

Social Media and Consumers' Countervailing Power: The Cottage Cheese Boycott*

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July 20, 2014

Abstract

Israel via Facebook, prompted by steep price increases after price controls were lifted in 2006. Prices immediately declined and stayed at a lower level. We find that (i) cross price elasticities substantially increased, (ii) demand declined more and own price elasticities increased more in areas where proxies for social media were high, suggesting the importance of social media mobilizing consumers. Increased elasticities cannot fully explain the observed price decline; firms lowered prices because of fears of the boycott spreading to other products and of government intervention.

JEL classification numbers: L1, D12

Keywords: consumer boycott, social media, price elasticities

*We thank Andrea Ichino, Tim Feddersen, Manuel Trajtenberg, Frank Verboven, Christine Zulehner and seminar participants at the Hebrew University, the 2014 “The Economics of Information and Communications Technologies” conference in Paris, the 2014 IIOC meetings in Chicago, the JIE-CEPR applied Industrial Organization in Athens, and the 2014 Economics of ICT conference in Mannheim for useful comments. We also thank Dan Aks and Max Bocharenko for excellent research assistance. Saul Lach gratefully acknowledges financial support by The Israel Science Foundation (Grant No. 858/11) and by the Wolfson Family Charitable Trust.

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1 Introduction

The role of social media in facilitating political mobilization has attracted considerable attention in the popular press and in academic research, especially following the crucial role that Facebook and Twitter played during the 2009-2010 Iranian election protests and the 2011 uprisings in Egypt and Tunisia. These events are often referred to as “the Facebook revolution” or “the Twitter revolution” (see e.g., Andersen, 2011).¹ Recently, some commentators have argued that social media can also become a powerful tool that will enable consumers to force companies to set lower prices² or act in a more socially responsible manner (Taylor, 2011, and Mainwaring, 2011). This possibility, of course, has far reaching implications for business strategy and for regulation. For instance, if consumers can indeed discipline firms, then antitrust authorities should be less concerned with the adverse effects of market power when they review horizontal mergers or examine vertical restraints.³

We study the cottage cheese consumer boycott that took place in Israel during the summer of 2011. The boycott was a precursor for the “tents protest” which started a month later and swept Israel with thousands protesting against the rising cost of living, and more generally, demanding social justice. Cottage cheese is a staple food in Israel and one of the best-selling food products. Until July 2006, the price of cottage cheese was under government control. Since deregulation until May 2011, its price increased by 43% (The Knesset Research and Information Center, 2011). Following this steep increase, and the ensuing news coverage, a Facebook event calling for a boycott of cottage cheese was created on June 14, 2011 demanding price concessions.⁴ Boycott organizers demanded a price reduction from about 7 NIS to 5 NIS per 250 grams container. The Facebook event was an instant success: a day after it started nearly 30,000 Facebook users joined it; by June 30, the number surpassed 105,000.

The boycott had an immediate impact on prices: the average price of cottage dropped to about 5.5 NIS within a week. The boycott had a long-lasting effect not only on prices, which remained well below pre-boycott levels, but also on business strategy.⁵ We believe that the cottage

¹In 2013, social media like Facebook and Twitter played an important role in facilitating protests in Bulgaria, Turkey, Brazil, and Bosnia (see, e.g., Faiola and Moura, 2013). For recent papers which study the effect of social networks on political participation in various countries, see Iskander (2011), Breuer (2012), Enjolras, Steen-Johnsen, and Wollebaek (2012), Tufekci and Wilson (2012), Valenzuela, Arriagada, and Scherman (2012), and Gonzalez-Bailon and Wang (2013).

²One example of consumer boycott organized on Facebook was the boycott on Bank of America (BOA), SunTrust and Wells Fargo, following their announcement in late 2011 of a charge a \$5 monthly fee on debit cards. A month after the boycott started, the bank announced that “We have listened to our customers very closely over the last few weeks and recognize their concern with our proposed debit usage fee... As a result, we are not currently charging the fee and will not be moving forward with any additional plans to do so.” CBSnews.com

³For analysis of self regulation see Harrison and Scorse (2010) and Abito, Besanko and Diermeier (2013).

⁴See <https://www.facebook.com/events/203744079670103/>

⁵For example, on January 2013, the Chief Marketing Officer of Tnuva (the market leader) said in the annual

boycott is worth studying as an example of consumers' organized countervailing power, with the specific intention of applying pressure on manufacturers and retailers to lower prices.⁶

We document the evolution of prices and quantities around the boycott period, examine the possible role of social media, and look at the likely reasons for the swift price concessions. We do this using daily, store-level data, on prices and quantities sold of the three leading brands of cottage and white cheese (the closest substitute) between January 2010 and April 2012. The data cover all supermarket chains and most minimarkets and grocery stores in Israel and allow for a before-after boycott comparison of quantities, prices, and demand across demographically different locations.

We find that the initial 24% price drop took place in the main supermarket chains practically overnight. In contrast, stores that initially had higher prices – groceries, convenience stores, and minimarkets – decreased prices only after several days or even weeks from the start of the boycott. Quantity sold slightly declined during the first week of the boycott, but increased in later weeks due to the sharp price decrease, despite the continuation of the boycott. The decrease in quantity on the first week of the boycott was mainly observed in the smaller store formats (groceries, convenience stores, and minimarkets), where sales dropped by about 20%. The decline in sales was more pronounced in the city of Tel Aviv-Jaffa than in the rest of the country.

Consumer boycotts can have different effects on demand. First, there is the immediate, possibly temporary, decline in demand as consumers join the boycott. Second, buyers may permanently substitute to other products (e.g., to white cheese) or brands (when the boycott targets a specific firm) if the targeted firms' image is damaged. Third, boycotts may raise consumers' awareness about pricing, which translates into more elastic demand. These three mechanisms provide alternative, not necessarily exclusive, explanations for the observed price decline following the boycott: firms may have lowered prices to counter the immediate drop in demand, or to prevent

meeting of the Israel Marketing Association that "The cottage cheese crisis taught us a lesson of modesty and humility" (<http://www.ishivuk.co.il/kenes/88>). And on July 2013, Tnuva's CEO said that "The cottage protests caused Tnuva to emphasize the opinion of the consumer and his needs. Part of this policy is putting cottage under self-regulation" (<http://www.nrg.co.il/online/1/ART2/486/100.html> and <http://www.jpost.com/National-News/Cottage-cheese-prices-fall-42-percent-318467>). Indeed, on August 25, 2013, the ministry of Agriculture and Rural Development announced its intention to re-regulate the price of "white cheese" (a soft fresh cheese, with a smooth and creamy texture, which is a close substitute for cottage cheese, and was deregulated around the same time as cottage cheese), due to "exceptional profitability." The ministry found no need to re-regulate the price of cottage cheese for the time being because it did not find "unreasonable profitability as in the past." The ministry stated however that it will continue to monitor the profitability of cottage cheese and it does not rule out re-regulation should its profitability become "unreasonable" ([http://www.moag.gov.il/NR/exeres/E911B43C-9BAD-488D-8493-A27069275754,frameless .htm?NRMODE=Published](http://www.moag.gov.il/NR/exeres/E911B43C-9BAD-488D-8493-A27069275754,frameless.htm?NRMODE=Published)).

⁶The cottage boycott is an example of private politics (e.g., Baron and Diermeier, 2007) where dairy manufacturers and retailers seem to be self regulating due to consumers' activism. Another recent example of a successful boycott on Facebook is the one against Bank of America's debit card fees mentioned above.

further damage to their image, or because they faced a more elastic post-boycott demand. We do, indeed, observe a temporary decline in demand. To study the permanent effects of the boycott, we estimate a simple demand model and compare price elasticities before and after the boycott. We find that one of the long-lasting consequences of the boycott was substantially higher own and cross price elasticities, possibly reflecting increased price awareness and more willingness to substitute across brands.

While the increased price sensitivity of consumers may explain part of the price decline, we find that the price concessions were too abrupt and too substantial to be explained by firms' optimal reaction to the increased demand elasticities. Only a fraction of the price decline is explained by the increased elasticities. We posit that fear of the boycott spreading over time and to other products, as well as the fear of further price controls and possibly class action law suits, played a role in the observed price changes. The finding highlights the limitations of using first order conditions, and elasticities, for capturing firms' incentives. This traditional approach does not always capture the whole business environment, which dictates behavior. Reputation, image as well as political consequences are part of the environmental considerations that appear to have shaped pricing.

To quantify the overall extent of the boycott, we compute an index of boycott impact on demand. The index is defined as observed sales divided by predicted sales at observed prices. The idea is to measure the change in sales, after taking into account the increase in sales due to the substantial price drop following the boycott. We find that: i. demand initially dropped by 30% , ii. despite the fact that the boycotters' demands were never met in full, most of the boycott impetus fizzled within a couple of weeks. It appears that the initial concessions were sufficient to take the wind out of the boycotters' sails. Justifiably, firms did not offer any further price concessions.

A necessary condition for the success of a consumer boycott is that activists or organizers garner the support of a group of followers who feel strongly enough about the issue.⁷ Unlike many other consumer boycotts, which are organized by interest groups (like Greenpeace), the cottage boycott did not have organized backing. Social media was essential for coordinating action, and getting the message out. Moreover, boycotts are susceptible to a commons problem: consumers realize that unless others join the cause, their unilateral sacrifice is futile. Social media like Facebook and Twitter can credibly convey the number of followers rallying behind the cause and hence encourage others to join. To explore the role that social networks played in the cottage boycott, we correlate the boycott index with several demographics, which proxy for the use of social media. We find that the boycott had a more negative impact on demand in stores located in areas where the use of social media is likely to be high, and that the increase in demand elasticities in these

⁷Public outrage is one of the four factors Diermeier (2012) mentions as necessary for a boycott's success: (i) customers must care passionately about the issue, (ii) the cost of participation must be low (relatively small sacrifice by consumers), (iii) the issues must be easy to understand, and (iv) the boycott should be widely covered on the mass media.

locations was more pronounced.

