial Competition Between Retailers Based on the 'Food Law'". Jerusalem, Israel. (In Hebrew)

The Bank of Israel. (2017). "The Monetary Policy and the Inflation". *Chapter 3, The Bank of Israel Annual Report for 2016.* Jerusalem, Israel. (In Hebrew)

The National Bureau of Statistics. (2013). "Household Expenditure Survey 2011, General Summary". *Publication number 1517*, Jerusalem, Israel. (In Hebrew)

The National Bureau of Statistics. (2015). "Weights of the Major and Minor consumption groups in the CPI" *Journal of Statistics and Prices*, Jerusalem, Israel. (In Hebrew)

The National Bureau of Statistics. (2016). "File of Local Authorities in Israel" *Publication number 045/2018*, Jerusalem, Israel. (In Hebrew)

The State of Israel. (2014). "Promotion of the Competition in the Food Industry", *Book of Legislations 2447*, Jerusalem, Israel. (In Hebrew)

9. Appendix

Table a1. The bundle of goods

Catalogue Number	Product Name	Brand	Size\Volume	Category	Weight in Category[1]
7290000060118	Pasta (Macaroni no. 3)	Osem	250 g	Doughs	0.844
729000211442	Rice	Sugat	1 kg	Grains	0.993
7290002543046	Cereal - Frosties	Kellogg's	750 g	Grains	1.370
7290003805556	Cereal - Branflakes	Telma	500 g	Grains	1.370
7290000063102	Self-Rising Flour	Osem	350 g	Flour	0.058
7290002348030	Tuna Cans	Viliger	160 g	Fish Cans	1.155
7290000144467	Sunflower Oil	Olive Tree	1 g	Oils	0.214
72993637	Chocolate Pudding	Strauss	125 kg	Yogurts and Puddings	1.980
7290102395972	Hard Cheese	Tara	200 g	Cheese	2.642
7290004127336	Cottage Cheese	Tnuva	250 g	Cheese	1.026
7290104508943	Peanut Snack	Osem	200 g	Candy and Chocolate	0.402
7290000170053	Milk Chocolate	Elite	100 g	Candy and Chocolate	1.318
7290105368522	Waffles	Elite	250 g	Candy and Chocolate	0.565
7290000284316	Coca Cola	Coca Cola	1.5 litres	Sweet Drinks	1.960
7290000688114	Mineral Water	Eden	1.5 litres	Sweet Drinks	0.876
7290001265116	Baby Food	Materna	300 kg	Spices and Baby Products	1.331
7290000345208	Black Tea	Wisotzky	25 bags of 1 g	Tea	0.558
7290000072753	Coffee	Taster's Choice	200 g	Coffee	1.305
7290000176420	Coffee	Elite	200 g	Coffee	0.746
7290002825692	Hummus	Strauss	500 g	Ready Made Salads	0.798
7290000120836	Mayonnaise	Hellman's	394 g	Ready Made Salads	0.305
7290003450572	Ketchup	Heintz	397 g	Ready Made Salads	0.227
7290000072623	Ketchup	Osem	750 g	Ready Made Salads	0.227
7290105694317	Pickles	Beit Hashita	725 ml	Frozen Vegetables	0.357
7290002239185	Frozen Peas	Pri Gallil	800 kg	Frozen Vegetables	0.617
4015400990482	Laundry Detergent	Ariel	3 kg	Laundry Products	1.188
4015600515492	Liquid Dish Soap	Fairy	720 ml	Laundry Products	0.636
7290011115418	Liquid Dish Soap	Neka 7	1.5 litres	Laundry Products	0.636
7290101868972	Dishwasher Tablets	Finish	24 tablets	Laundry Products	0.636
7290000143255	Shampoo	Hawaii	700 ml	Cosmetics	1.499
7290002730675	Toothpaste	Colgate	100 g	Cosmetics	0.928
3014260228842	Shaving Cream	Gillette	200 ml	Cosmetics	0.331
7290000197128	Diapers	Huggies	size 3	Bags and Baby Products	1.681

(1) The weight is of this product (overall, not branded) out of 1000.