Most of the empirical literature on boycotts has examined the stock price reaction to consumer boycotts (Friedman (1985), Pruitt and Friedman (1986), Pruitt Wei, and White (1988), and Davidson, Worrell, and El-Jelly (1995), Koku, Akhigbe, and Springer (1997), Teoh, Welch, and Wazzan (1999), Epstein and Schnietz (2002)), finding mixed evidence for boycott effects.⁸ Barrage, Chyn, and Hastings (2014) study the impact of green advertising in softening the negative reaction of consumers to BP’s oil spill. We are aware of only four papers that study the effects of consumer boycotts on actual sales.⁹ Unlike our paper, where the boycott was intended to pressure the targeted firms (to lower prices), these papers study “proxy boycotts,” in which firms were punished as a proxy for their country of origin. Bentzen and Smith (2002) study how aggregate monthly imports of French wine in Denmark were affected by a call for a boycott of French products in response to the French nuclear testing in the South Pacific in 1995 – 1996. They report a temporary decline in sales and possibly minor permanent negative effects on French red wine. Chavis and Leslie (2009) examine whether French wine in the U.S. was boycotted following the French opposition to the Iraq war in early 2003. Like us they use disaggregated product-level data. Specifically, they use scanner data on weekly prices and quantities in mass-merchandise stores in Boston, Houston, Los Angeles, and San Diego. They find that the boycott exhibited a two month ramping-up period, followed by gradual decay over 6 months. During that period, the boycott resulted in 26% lower weekly sales at its peak (9 weeks after the first news reports of the boycott), and 13% lower sales during the total duration of the boycott. They do not find political preferences nor media attention to be important determinants of participation in the boycott. Hong et al. (2011) study the boycott of French automobiles in 2008 in China following the disruption of the Olympic torch relay in Paris in April 2008 and the French President’s decision to meet with the Dalai Lama in late 2008. They find that sales of French automobile brands fell by 25% – 33%, with consumers substituting mostly to Chinese and other Asian cars. Finally, Clerides, Davis, and Michis (2013) study the effect of anti-American sentiment (but not an open boycott) caused by the 2003 Iraq war on sales of U.S. soft drinks and laundry detergents in 9 Arab countries using monthly (soft drinks) or bimonthly (detergents) brand-level data on sales and prices. They find that the sales of Coca Cola and Pepsi Cola fell significantly in 7 countries (Egypt, Jordan, Kuwait, Oman, Qatar, Saudi-Arabia and UAE) following the war and stayed low even two years after the end of the war in 5 out of the 7 countries. In contrast, they find little evidence of a decline in sales of U.S. detergents, with sales significantly

⁸More recently, Fisman, Hamao, and Wang (2014) find that adverse shocks to Sino-Japanese relations in 2005 and 2010 had a negative effect on the stock prices of Japanese firms with high China exposure and on Chinese firms with high Japanese exposure. They also find a larger negative effect on Japanese firms operating in industries dominated by Chinese state-owned enterprises, but a smaller effect on firms with high Chinese employment.

⁹Fershtman and Gandal (1998) use product-level data to study the effect of the Arab boycott on Israel on consumer and producer welfare in the Israeli automobile market. This boycott however was imposed by Arab countries on Japanese car manufacturers rather than by consumers.

falling after the war only in Kuwait.

Our paper also relates to the recent literature that studies the effect of the Internet on political outcomes. Miner (2012), Czernich (2012), Falck, Gold, and Heblich (2013) and Campante, Durante, and Sobbrío (2013) study the link between the internet and voters turnout in elections in different European countries.

In the economics literature, the use of the Internet is usually viewed as a way of providing timely and cheap information on prices thereby enhancing competition and lowering prices. Many studies have analyzed the effect of Internet usage on prices (e.g., Brown and Goolsbee, 2002). In our paper, the Internet and related social media play an additional role, namely, that of organizing atomistic consumers into an effective force that can credibly threaten, and implement, a consumer boycott.

The paper is organized as follows. In Section 2 we describe the background leading to the cottage boycott. Section 3 introduces the data, while Section 4 describes the evolution of prices and quantities and demand. In Section 5 we test whether price elasticities changed after the boycott. In Section 6 we look at the role played by social networks. In Section 7 we examine how firms incentives were affected. Conclusions appear in Section 8.

2 Background

Cottage cheese is a staple food and one of the best-selling food products in Israel.¹⁰ It is sold in various milkfat contents and flavours, though by far, the most popular variety is the plain 5% fat content which accounts for about 80% of sales. The closest substitute for cottage cheese is a soft, spreadable white cheese. In 2010, 31,027 tons of cottage cheese and 45,960 tons of white cheese (including all fat contents) were sold in Israel (Israeli Dairy Board, annual reports for 2011).

Cottage cheese is produced in Israel by three large dairies (there are no imports due to high tariffs)¹¹: Tnuva, which is the largest food supplier in Israel, the Strauss Group, the second largest food supplier, and Tara, a subsidiary of the Central Bottling Company Group, the fourth largest food supplier and the largest beverage supplier in the country. By the end of 2003, Tnuva's market share was 71.9%, Tara's 14.5%, and Strauss', which entered the market in 2003, 12.9%.¹²

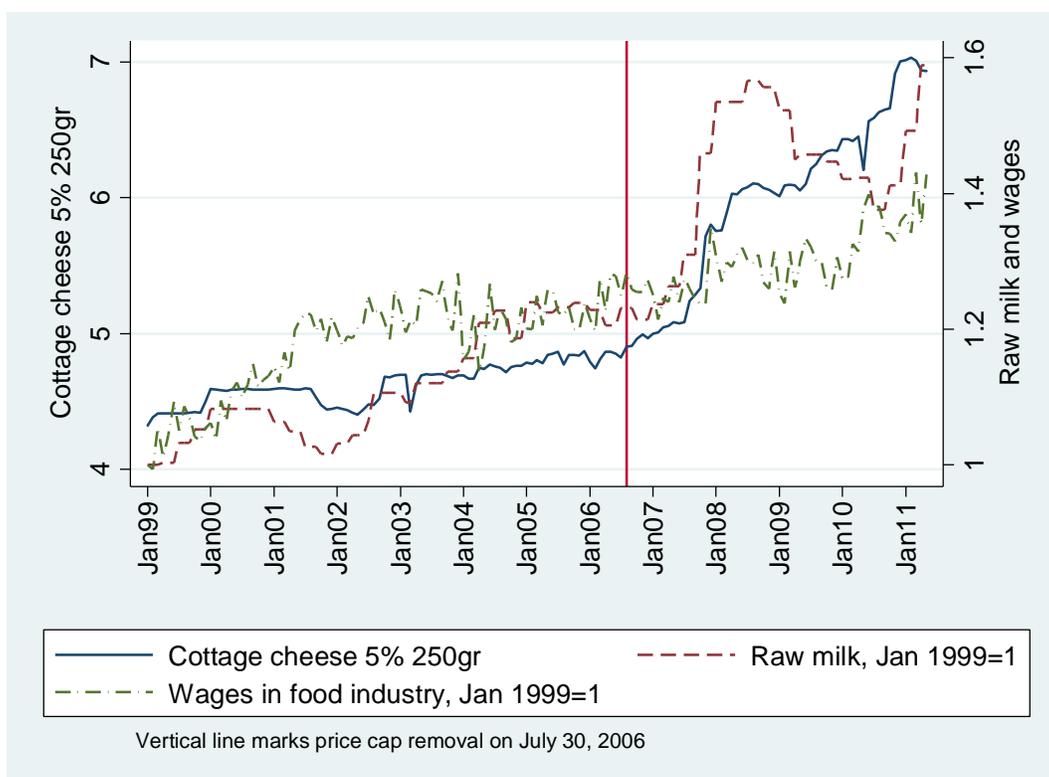
¹⁰See <http://www.globes.co.il/news/article.aspx?did=1000264488>, <http://www.ynet.co.il/articles/0,7340,L-3370903,00.html>, and <http://haforum-letiful.co.il/sites/default/files/files/Iftach-Bloch-Preseention.ppt> Indeed, as a famous Israeli chef has put it: "Cottage cheese is the symbol of the Israeli home... it is a staple of the two home-based meals of the day — breakfast and dinner ..." see <http://forward.com/articles/139163/a-soft-food-falls-on-hard-times/#ixzz2R67S9atZ>

¹¹Until 2013, the effective tariff on fresh cheese was 126%. The government intends to lower this tariff gradually from 2013 onward. See <http://www.chamber.org.il/content.aspx?code=20456>

¹²As of 2011 Tnuva had a market share of almost 57% in the dairy market, the Strauss Group almost 23%, and Tara 10%, see http://www.storenext.co.il/component/docman/doc_download/83-2011-.html?Itemid= for market shares in the food market and <http://www.globes.co.il/news/article.aspx?did=1000713569> for market shares in the

Until July 2006, the prices of 20 dairy products (cottage cheese both 5% and 9%, fresh milk, cream, sour cream, semi-hard cheese, and dairy desserts) were set by the government.¹³ From July 2006 to June 2009, the government gradually deregulated the prices of 10 of those products, including cottage and white cheese. Following deregulation, the prices of the de-regulated products increased sharply, relative to the CPI.

Figure 1 shows the evolution of the monthly average price of a standard container of 250 gram of 5% cottage cheese from January 1999 to May 2011 (just before the start of the cottage boycott).¹⁴ Figure 1 also shows the prices – relative to January 1999 – of raw milk and wages in the food industry, two of the main cost drivers of cottage cheese (plotted on the right hand side axis).¹⁵



dairy market.

¹³The 20 regulated dairy products accounted for about 30% of the total expenditure on dairy products (State Comptroller of Israel, 2012, p. 36). These prices were set by a Government committee that consists of two representatives from the ministry of Finance and two representatives from the ministry of Agriculture. The committee sets prices such that dairy producers can cover their costs and earn a rate of return of 6% – 12% on their invested capital. Prices were updated every 12 months or earlier if input prices change by more than 3%. For more details, see State Comptroller of Israel (2012).

¹⁴The price plotted in the figure is based on monthly prices of cottage cheese collected from a cross-section of stores in Israel by the Central Bureau of Statistics for the purposes of computing the monthly CPI. The figure plots the cross-sectional mean of prices. The data in the figure come from Ofek (2012).

¹⁵The cost of raw milk accounted for 36.5% of the retail price of cottage cheese in January 2006 and 27.8% of the price of cottage cheese in June 2011 (see The Knesset Research and Information Center, 2011).

Figure 1: Cottage cheese and input prices

As the figure shows, the price of cottage cheese hovered around 4.5 – 5 NIS until its deregulation on July 30, 2006. Following deregulation, the price increased sharply, reaching 7 NIS on the eve of the boycott. This represents a 43% increase between July 2006 and May 2011. By comparison, the consumer price index increased by 12%, and the mean price of regulated dairy products increased by 10% over the same period (State Comptroller of Israel, 2012, p. 34). The price of raw milk also increased sharply in 2007, and this can account for part of the steep rise in the price of cottage cheese. However, the decline in the price of raw milk, which started at the end of 2008, was not passed-through to cottage prices. Wages exhibited less fluctuations over time, increasing by about 11% during the post deregulation period. Thus, only part of the price increase of cottage cheese after deregulation can be attributed to increases in input prices.¹⁶

2.1 The Cottage protest

In general, food prices in Israel increased a lot since 2005.¹⁷ Starting on May 31, 2011, a series of articles, describing this surge in food prices, as well as the general high cost of living in Israel, were published in newspapers and on TV.¹⁸ The reports showed that prices of food and other consumer goods and services are higher in Israel – sometimes substantially so – than in the U.S. or in Europe. Most striking, this was also true for Israeli products exported to the U.S., such as cottage cheese, tea, honey, and chewing gum.

The news reports were followed by a sequence of events summarized in Appendix A. On June 14, 2011, a Facebook event was created calling for a boycott of cottage cheese, starting on July 1, 2011. The Facebook event was widely covered by the media. A day after it started, nearly 30,000 Facebook users joined the event, and three days later, the number grew to 70,000. By June 30, 2011, the number surpassed 105,000. Following this success, the event leaders announced on June 16, 2011 that the boycott will start immediately rather than on July 1, 2011, and recommended buying cottage and white cheese only if their prices drop under 5 NIS.

The effect of the boycott was almost immediate: several supermarket chains announced, already on June 14, that they will offer cottage cheese and other dairy products at a special sale price.¹⁹ The protest leaders, however, argued that they will not stop the protest until the price of

¹⁶For more details on the effect of deregulation on the prices of dairy products see Ofek (2012).

¹⁷The cumulative annual growth rate of food prices in Israel was 2.1% between January 2000 and September 2005, and jumped to 5% between September 2005 and June 2011. By comparison, the cumulative annual growth rate of food prices in the OECD countries was around 3.2% throughout the 2005-2011 period (see the Kedmi Committee report, 2012, p. 8).

¹⁸The stories were first published in the evening financial newspaper Globes, see <http://www.globes.co.il/news/article.aspx?did=1000655975> though other newspapers and TV news have soon followed this lead and also started reporting extensively on this issue.

¹⁹For instance, Rami Levy, which is a hard discount chain, announced that they will offer Tnuva,

cottage falls permanently under 5 NIS.²⁰ Some politicians and Government ministers also called for various measures to control food prices.²¹

On June 24, Mrs. Zehavit Cohen, the CEO of Apax Partners (a private equity fund which controls Tnuva) and the chairperson of Tnuva's board, announced in a TV interview that Tnuva will not unilaterally lower its cottage cheese prices.²² Following the interview, three new groups formed on Facebook calling to boycott Tnuva's products. In response to these new threats, Tnuva lowered the wholesale price of cottage cheese to 4.55 NIS, and soon after, the Strauss Group and Tara followed suit.²³

On July 2011, the "tents protest" started with thousands setting up tents on the centrally located Rothschild Boulevard in Tel Aviv to protest the rising cost of living and demanding social justice. Like the cottage boycott, the tents protest also started on Facebook. The protest spread quickly to other locations in Tel Aviv and to other cities, reaching its peak on September 3, 2011, when around 300,000 people gathered in Tel Aviv to demonstrate against the high cost of living. Motivated by the protest, the student associations in 12 colleges and universities announced at the beginning of September 2011, that they intend to boycott Tnuva until it lowers its prices.

In response to the boycott, the government appointed on June 27, 2011, a joint committee to review the level of competition and prices in Israel (the Kedmi Committee). The committee submitted its recommendations on the dairy market by mid July 2011. Among other things, it recommended a gradual opening of the dairy market to competition, removing import tariffs, and eliminating the exemptions to produce distributors from antitrust action.²⁴

On September 25, 2011, the Israeli Antitrust Authority (IAA) raided Tnuva's offices, as part of an open investigation on the extent of competition in the dairy industry. According to the press, the IAA seized, among other things, a 2008 McKinsey report which found that the demand Strauss, and Tara Cottage cheese for a few days at a special price of 4.90 NIS, instead of the regular price of 6.50 NIS, and Shufersal, which is the largest supermarket chain in Israel, announced a special "buy one get one free" sale for a few days on Tnuva and Tara Cottage cheese for shoppers who spend more than 75 NIS. See <http://www.calcalist.co.il/marketing/articles/0,7340,L-3520937,00.html> and <http://www.ynet.co.il/articles/0,7340,L-4082055,00.html>

²⁰See <http://www.ynet.co.il/articles/0,7340,L-4083268,00.html>

²¹See <http://www.themarker.com/markets/1.656978>

²²Specifically, Zehavit Cohen said that Tnuva will agree to lower its prices only if both dairy farmers, supermarkets, and the government will contribute to the price reduction. See <http://qa-galatz.scepia-sites.co.il/1404-38999-he/Galatz.aspx>

²³Tnuva also lowered its recommended retail price to 5.90 NIS and argued that many supermarkets did not follow its previous recommended retail price of 6.97 NIS and, instead, sold cottage cheese at 7.20 – 8.00 NIS. See <http://www.haaretz.co.il/misc/1.1178816>

²⁴See <http://www.icba.org.il/news/files/%D7%94%D7%9E%D7%9C%D7%A6%D7%95%D7%AA%20%D7%95%D7%A2%D7%93%D7%AA%20%D7%94%D7%9E%D7%A9%D7%A0%D7%94%20%D7%9C%D7%91%D7%97%D7%99%D7%A0%D7%AA%20%D7%A9%D7%95%D7%A7%20%D7%94%D7%97%D7%9C%D7%91.pdf> (in Hebrew) and <http://www.ynetnews.com/articles/0,7340,L-4101368,00.html>

for cheese was inelastic, and advised Tnuva to raise prices by at least 15%.²⁵ Shortly after the raid, on October 2, 2011, Mrs. Cohen announced her resignation as the chairperson of Tnuva’s board.²⁶ Following her resignation, Tnuva announced a price cut of up to 15% on dozens of products.²⁷

3 Data, sample selection, and aggregation

We purchased data from a private company providing data services to the retail sector. The raw data record the daily transactions of the cottage and white cheese categories in 2,169 stores throughout the country, over the period January 1, 2010 - April 30, 2012. Each observation represents the total quantity and total revenue recorded by the cash register on a specific item - identified by its unique barcode - in a specific store and day. The raw dataset has over 22 million observations on 339 items over time and across stores. In Appendix B, we describe how we cleaned the data.

Items vary in terms of physical attributes (weight, flavors, fat content, packaging, kashrut standards, etc.), as well as manufacturer. We restrict attention to the most popular configurations: 250 grams containers of plain cottage and white cheese, with 3% and 5% fat content, produced by the three major manufacturers, which we label A, B and C (we use the terms “brand” and “manufacturer” interchangeably). We thus have 12 items (two types of cottage cheese and two types of white cheese for each of the three manufacturers) sold in 2,135 stores, spanning 7,291,875 store-item-day observations. This subsample of 12 items represents about 80% of cottage cheese sales in the original data, and 30% of white cheese sales.

We eliminate from the sample 1,008 stores selling the 12 items infrequently (two thirds of the deleted stores are convenience stores).²⁸ We also eliminate 298,657 observations corresponding

²⁵See <http://www.haaretz.com/business/trustbuster-raids-tnuva-offices-questions-chiefs-1.386731> and <http://www.haaretz.com/business/allegations-trustbuster-said-surprised-by-tnuva-s-overt-monopoly-pricing-1.389281>.

According to a newspaper article from June 2011, Apax Partners asked McKinsey to examine Tnuva’s pricing policies after it acquired Tnuva in January 2008. Before the acquisition, Tnuva was a cooperative of 620 kibbutzim (collective, mostly agricultural, communities) and moshavim (non-collective agricultural communities). See <http://www.globes.co.il/serveen/globes/docview.asp?did=1000657979&fid=1725> The article also reports that Tnuva’s chief economist “warned the company that raising prices was liable to blow up in their faces.”

²⁶The resignation was explained as a response to the “changing economic climate” and the raid on Tnuva’s offices by the IAA. See <http://finance.walla.co.il/?w=/3/1865060> and <http://news.walla.co.il/?w=/9/1863467>

²⁷See <http://www.tnuva.co.il/about/PressRelease/Pages/SpecialSale.aspx>

²⁸The 1,008 eliminated stores have less than 2,000 observations on the 12 items. The logic is as follows: if a store sells one of the 12 items at least once every weekday (virtually all shops are closed on Saturdays), we would expect 729 observations per store (the number of days between January 1, 2010 and April 30, 2012, excluding Saturdays). And if a store sells all 12 items at least once a day, we should expect 8,748 observations per store (12×729). The deleted stores have on average 690 observations (the median is 546), indicating that they sell only a limited range of cottage and white cheeses and do so infrequently. In addition, we deleted 13 observations that were duplicated.

to Saturdays since most stores are closed for religious reasons. The final sample includes 6,596,052 observations from 1,127 stores over 729 days between January 1, 2010 and April 30, 2012 (excluding Saturdays). The deleted observations represent about 5% of the total sales of the original 2,135 stores.

Table 1 shows the business formats of the 1,127 stores in our final dataset.

Table 1: Distribution of stores

Store Format	Frequency	Percent	Percent of Sales
Convenience Stores	54	5	0.3
Grocery Stores	84	7	0.8
Minimarkets	320	28	8.9
Main Local Supermarket Chains	290	26	28.6
Main HD Supermarket Chains	227	20	36.6
Other HD Supermarket Chains	152	13	24.9
Total	1,127	100	100

Most stores – 46% – belong to the main supermarket chains and these stores are similarly distributed between hard-discount (HD) and local supermarkets.²⁹ These stores account for 65% of the sales in our sample. Other HD supermarkets account for only 13% of the stores in the sample, but for almost 25% of the sales. The smaller store formats (convenience stores, groceries, and minimarkets), represent 40% of the stores, but only 10% of the sales.³⁰ The largest metropolitan area in Israel – the Tel Aviv region – accounts for almost a quarter of the stores. The remaining stores are equally distributed across the rest of the country.

It is convenient to view the data as a standard panel of stores over time in which, for each store-date combination, we record the transaction data of each of the 12 items. Stores not selling a particular item on a specific date have missing values. All in all we have 741,940 store-date observations, implying that each store has, on average, some transaction data on 658 days.