(2) For products which appear more than once I divided the weight of their category into the amount of goods in that category which appear in the bundle. This is in order to not count them multiple times.

Table a2. The list of Mega stores that were closed in the second half of 2015.

Town	Town's Socio-Economic Rank[1]	Sub-Chain	Opening Date	Closing Date	Reopened or Closed	When Reopened
Even Yehuda	8	Mega Bair	01/02/2011	20/07/2015	Closed	
Arad	4	Mega Bair	16/06/1970	06/08/2015	Closed	
Hadera	6	YOU	24/08/1983	06/08/2015	Closed	
Acre	4	YOU	01/01/1995	06/08/2015	Closed	
Bnei Brak	2	Zol Beshefa	15/01/1995	06/08/2015	Reopened	07/12/2015
Yokneam	7	Mega Bair	20/03/1996	06/08/2015	Reopened	02/02/2016
Ashdod	5	YOU	18/04/1996	06/08/2015	Closed	
Arad	4	Mega Bul	01/04/1997	06/08/2015	Closed	
Netania	6	YOU	16/09/1997	06/08/2015	Closed	
Karmiel	6	Mega Bul	25/08/1998	06/08/2015	Closed	
Haifa	7	YOU	21/12/1999	06/08/2015	Closed	
Netivot	3	Zol Beshefa	14/03/2000	06/08/2015	Closed	
Afula	5	Mega Bul	15/03/2000	06/08/2015	Reopened	23/11/2015
Haifa	7	Mega	15/08/2000	06/08/2015	Reopened	15/03/2016
Rishon Lezion	7	Mega Bair	04/12/2001	06/08/2015	Reopened	26/01/2016
Nazareth	3	Mega	03/05/2004	06/08/2015	Closed	
Petah Tikva	7	YOU	06/03/2007	06/08/2015	Closed	
Kiryat Bialik	7	Mega Bair	08/05/2007	06/08/2015	Closed	
Kiryat Motzkin	7	Mega Bair	04/09/2007	06/08/2015	Closed	
Jerusalem	3	Zol Beshefa	14/01/2008	06/08/2015	Reopened	13/10/2015
Kiryat Yam	5	Mega Bair	02/06/2009	06/08/2015	Closed	
Acre	4	Mega Bul	18/08/2009	06/08/2015	Closed	
Zichron Yaakov	8	Mega Bair	04/11/2009	06/08/2015	Closed	
Or Yehuda	5	Mega Bair	12/01/2010	06/08/2015	Closed	
Jerusalem	3	Mega Bair	07/02/2012	06/08/2015	Closed	
Petah Tikva	7	Mega Bair	10/05/2012	06/08/2015	Closed	
Petah Tikva	7	Mega Bair	05/06/2012	06/08/2015	Closed	
Kiryat Motzkin	7	Mega Bair	17/12/2013	06/08/2015	Closed	
Kiryat Ata	6	Zol Beshefa	12/03/2014	06/08/2015	Reopened	23/02/2016
Bnei Brak	2	Tachles	17/06/2014	06/08/2015	Closed	
Beer Sheva	5	YOU	09/04/2000	06/10/2015	Closed	
Eilat	6	Mega Bair	15/01/1989	01/11/2015	Closed	
Or Yehuda	5	Mega Bair	27/07/2010	05/11/2015	Closed	
Tel Aviv	8	Mega	28/11/1978	20/12/2015	Closed	
Bat Yam	5	YOU	11/03/1986	20/12/2015	Closed	
Nes Ziona	8	Mega	24/09/1986	20/12/2015	Closed	
Rishon Lezion	7	Mega Bul	19/01/1988	20/12/2015	Reopened	16/02/2016
Lod	4	Mega Bul	14/09/1992	20/12/2015	Closed	
Tel Aviv	8	Mega Bul	22/02/1994	20/12/2015	Closed	
Or Yehuda	5	YOU	19/07/1994	20/12/2015	Closed	
Ashkelon	5	YOU	25/07/1994	20/12/2015	Reopened	04/02/2016
Dimona	4	YOU	28/03/1995	20/12/2015	Reopened	09/02/2016
Ramat Yishai	8	Mega Bair	28/06/1997	20/12/2015	Reopened	18/02/2016
Rosh Ha'Ain	7	YOU	29/12/1997	20/12/2015	Reopened	02/02/2016
Modi'in	8	Mega Bair	07/09/1998	20/12/2015	Reopened	01/03/2016
Tiberias	4	YOU	06/07/1999	20/12/2015	Closed	
Raanana	8	Mega	01/09/2002	20/12/2015	Reopened	01/03/2016
Kfar Saba	8	YOU	05/11/2002	20/12/2015	Closed	
Nesher	7	Mega	15/07/2003	20/12/2015	Closed	
Tel Aviv	8	Mega	16/09/2003	20/12/2015	Reopened	07/03/2016
Ramat Hasharon	9	Mega	20/04/2004	20/12/2015	Closed	
Beit Shaan	4	YOU	30/03/2006	20/12/2015	Reopened	11/02/2016
Ofakim	3	YOU	20/06/2006	20/12/2015	Reopened	23/02/2016
Rishon Lezion	7	Mega Bul	31/01/2007	20/12/2015	Reopened	26/01/2016
Beer Sheva	5	YOU	25/07/2007	20/12/2015	Closed	