3.1 Prices and aggregation into products

The prices of the 3% and 5% fat varieties of the same brand are highly correlated (the correlation is above 95% for cottage cheese and around 85% for white cheese), making it impossible to separately identify their respective demands. We therefore aggregate the sales of 3% and 5% cottage cheese and 3% and 5% white cheese of the same brand into a single product. This aggregation results in 6

²⁹Relative to the HD stores, the local stores are smaller, carry fewer products, and tend to have higher prices.

³⁰The vast majority of stores in our sample (91%) serve the general public, while 6% of the stores are dedicated to the orthodox Jewish population. The remaining stores are in Arab towns, though this group is underrepresented in our sample.

products: one cottage cheese and one white cheese per brand. Thus, brand A cottage cheese refers to “brand A cottage cheese of 3% and 5% fat.”

In 55% of the store-date observations, all 6 products are sold. About 75% sell at least 5 products. Thus, in most observations, most of the products are being transacted, which is not surprising given the popularity of cottage and white cheeses.

The price per 250 grams (the standard size of a container) of cottage cheese of brand $b = A, B, C$, in store s at time t is computed as follows:

$$p_{bst}^c = 250 \times \frac{r_{bst}^c}{q_{bst}^c}, \quad (1)$$

where r_{bst}^c is the total revenue from selling 3% and 5% cottage cheese of brand b in store s at time t and q_{bst}^c is the corresponding quantity in grams.³¹ The price of white cheese, p_{bst}^w , is defined similarly. These prices can be thought of as the quantity-weighted mean price across all daily individual transactions (for a given product and store).³²

4 Anatomy of the cottage boycott

We now look at prices and quantities. We start with the evolution of prices since they were the first to react to the boycott threat. We then turn to quantities in order to assess the harm consumers inflicted on manufacturers. We later estimate demand functions to assess the impact of the boycott on demand and examine how demand changes correlate with various demographics proxying for exposure to social networks.

4.1 Firms’ reaction to the boycott: prices

To gain a long-term perspective on how firms reacted to the boycott, we look at prices during the entire sample period, by brand.

³¹These prices exhibit a few extreme values due to very low recorded revenues and relatively high weights sold and vice-versa. We view these cases as keying errors (typos) and therefore deleted them from the sample. Specifically, we deleted from the sample 15,682 observations with prices per 250 grams below 3.75 NIS or above 9 NIS; these observations represent a quarter of one percent of the observations (the bottom and upper 1 percentiles are 4.60 NIS and 7.90 NIS, respectively).

³²Weighting by quantity will only matter if prices differ across transactions within the same day (e.g., due to quantity discounts), but we are not aware of this happening in cottage and white cheeses. The price of an item not being sold in a store in a given day is set to missing.

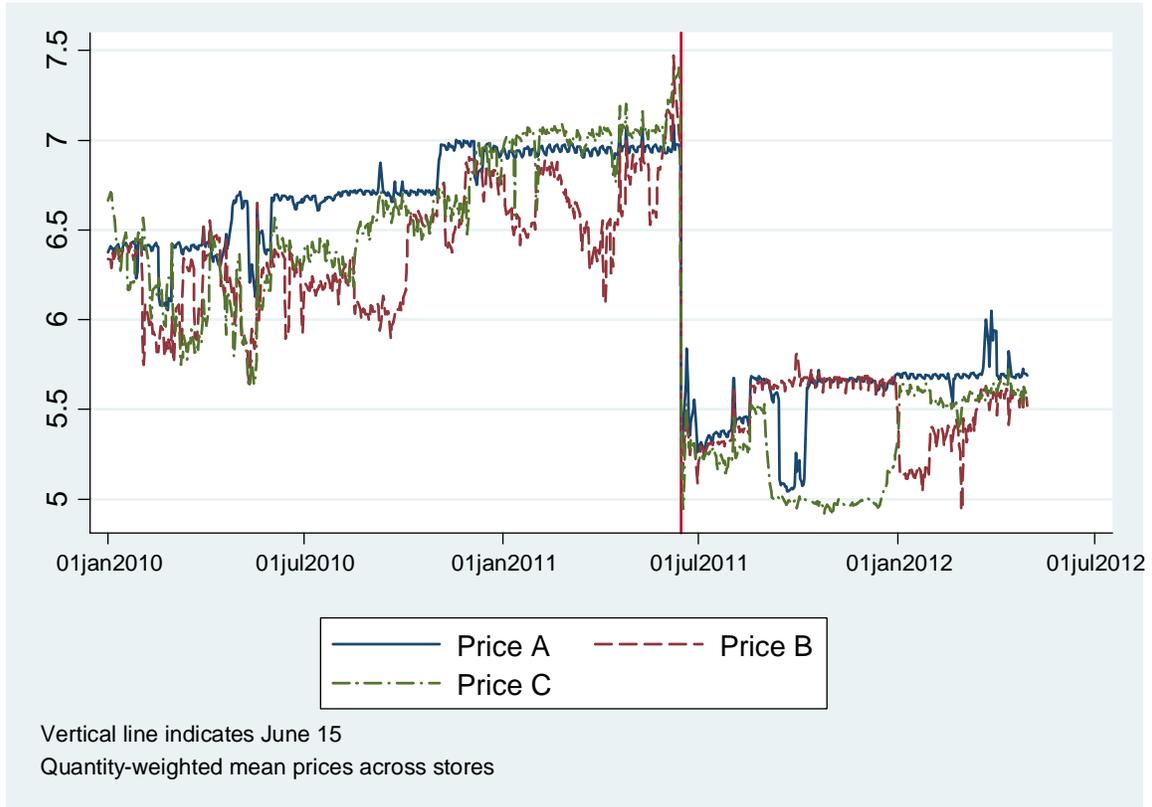


Figure 2: Daily mean price of cottage cheese by brand

Figure 2 shows the daily, quantity-weighted mean price of cottage cheese by brand.³³ Several points are worth mentioning. First, the prices of the three brands are fairly close to each other, with some divergence for relatively short periods of time. The price of brand A, though, seems more stable and typically higher than the prices of brands B and C.

Second, the price responses to the boycott were almost immediate: the quantity-weighted average price (across all brands) dropped by 24% between June 14 and June 16. We do not know whether the price concessions were initiated by the manufacturers or by the retailers, although we will be able to shed some light on this issue below.

Third, the mean prices of all three brands decreased after the boycott started to about 5.50 NIS, close to the boycott organizers' demand of 5 NIS, and remained at the new level until the end of the sample period.

The immediate, and steep, price decline may give the impression that the dairies and retailers fully complied with the demands of the boycott organizers and that the boycott ended (almost) as soon as it started. However, as described in Section 2.1, not only did the initial boycott

³³Prices are computed using equation (1), for each brand $b = A, B, C$, and averaged across stores using quantity weights. The price lines are not smooth because the weights change on a daily basis, even though prices change less frequently. These prices are consistent with the Central Bureau of Statistics data shown earlier in Figure 1.

remain active (since demands were not fully met) but additional boycotting groups were organized later in the summer of 2011.

We now take a closer look at the price responses. Figure 3 zooms in on the period May 15 to July 15 (i.e., from one month before to one month after the boycott started), and plots various percentiles of the daily, cross-sectional, distribution of prices by brand.

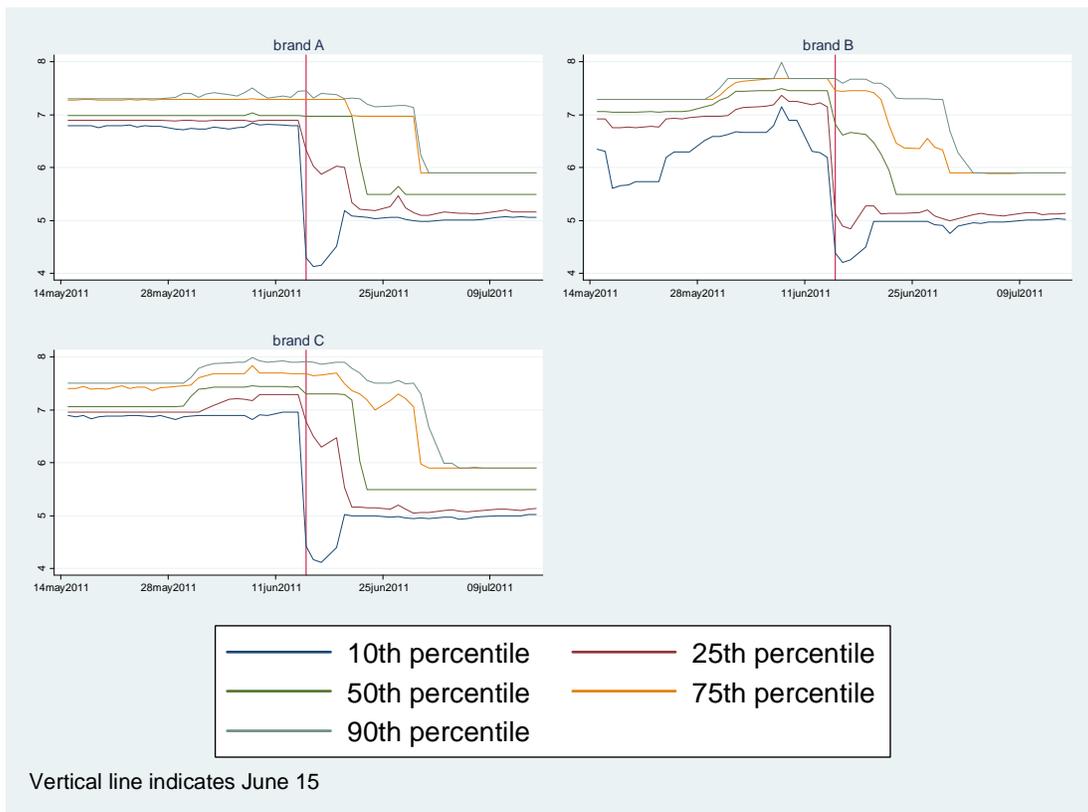


Figure 3: Distribution of cottage cheese prices by brand around the boycott period

Figure 3 shows that the steep price decrease displayed in Figure 2 was not uniform across stores. Only the low-price stores (those located in the 10th percentile of the cross-sectional distribution, and to a lesser extent also those in the 25th percentile) reacted immediately to the boycott. Low prices rebounded somewhat after the steep initial decline. The high-priced stores took days, and in some cases even weeks, to cut prices. It seems that by the beginning of July, all stores converged to a new low price level.

There are interesting differences in the price response to the boycott by store format. Figure 4 plots the quantity-weighted mean price (across stores and brands) by store format around June 15. The plots suggest that the swift decline in prices occurred mainly at the supermarket chains. In particular, prices dropped from June 14 to June 16 by 33% in the hard-discount stores belonging to the main supermarket chains, 24% in the non-HD stores belonging to the main supermarket chains, and 15% in the hard-discount stores which do not belong to the main supermarket chains.

By contrast, the price reaction of the smaller formats (convenience stores, groceries, and minimarkets) lagged by around 10 days and was substantially smaller. Between June 14 and June 30, prices dropped by 16% in convenience stores, by 15% in groceries, and by 18% in minimarkets. Interestingly, prices in the hard-discount stores belonging to the main supermarket chains rebounded after the initial steep decline on the eve of the boycott and increased somewhat during the first week of the boycott.

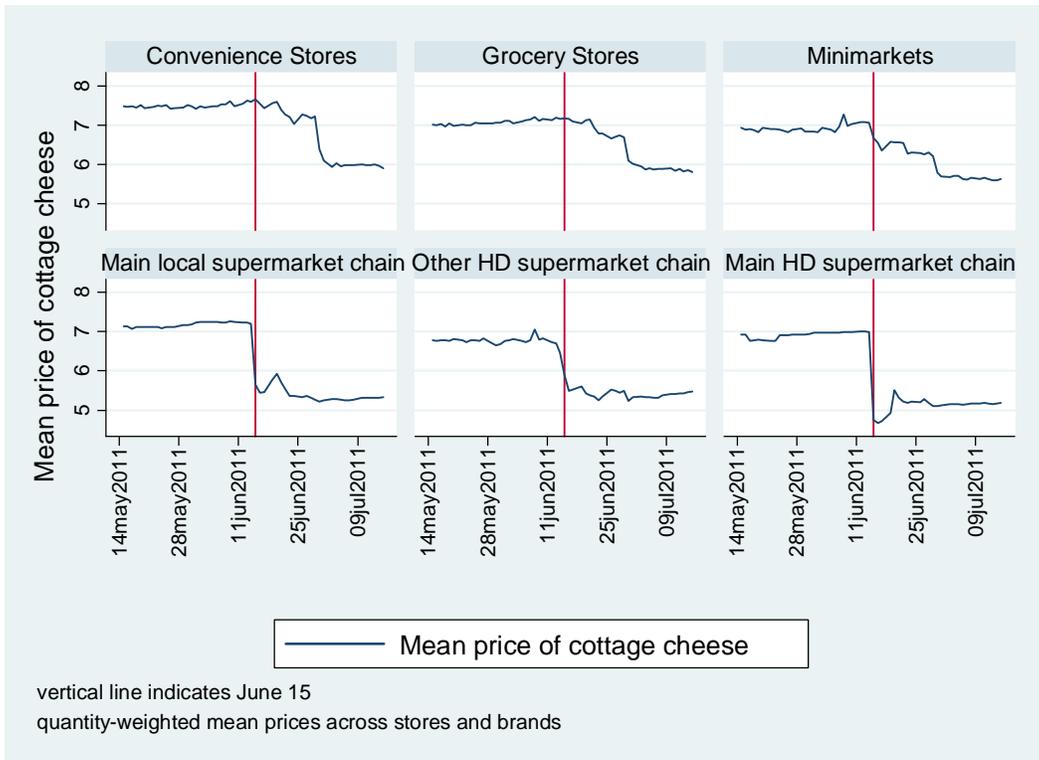


Figure 4: Mean price of cottage cheese by store format around the boycott period

Figure 5 shows the standard deviation of prices by store format. It is clear that the price cuts documented earlier varied a lot across stores even within the same store format. This is particularly so within the group of supermarkets, especially those that belong to the main supermarket chains.

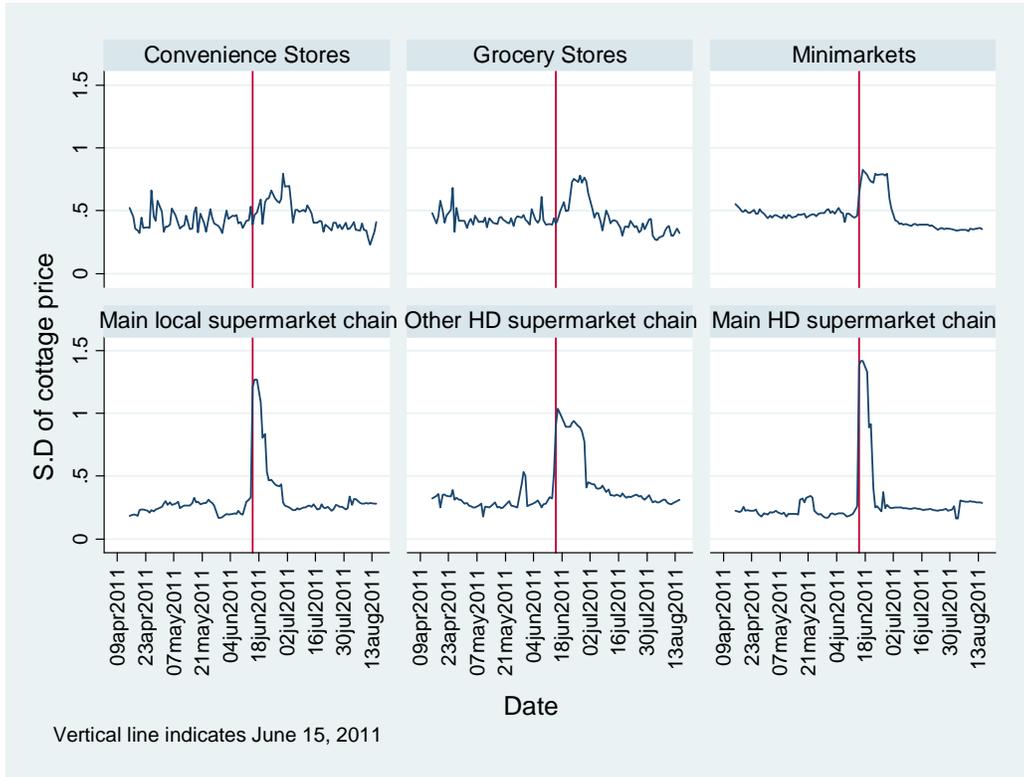


Figure 5: Standard deviations of cottage cheese price by store format around the boycott period

While we cannot tell from the data whether manufacturers or retailers took the lead in lowering prices – and keeping them low – there are indications suggesting that large retailers were the first to react to the boycott, while manufacturers reacted only later, lowering their wholesale prices. First, as shown in Figure 5, the steep increase in price dispersion following the boycott is consistent with the stores, rather than the manufacturers, taking the initiative of reducing prices. Second, price declines were quite uniform across brands within a store, suggesting that the decision to cut prices was made at the store (or chain) level rather than at the manufacturer level. Indeed, redoing Figures 4 and 5 by brand gives essentially the same picture. Third, small retailers have dropped prices only after the manufacturers publicly announced cuts in their wholesale prices.

A possible explanation why large retailers took the initiative in reacting to the boycott is that, in light of the attention garnered by the product category, lowering prices worked as a sort of loss leader for large retailers. This interpretation is consistent with the evidence mentioned in Section 2.1. According to public announcements, several large supermarket chains announced special temporary deals as soon as the boycott started, while Tnuva – the largest manufacturer – announced it would not cut prices. Only towards the end of June, after three new groups formed on Facebook calling for the boycott of all of Tnuva’s products, Tnuva announced wholesale price reductions. The other two manufacturers – Strauss and Tara – followed Tnuva’s lead.

4.2 Consumers' reaction to the boycott: quantities

A key for the success of a boycott is the harm that boycotters can inflict on the target. In this case, there were at least three potential channels through which firms can be harmed: (i) the immediate loss of sales, (ii) the risk of the government deciding to re-regulate prices or to introduce market reforms (such as eliminating various restrictions on imports), and (iii) the risk of class action on the grounds that prices are excessive.³⁴ The latter is relevant for Tnuva, which was declared a monopoly in the “milk and milk products” market by the IAA in 1989.³⁵ The Israeli antitrust law prohibits a monopoly from abusing its dominant position, among other things, by charging “unfair prices.”³⁶

While it is hard to quantify the risk of government intervention and the risk of class actions, we can use our data to examine the direct loss of sales due to the boycott. To this end, we examine the evolution of quantities sold during the May 15-July 15 period.³⁷ Since sales vary considerably within the week (high sales on Thursdays and Fridays and low sales on Sundays and Mondays), Figure 6 displays weekly total sales (Sunday to Friday); each dot in the figure represents the total weekly quantity sold in tons, with the dots being displayed on the last day of the week (Friday). The quantity for the week when boycott started – the week starting on Sunday June 12, 2011– appears just to the right of the vertical red line.

³⁴Indeed, the government is considering re-regulating the price of white cheese, and a class action lawsuit was filed against Tnuva.

³⁵Among other things, the declaration can serve as prima facie evidence for the firm's dominant position in any legal proceeding, including class action law suits.

³⁶A class action lawsuit against Tnuva was submitted to a district court on July 2011, alleging that Tnuva has abused its monopoly position; see Mivtach-Shamir Holdings LTD, financial statements for 2011, Sec. 26.1.5 (Mivtach-Shamir Holdings controls Tnuva along with Apax). The document is available at http://maya.tase.co.il/bursa/report.asp?report_cd=725120

³⁷We only report the evolution of total sales because the data acquisition agreement does not allow us to disclose quantity information at the brand level.