(1) The town's socio-economic rank is taken from National Bureau of Statistics (2016). The rank goes from low to high – 10 indicating the highest rank. It is important to note that only two towns received the rank of 10 in that year.

It can be observed from Table a2 that the Mega stores which closed belonged to all sub-chains (larger, urban, discount and for ultra-orthodox as was elaborated in section 3.2). In addition, they are located in different socio-economic ranked areas in the country.

Table a3. The effect of closing Mega stores on the price of the bundle of goods

Variables	equation 2 radius 2km treated group 1	equation 2 radius 2km treated group 2	equation 2 radius 4km treated group 1	equation 2 radius 4km treated group 2	equation 2 radius 8m treated group 1	equation 2 radius 8km treated group 2	equation 2 competition group treated group 1	equation 2 competition group treated group 2
NS	0.0006***	0.0005***	0.0003***	0.0004***	9.44e-05	9.85e-05	0.0003**	0.0003**
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(6.35e-05)	(6.17e-05)	(0.0001)	(0.0001)
MC	-0.002	-0.003	0.002	0.004	-0.0009	0.002	0.007*	0.008**
	(0.003)	(0.002)	(0.006)	(0.006)	(0.006)	(0.008)	(0.003)	(0.003)
Observations	267,993	262,267	387,104	385,659	456,356	443,606	202,429	196,378
R-squared	0.977	0.978	0.982	0.984	0.985	0.985	0.976	0.976

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tables a4, a5 and a6. Differential effect of the closed Mega stores on products, sub-chains and dates.

Table a4. Differential effect on Products

	Variables	equation 2 competition group
	NS	0.0003** (0.0001)
	MC	0.0003 (0.010)
MC X	Chocolate Pudding	-0.005 (0.011)
	Rice	-0.009 (0.011)
	Shaving Cream	0.003 (0.012)
	Laundry Detergent	0.101*** (0.024)
	Liquid Dish Soap (Fairy)	-0.001 (0.014)
	Pasta	-0.0005 (0.014)
	Self-Rising Flour	0.004 (0.012)
	Ketchup (Osem)	-0.003 (0.009)
	Coffee (Taster's Choice)	-0.002 (0.011)
	Mayonnaise	0.002 (0.013)

Table a5. Differential effect on sub-chains

	Variables	equation 2 competition group
	NS	0.0003** (0.0001)
	MC	-0.021*** (0.006)
MC X	Zol Vebegadol	0.019** (0.008)
	Shufersal Deal	0.015* (0.008)
	Shufersal Express	0.022*** (0.006)
	Shufersal Shelly	0.0006 (0.017)
	Yesh (by Shufersal)	0.010 (0.009)
	Mega Bair	0.008 (0.007)
	Mega	-0.015** (0.006)
	Tachles (by Mega)	0.002 (0.006)
	Rami Levy	0.040*** (0.008)
	Osher Ad	0.066*** (0.016)