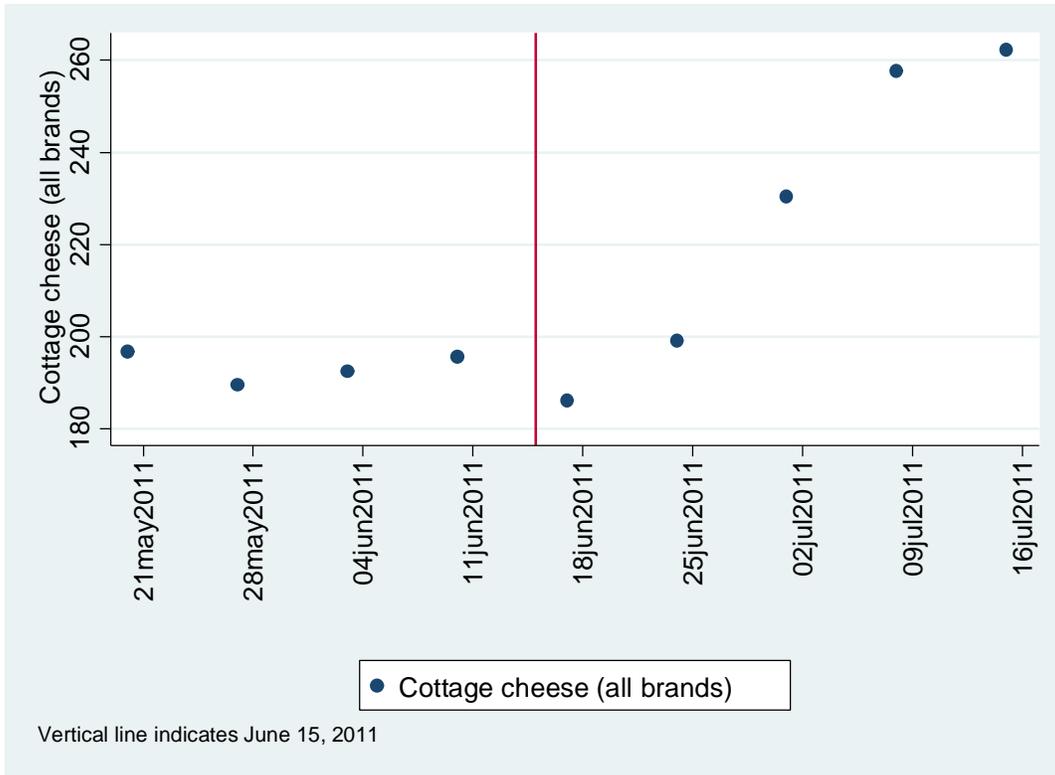


Figure 6: Weekly total quantity of cottage cheese sold (in tons)

Figure 6 shows a small decline in sales during the first week of the boycott. Although the quantity decrease is minimal, the 24% price decline around June 15th gives a rough estimate of the foregone revenue during that week, which provides a sense of the inflicted harm. In later weeks, however, sales increased sharply probably in response to the substantial price reductions.

Figures 7 and 8 show different breakdowns of the quantity data. In Figure 7, we plot total weekly quantities by store format relative to the weekly quantity sold during the week starting on Sunday May 15, 2011 (a month before the boycott).

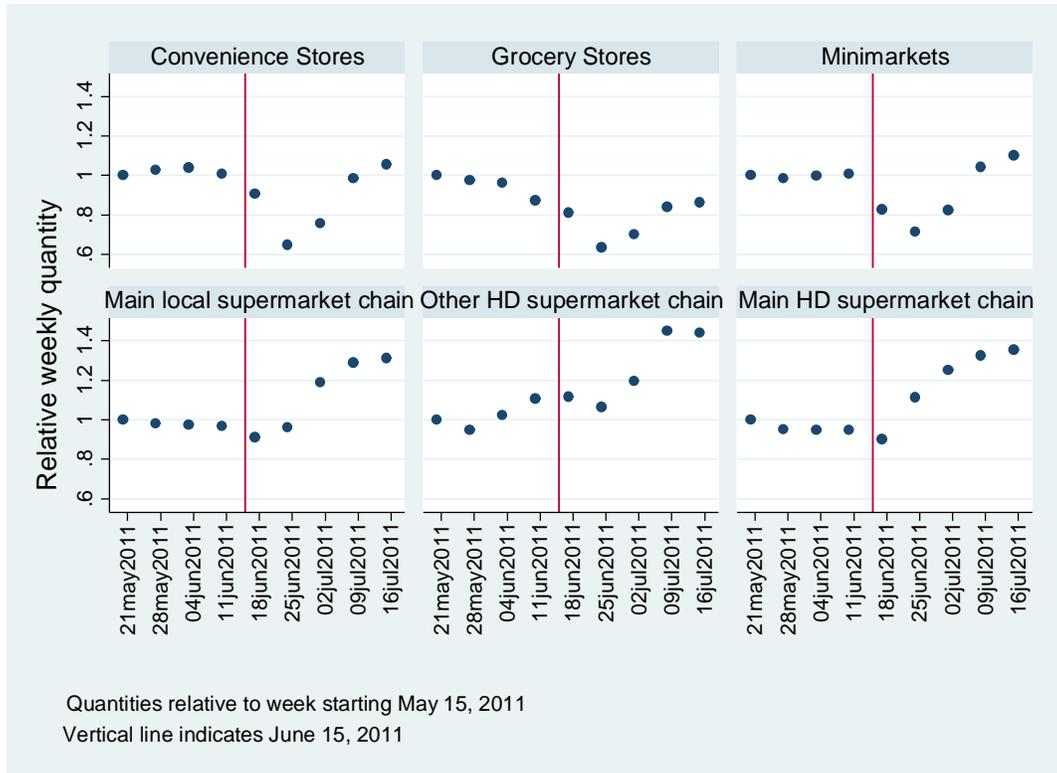


Figure 7: Relative weekly quantity of cottage cheese sold by store format (all brands)

Figure 7 confirms that the boycott initially lowered sales, but not uniformly across store formats: the decrease in quantity sold is mainly observed in the smaller store formats (convenience, grocery stores, and minimarkets), where quantities sold declined by about 20% on average the week the boycott started. These formats account for about 40% of the observations but only 10% of quantity sold. By contrast, the boycott had only a slight negative effect on sales in larger store formats.

Figures 4 and 7 present a consistent picture: stores that did not immediately cut prices – the smaller store formats – experienced declines in sales, whereas stores that did cut prices – the larger store formats – actually gained sales.

Figure 8 indicates that the decline in quantity sold was more pronounced in the city of Tel Aviv-Jaffa – which represents about 10% of the observations and 8.7% of the quantity sold – than in the rest of the country. Quantities sold declined by 15% in Tel Aviv-Jaffa between the week ending on June 10 and the week ending on June 24. In conjunction with the decline in prices, this represented a loss of 32% in revenues during that two-week period.

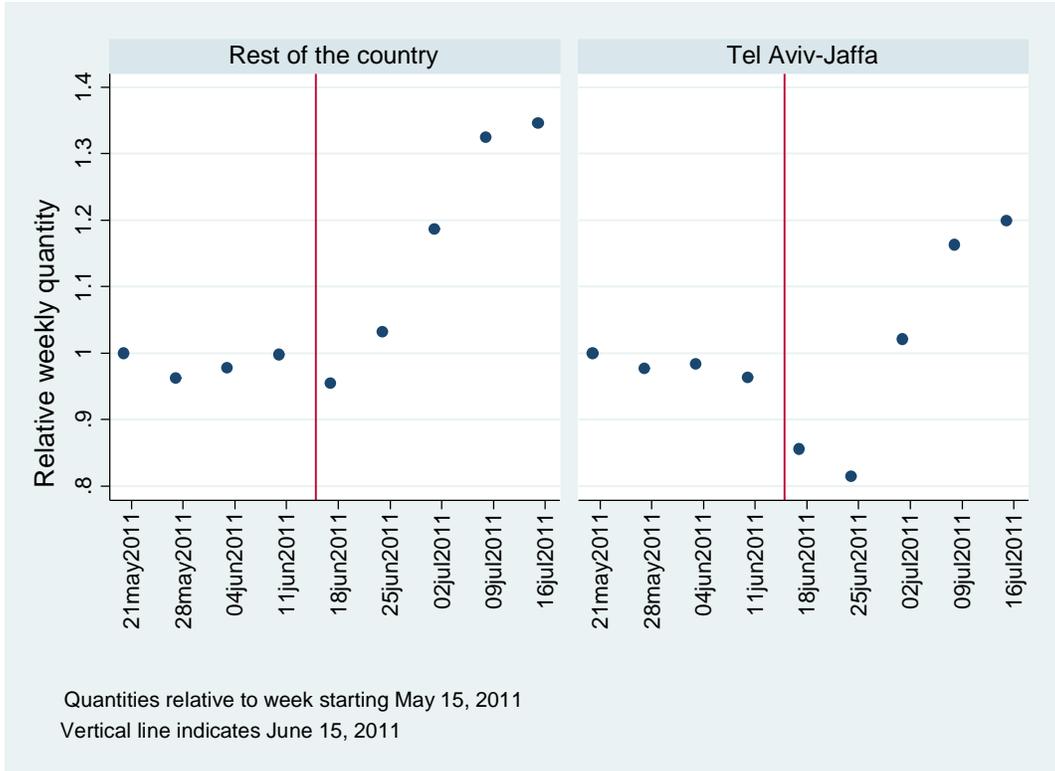


Figure 8: Relative weekly total cottage cheese quantity sold by location (all brands)

4.3 Demand versus quantity decline

As observed in Figures 6-8, quantities of cottage cheese initially declined but, after a week or two, they were back to the pre-boycott level and kept increasing thereafter. This change in quantities sold was likely prompted by the price concessions. The quantity data mixes two possibly conflicting effects: a decrease in demand *and* movements along the demand curve, as prices were drastically reduced. We therefore cannot infer from sales data alone the extent of demand decline. In order to do this, we estimate a demand system and use it to impute the move along the demand curve, attributed to the observed price decline.

While the purchase decision at the household level is a discrete choice – how many units and what brands to purchase – in the absence of consumer level data, we can only estimate an aggregate demand system. We could still estimate a discrete choice model of aggregate demand, but we do not think it is necessary. Discrete choice modeling is handy when the choice set is large, requiring many parameters to be estimated relative to the available data. In our application the choice set is quite limited (only six products), while the store-level, daily data provide us with a large number of observations.

Our basic specification assumes that the demand for product j at store s in day t is linear

in logs:

$$\log q_{jst} = \alpha_{sj} - \beta_j \log p_{jt} + \sum_k \gamma_{jk} \log p_{kt} + x_t \delta + \varepsilon_{jst}, \quad j = 1, 2, \dots, 6, \quad k \neq j \quad (2)$$

where α_{sj} is a brand-specific intercept for each store s , x_t are exogenous covariates that vary only over time (day-of-the-week dummies and week dummies), and ε_{jst} is an *i.i.d.* shock.

Price endogeneity is always a concern when estimating demand functions. First, there is a cross-sectional concern that stores may be of heterogeneous quality (service, location, product assortment, etc.), and quality may determine both sales and prices. Ignoring store heterogeneity may bias the estimated price elasticities. We expect a bias towards zero in the estimated elasticities because higher prices are associated with higher unobserved quality and therefore more sales. The structure of our data allows us to control for brand-store fixed effects to deal with this type of endogeneity at the brand-store level. In addition, there is a time dimension concern if unobserved demand shocks drive both prices and quantities. We therefore include “day of the week” dummies to control for within-week consumption variation, and dummies for each of the 121 weeks in the sample to control, in a very flexible way, for main holidays, seasonality and other trends for each brand of cottage cheese. The price variation used for estimation is, therefore, store-level deviations from the daily mean price (which itself evolves over time in a flexible way) for each brand. Although there might be an idiosyncratic, store-specific, component to these changes, a good part of the price variation can be traced to national-level changes generated by manufacturers and retail chains. The variation across stores in price changes is, therefore, related to the timing and speed by which national price changes are passed through to the local level. Importantly, national brand price changes are not likely to be driven by changes in store-level demand. Thus, given our understanding of pricing in this market and using the added controls, we believe that endogeneity of store-level prices is not a major concern.

Indeed, decomposing the variation of (log) price for each of the three brands we find that, on average, store and week dummies account for 13% and 64% of the total variation, respectively (the differences across brands is minor). “Day of the week” dummies account for almost nothing. Thus, most of the variation in prices is over time.³⁸

An additional endogeneity concern, not addressed by store and week fixed effects, is due to store- or chain-specific promotions. While cottage cheese products are not the subject of specific promotions (as indicated to us by industry insiders) there are retailer-brand-level promotions (including cottage cheese), which may create a spurious relation between prices and quantity. We expect the estimated elasticities to be upward biased (in absolute value), as low prices may capture promotional activities.

³⁸Naturally, the week dummies capture the break in prices due to the boycott but, redoing the variance decomposition for the subperiod before the boycott (before May 15, 2011) and for the subperiod after the boycott (after October 2, 2011) we find that week dummies account for a substantial 27% of (log) price variation.

To verify that promotional activity does not substantially affect our estimated elasticities, we use prices in other cities, prices of other chains in the same city and prices of other chains in other cities to instrument for prices in equation (2). Instrumenting leads to very limited qualitative differences; elasticities remain of the same order of magnitude. These estimates are shown in Appendix E. The IV estimates, however, are sensitive to which specific instruments are used and which fixed effects are included, and often result in negative cross prices effects.³⁹ For these reasons, we are more confident in our OLS-fixed effect estimator of equation (2), which we adopt for the rest of the paper

Finally, it is worth mentioning that the main points made in the paper are comparisons of “before and after” and “across locations” estimates of price elasticities and that, as long as any potential biases are not systematically different across these dimensions, our conclusions will remain valid.

OLS-fixed effects estimates of the demand parameters are shown in Table 2 and described later in Section 5. For now, we only use the estimated parameters for the pre-boycott period (January 1, 2010 – June 14, 2011) from the basic specification (columns (1)-(3)) to predict quantity under the pre-boycott demand function at post-boycott prices. Formally, we define the boycott index at time t as follows:

$$BI(p_t, q_t) = 100 \times \left(\frac{q_t}{\hat{q}_0(p_t)} - 1 \right),$$

where t is a period after the boycott started, $\hat{q}_0(p_t)$ is the predicted quantity under the pre-boycott demand function at observed prices p_t and q_t are observed sales at time t .

The index $BI(p_t, q_t)$ captures the gap between observed and predicted sales, in percentage terms, at observed post-boycott prices. It measures how much lower demand in period t is relative to what it would have been expected at prices p_t had the boycott not occurred. Negative values of the index indicate that sales were below their expected level. The more negative the index, the more intense the boycott effect is. The BI index proxies foregone sales and will help us to evaluate the initial impact of the boycott, as well as its evolution throughout the summer of 2011, in reaction to the partial price concessions and to the creation of additional consumer groups joining the boycott.

Details of the computation of $BI(p_t, q_t)$ are presented in Appendix C. Figure 9 shows $BI(p_t, q_t)$ from the start of the boycott on June 14, 2011 until the end of August, 2011. For ease of exposition, we show a normalized BI index obtained by subtracting its value on June 14, 2011.

³⁹A possible reason for this fragility is that the retail chain information is less reliable than our price data since it was put together by matching store’s addresses to information available in the Internet on retail chain branches.

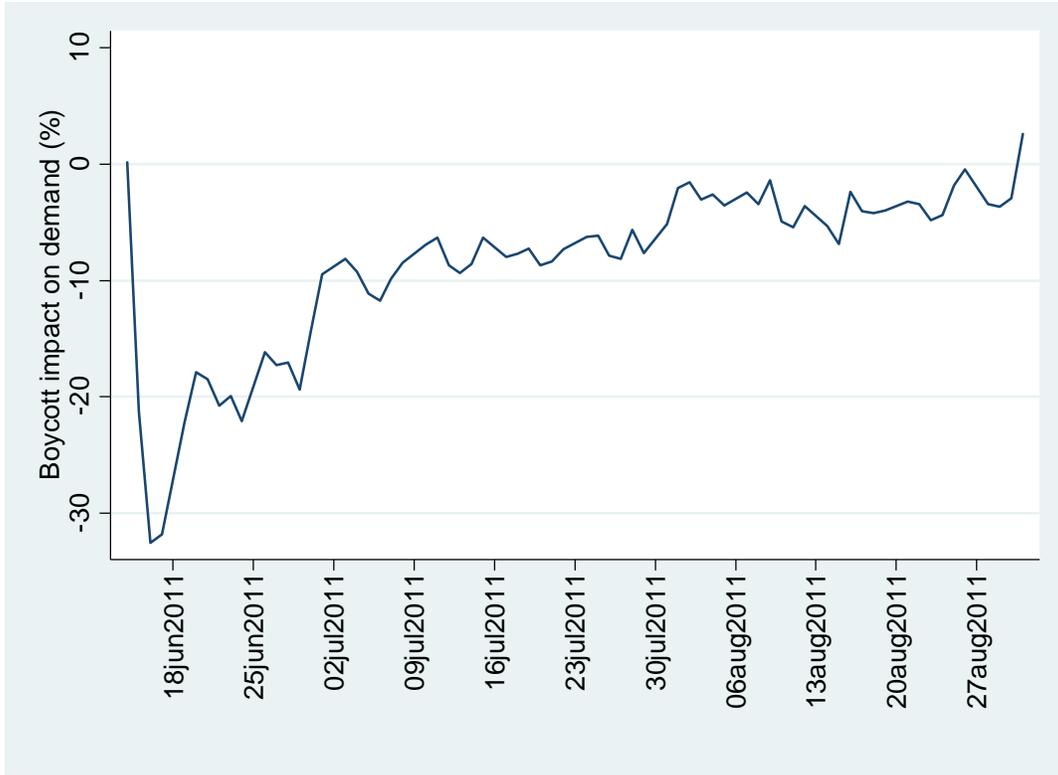


Figure 9: Boycott impact-on-demand index (all brands)

Figure 9 shows an immediate and quite strong effect: sales are much lower than anticipated given the substantial price reductions. Gradually, the boycott impact diminishes. About six weeks after its start, the boycott effect all but fizzled out: while sales recovered and surpassed pre-boycott levels due to the lower prices, they matched the expected demand at observed prices.

Underlying the evolution of the BI index is a downward shift of demand as displayed in Figure 10. The move from (q_0, p_0) to (q_1, p_1) represents about a 30% decline in the quantity that would have been sold at the new post-boycott price p_1 with the pre-boycott demand function. Over time, demand shifts gradually outward and the BI index tends to zero. Towards the end of August 2011, demand reaches point $(\hat{q}(p_1), p_1)$ on the old demand curve and the BI index then is zero. As we will show in Section 5, the post-boycott demand curve – passing through $(\hat{q}(p_1), p_1)$ – is more elastic than the pre-boycott demand curve.

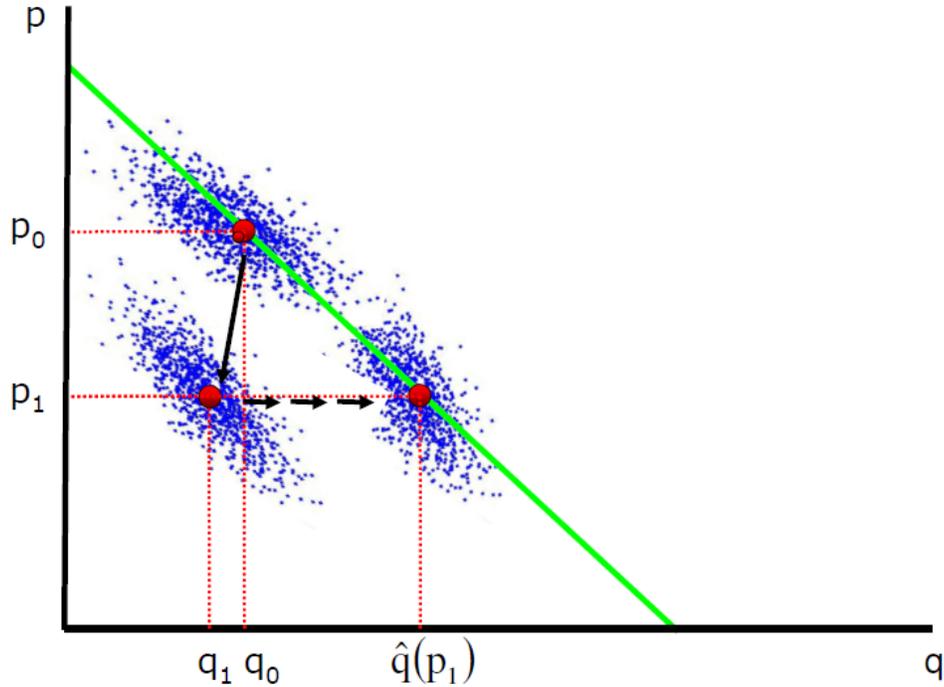


Figure 10: The evolution of the *BI* index

Judging by the evolution of the *BI* index, firms rightfully reacted with immediate price concessions, but then correctly perceived there was no need for further price reductions, despite the creation of additional boycott groups on Facebook. The public appears to have been satisfied with their initial accomplishments.

5 What did the boycott do?

The previous sections show that, by and large, the public rallied behind the boycott organizers, forcing the three dairies and retailers to cut the prices of cottage cheese. In this section we look at the lasting impact of the boycott and examine the effect of the boycott campaign on the demand for cottage cheese.