	Shampoo	-0.010 (0.011)
	Sunflower Oil	0.037** (0.015)
	Milk Chocolate	-0.031** (0.013)
	Coffee (Elite)	0.001 (0.011)
	Diapers	0.028 (0.020)
	Coca Cola	-0.006 (0.010)
	Black Tea	-0.013 (0.013)
	Mineral Water	-0.022 (0.034)
	Baby Food	-0.016 (0.020)
	Frozen Peas	0.0059 (0.019)
	Tuna Cans	0.038 (0.035)
	Cereal (Frosties)	0.0018 (0.014)
	Toothpaste	0.0012 (0.015)
	Hummus	-0.001 (0.013)
	Ketchup (Heintz)	0.0130 (0.029)
	Cereal (Branflakes)	-0.024 (0.016)
	Cottage Cheese	0.0007 (0.009)
	Liquid Dish Soap (Neka 7)	0.003 (0.023)
	Dishwasher Tablets	-0.005 (0.021)
	Hard Cheese	-0.009 (0.008)
	Peanut Snack	-0.004 (0.022)
	Waffles	-0.008 (0.009)
	Pickles	0.002 (0.05)
	Observations	295,132
	R-squared	0.981

	Coop-Shop	0.002 (0.010)
	Machsaney Hashuk	0.154*** (0.019)
	Victory	0.026*** (0.009)
	Hatzi Hinam	-0.022 (0.016)
	Yinot Bitan	0.019* (0.009)
	Keshet Teamim	0.099*** (0.035)
	Tiv Taam	0.040 (0.035)
	Super Dush	0.018** (0.009)
	Observations	295,132
	R-squared	0.981

Table a6. Differential effect on week

VARIABLES	equation 2 competition group treatment group 1 time coefficients	equation 2 competition group treatment group 2 time coefficients
NS	0.0001	0.0001
	(0.0001)	(0.0001)
MC	-0.016	-0.015
	(0.015)	(0.015)
21/2015	0.038**	0.038**
	(0.014)	(0.015)
22/2015	-0.051*	-0.051*
	(0.029)	(0.030)
23/2015	0.007	0.006
	(0.005)	(0.005)
24/2015	-0.0004	-0.001
	(0.005)	(0.006)
25/2015	0.015	0.015
	(0.016)	(0.016)
26/2015	0.020	0.021
	(0.015)	(0.016)
27/2015	0.057	0.058
	(0.052)	(0.063)
28/2015	0.017	0.017
	(0.015)	(0.016)
29/2015	0.004	0.0036
	(0.016)	(0.016)
30/2015	0.025	0.024
	(0.017)	(0.017)
31/2015	0.023	0.024
	(0.014)	(0.015)
32/2015	0.016	0.016
	(0.014)	(0.014)
33/2015	0.014**	0.013
	(0.004)	(0.015)
34/2015	0.019**	0.018
	(0.011)	(0.014)
35/2015	0.015*	0.012
	(0.006)	(0.015)
36/2015	0.019*	0.020
	(0.011)	(0.014)
37/2015	0.018	0.018
	(0.014)	(0.014)
38/2015	0.016	0.016
	(0.014)	(0.014)
39/2015	0.016	0.016
	(0.014)	(0.015)
40/2015	0.022	0.022
	(0.015)	(0.015)
41/2015	0.020	0.020
	(0.015)	(0.015)
42/2015	0.020	0.020
	(0.014)	(0.015)
43/2015	0.022	0.022
	(0.014)	(0.015)
44/2015	0.022	0.022
	(0.014)	(0.014)
45/2015	0.021	0.020
	(0.014)	(0.015)
46/2015	0.021	0.020
	(0.014)	(0.015)
47/2015	0.051*	0.052
	(0.028)	(0.039)
48/2015	0.014	0.013
	(0.016)	(0.017)
49/2015	0.017	0.017
	(0.014)	(0.015)

50/2015	0.061	0.049
	(0.042)	(0.042)
51/2015	0.032	0.031
	(0.028)	(0.018)
52/2015	0.134	0.130***
	(0.144)	(0.046)
53/2015	0.015	0.014
	(0.016)	(0.016)
01/2016	0.024	0.024
	(0.019)	(0.019)
02/2016	0.020	0.021
	(0.016)	(0.016)
03/2016	0.015	0.016
	(0.016)	(0.016)
04/2016	0.0147	0.015
	(0.016)	(0.016)
05/2016	0.016	0.017
	(0.016)	(0.016)
07/2016	0.013	0.013
	(0.016)	(0.016)
08/2016	0.018	0.018
	(0.016)	(0.016)
09/2016	0.011	0.011
	(0.016)	(0.016)
10/2016	0.019	0.013
	(0.017)	(0.017)
11/2016	0.015	0.015
	(0.016)	(0.016)
12/2016	0.026	0.026
	(0.017)	(0.017)
13/2016	0.015	0.015
	(0.0164)	(0.016)
Observations	286,032	274,647
R-squared	0.982	0.982

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The equation for each the tables are based on the competition groups[15]:

(4) $\log(P_{ijkt}) = \beta_0 + \beta_1 NS_{jst} + \beta_2 MC_{jst} + \boldsymbol{\beta_3 MC_{jst}} * \boldsymbol{D_i} + \beta_4 D_i + \beta_5 D_j + \beta_6 D_k + \beta_7 D_t + \varepsilon_{ijkt}$

(5) $\log(P_{ijkt}) = \beta_0 + \beta_1 NS_{jst} + \beta_2 MC_{jst} + \boldsymbol{\beta_3 MC_{jst}} * \boldsymbol{D_k} + \beta_4 D_i + \beta_5 D_j + \beta_6 D_k + \beta_7 D_t + \varepsilon_{ijkt}$

(6) $\log(P_{ijkt}) = \beta_0 + \beta_1 NS_{jst} + \beta_2 MC_{jst} + \boldsymbol{\beta_3 MC_{jst}} * \boldsymbol{D_t} + \beta_4 D_i + \beta_5 D_j + \beta_6 D_k + \beta_7 D_t + \varepsilon_{ijkt}$

In Table a4 one can observe the value of the interaction term coefficient for each of the different products in the bundle. The value of each coefficient can be explained as the percentage increase in the average price level for that product in the country, when a Mega store closed around it compared to their average price level prior to the change.[16] It can be observed that for the vast majority of the products, there was no significant change in prices. The only products that were significantly more expensive are sunflower oil, milk chocolate and laundry detergent. Therefore, it is plausible to assume that the change in the average price level did not occur in certain products more than other.

In Table a5 one can observe the different dummy coefficients for the sub-chains in the country. Each coefficient can be explained as the average increase in the price level in that particular sub-chain, if and when a Mega store closed around it. The first thing that comes to mind when observing these coefficients is that all of the sub-chains which have changed their prices significantly have done so by raising – other than Mega itself, which have lowered its average price level by 1.5%. Note that there were many Mega stores in the country, some of them had other Mega stores in their

[15] For further explanations in regard to the variables, see section 4.
[16] Just to clarify, if for example we look at laundry detergent, the overall effect would be after Mega closed around it 0.101 which is its marginal effect, plus the overall effect of closing Mega which is 0.0003.

competition group which closed. It is reasonable to believe that those Mega stores knew about the stores that will close, and lowered their prices in advance to attract more consumers.

It is also interesting to observe that among the stores that have increased their average price level by a significant percentage, mainly are cheaper and discount sub-chains (all except Shufersal Express). Those discount stores have raised their prices by a range of 1.5%-15.4% compared to their average level. The more expensive sub-chains have not changed their average price level significantly. It is plausible to assume that those are originally located in areas where there is a lot of competition such as in city centers (sub-chains such as Mega Bair, Tiv Taam and Shufersal Shelly only operate in urban areas), therefore the closing of a Mega store in their competition group did not affect their pricing strategy much. The only sub-chain which does not follow this pattern is Shufersal Express, which have raised its average price level by 2.2% compared to its average level, but only operates in urban areas.

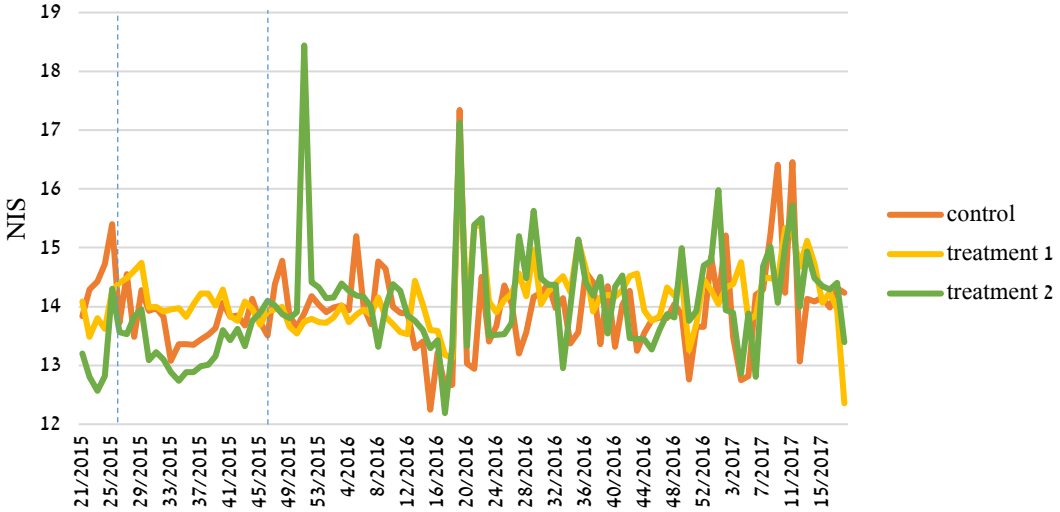
Table a6 shows the difference between the control and treatment groups for their change in the average price level over time. The F statistics from joint test for time level trends exceeded 500 in both regressions prior to week 32 of 2015. As was also mentioned above, the first treatment group experienced the change on week 32 of 2015, while the second treatment group experienced it in week 52 of 2015. These results support the conclusion that was obtained from Figure 2(a) and Figure 2(b). Prior to the closing of the Mega stores, the time coefficients were not significantly different between treatment and control groups, which indicates that the common trends assumption did in fact exist. It can also be observed that after the Mega stores closed the first treatment group experiences four weeks of relative significant price increase, while the second treatment group experiences a very relative sharp increase on the exact same week.

Table a7. Different definition for the number of stores, not including the Mega stores

Variables	equation 1 competition groups	equation 2 competition groups	equation 3
NS	0.0001*** (0.00006)	0.0001*** (0.00006)	0.0001*** (0.00005)
MC		0.007* (0.004)	0.007* (0.004)
H			-0.001 (0.033)
Observations	223,907	223,907	222,120
R-squared	0.967	0.962	0.981

The definition of the number of stores (NS) in the original regression, as shown in Table 2, included all of the Mega stores which closed. Therefore, a separate regression was made, in order to examine whether it changes once we exclude them, and include just the number of stores which are not Mega which were in the area of the store. Please note that no new Mega stores opened at that period of time, therefore in this regression NS includes all the stores which are not Mega. One can observe that NS still stays positive and significant, which is not intuitive. MC is still positive and significant, and the concentration index of the stores is still insignificant. Overall, the results look very similar to those posted in Table 2.

Figure a1. Seasonality in price variation



In order to examine the seasonality of the prices, the timeframe was extended – rather than looking only until week 13 of 2016, it now includes until week 19 of 2017. Since it includes another full year, it is easier to notice any patterns which occur throughout the year. For example, it can be seen that around week 20 of 2016, there is a significant jump in the price level, probably due to Passover. Other than that, it seems as if all three groups act quite similarly throughout the year, except around when Mega closed around them. Other than that, it seems the control and treatment groups acted similarly throughout the year.

Figure a3. Spatial representation of the Mega store

Figure a3 shows the spatial layout of the Mega stores which closed. Red locations are treatment groups 1, green are treatment group 2 and pink are the four stores which were neither in treatment group 1 not treatment group 2. One can observe that all of those stores are located all around the country – in more populated areas and in rural ones.