As in most boycotts, the organizers based their argument on claims of unfair business practices in order to motivate the public to join the cause. This animosity can lead to a drop in demand, a temporary or a long-lasting one, should the reputation of the target firms be tarnished. As documented in previous sections, demand did decline but, judging by the *BI* index, only temporarily. In addition, by raising the public's awareness to the high prices in the product category, the boycott may change consumers' shopping habits, possibly inducing them to search more and compare prices across brands, products, and store formats.⁴⁰ One would expect increased consumers' awareness

⁴⁰Indeed, a consumer survey from August 2011, reported in the press, showed that following the boycott, a third of the respondents reported that they buy fewer consumer products, including dairy products, and 60% reported that

to translate into higher own and cross price elasticities.

To examine the lasting impact of the boycott, we use the demand system described above, to study whether demand has changed following the boycott. We estimate variants of equation (2) interacting each regressor, including the store fixed effects, with a before/after indicator. Thus, our estimates of the change in price elasticity account for differential effects of the boycott on the level of sales of different stores. The sample period is January 1, 2010 until April 30, 2012, excluding the subperiod May 15, 2011 - October 2, 2011. This subperiod covers the boycott, as well as the tents protest, and is excluded because we want to use data from periods when consumer preferences are stable.⁴¹ We estimate each equation separately because there are no efficiency gains to joint (SUR) estimation. Table 2 reports OLS elasticity estimates, controlling for the various fixed effects.

In Columns (1)-(3), we only include cottage cheese prices – own price and the price of the other two brands. Own (brand) price elasticities are negative and of reasonable size. They increase, in absolute value after the boycott suggesting that consumers become more price sensitive, though the increase is statistically significant only for brands B and C. Interestingly, brand A’s own price elasticity, which did not significantly change after the boycott, is a lot smaller than that of the other two brands.⁴² This is interesting because all three brands were similarly priced before the boycott, despite the large difference in price elasticities. We return to this point in Section 7.2.

Cross-brand price elasticities are all positive, so that brands are perceived by consumers as substitutes. The cross-brand elasticities also increase significantly after the boycott: consumers become more willing to substitute across brands. The increase in cross price elasticities is quite substantial: the average of the six cross-brand price elasticities, across the three equations, was 0.198 before the boycott and increased five-fold to 1.002 after the boycott. Especially large is the increase in substitutability between brands A and C.

The change in own and in cross-price elasticities is consistent with the boycott having increased consumers’ awareness prompting them to engage in more active search for lower prices and in more substitution across brands.

In Columns (4)-(6) we add the prices of the three brands of white cheese. The number of observations is reduced by about 23% since many stores do not sell all six products on any given day. The effect of white cheese prices on the demand (own and cross-brand elasticities) for cottage is minimal and, in many instances, not significantly different from zero. In order to use a larger

they search for cheaper products (see <http://www.globes.co.il/news/article.aspx?did=1000674348>).

⁴¹We also excluded the subperiod corresponding to a strike at one of the manufacturers (March 18, 2012-April 3, 2012)

⁴²The finding that A’s own price elasticity did not change significantly could be the result of two conflicting effects: on the one hand, it could be that all customers (including those of A) became more price sensitive after the boycott. But at the same time, if the more price sensitive consumers migrated away from A, the remaining consumers of A could be on average no more price sensitive than A’s consumers before the boycott.

sample, we omit white cheese prices from the regressions that follow.⁴³

Table 2: Cottage cheese own and cross price elasticities

Brand	Dependent Variable: log quantity					
	(1)	(2)	(3)	(4)	(5)	(6)
	A	B	C	A	B	C
Constant	9.352***	9.578***	9.922***	10.623***	9.694***	11.761***
Constant × after	-1.426***	-1.927***	-1.24***	-1.382***	-1.094***	-2.108***
Log Price A	-1.564***	0.505***	0.144	-1.283***	0.603***	0.274***
Log Price A × after	-0.13	1.548***	1.628***	-0.289	1.410***	1.536***
Log Price B	0.108***	-3.632***	0.114***	0.09***	-3.446***	0.226***
Log Price B × after	0.161***	-1.075***	0.482***	0.147***	-0.992***	0.289***
Log Price C	0.031	0.238***	-4.300***	0.092**	0.285***	-3.85***
Log Price C × after	0.436***	0.569***	-0.771***	0.372***	0.365**	-1.931***
Log Price A white cheese	–	–	–	-0.207***	-0.084*	-0.166***
Log Price A white cheese × after	–	–	–	0.127*	0.187	0.521***
Log Price B white cheese	–	–	–	0.012	0.019	0.034
Log Price B white cheese × after	–	–	–	0.009	0.364***	-0.019
Log Price C white cheese	–	–	–	-0.037*	0.003	-0.373***
Log Price C white cheese × after	–	–	–	0.074*	0.192**	1.053***
Number of observations	431,954	431,954	431,954	330,907	330,907	330,907
R squared	0.88	0.74	0.72	0.87	0.72	0.71

Daily price data are used. The sample period is from January 1, 2010 until April 30, 2012, excluding the boycott period (May 15, 2011-October 2, 2011) and the period corresponding to a strike at a major manufacturer (March 18, 2012-April 3, 2012). The coefficients for the interactions with the “after” indicator represent the additional effect after the boycott. All regressions include “day of the week” and store effects whose values are allowed to change after the boycott, as well as a set of week dummies to capture weekly aggregate effects over the sample period. Standard errors clustered at the store level.

⁴³Moreover, our estimates are robust to different specifications of the model. For example, aggregating the data to a weekly frequency gives similar estimates of the price elasticities.

6 Social Networks

The consumer boycott was initiated and managed on Facebook, although it received wide media coverage. We examine the role of social networks by correlating demographics that proxy for social media utilization with (i) *the impact of the boycott on demand*, and (ii) *the changes in price elasticities*.

The demographic data come from the 2008 Israel Census of Population conducted by the Central Bureau of Statistics. They correspond, when available, to the statistical area in which the store is located. A statistical area is a relatively small, homogenous, geographical area (with population between 2,000 and 5,000) within cities, defined by the Central Bureau of Statistics (similarly to census tracts in the US). When we do not have data at the statistical area, the match is done using demographic data at the subquarter, quarter, or city level.

6.1 Who participated in the boycott?

We correlate the boycott index with several demographics which serve as proxies for the use of social media. To this end, we define for each store s , the average BI index for that store over the period June 15 – August 31, 2011:

$$BI_s = \frac{1}{T_s} \sum_{t=1}^{T_s} 100 \times \left(\frac{q_{st}}{\hat{q}_0(p_{st})} - 1 \right),$$

where T_s is the number of days for which we have price and quantity observations for store s during the period.

The index BI_s shows the average daily percentage point decrease in sales of cottage cheese in store s during June 15 – August 31, 2011 relative to what would have been expected at post-boycott prices had the boycott not occurred. We regressed BI_s on six demographic variables measured at the stores' location; we run separate OLS regression for each demographic variable (each store is an observation). The estimated coefficients are reported in Table 3.

Table 3: Correlation between BI_s and proxies for social media

	BI_s	Number of observations
Coefficient of:		
% of households using a PC	−.362***	882
% of households with an Internet subscription	−.360***	882
% of those aged 15 and over with bachelor’s degree	−.658***	838
Average number of mobile phones per household	−7.96***	882
% of men over 15 who study in a “yeshiva” (religious school)	.195***	817
% of those aged 65+	−.007	886

Standard errors clustered at the statistical area level. *** p<0.001

The first four demographic variable – % of households using a PC through average number of mobile phones per household – can be thought of as indirect measures of accessibility to social media, and are likely to be positively correlated with the use of social networks. All four demographics turn out to be negatively correlated with the BI_s index. This suggests that the boycott had a more negative impact on demand in stores located in areas with higher exposure to social networks.

The last two variables, religiosity and age, are likely to be negatively correlated with participation in social networks. The coefficient is positive for religiosity, and is not significant for older population age, suggesting that the boycott either had no effect or had a smaller effect on stores located in areas with smaller exposure to social networks. This is another piece of evidence in support of the notion that the use of social networks might have increased the impact of the cottage cheese boycott.

6.2 Who was influenced by the boycott?

We now examine whether demand changed differentially by demographic composition. To this end we estimated the demand functions for each brand of cottage cheese, allowing the elasticities to vary with demographics, as well as with the boycott. We do this by interacting prices, as well as the store effects, with two indicators: one for the store’s location being above the median value of each demographic variable, and the other for the period after the boycott. We can thus assess the relation between demographics and price sensitivity and, more importantly, the relation between demographics and changes in elasticities following the boycott.

In Table 4 we report the own-price elasticities for each brand in locations where the corresponding demographic variable – the percentage of households using a PC and the percentage of population aged 15 and over with a bachelor’s degree – is above and below the median, as well as before and after the boycott. We display above-below and after-before differences and their

estimated difference-in-difference (in the bottom right cell). Results for the other four demographic variables appear in Table D1 in Appendix D (the underlying estimates of the demand function are shown in Tables D2-D4).

	Percentage of households using a PC			Percentage of population with bachelor's degree		
	Own-price elasticity A			Own-price elasticity A		
	Before boycott	After boycott	After - Before	Before boycott	After boycott	After - Before
Below median	-1.855***	-1.923***	-0.068	-1.928***	-2.072***	-0.144
Above median	-1.174***	-1.376***	-0.202***	-1.211***	-1.266***	-0.055
Above - Below	0.681***	0.547	-0.134	0.717***	0.806***	0.089
	Own-price elasticity B			Own-price elasticity B		
Below median	-4.067***	-5.128***	-1.061***	-4.129***	-5.047***	-0.918***
Above median	-3.144***	-4.246***	-1.102***	-3.112	-4.445***	-1.333***
Above - Below	0.923***	0.882***	-0.041	1.017***	0.602***	-0.415**
	Own-price elasticity C			Own-price elasticity C		
Below median	-4.886***	-5.343***	-0.457**	-4.887***	-5.419***	-0.532**
Above median	-3.453***	-4.784***	-1.331***	-3.503	-4.812***	-1.309***
Above - Below	1.433***	0.559***	-0.874***	1.384***	0.607***	-0.777***

Standard errors clustered at the store level. *p<0.10; ** p<0.05; *** p<0.01

Three results are worth mentioning. First, demand is less price elastic in localities with higher computer usage and with more educated population, both before and after the boycott has started (the above - below difference is always positive and significant in all but one case).⁴⁴ Since higher computer usage and a more educated population are likely to be associated with higher income levels (we do not have income data), our findings suggest, as one might expect, that richer households were less price sensitive both before and after the boycott has started. Second, the elasticities of brands B and C increase (in absolute value) after the boycott (the after - before difference is always negative and significant for brands B and C). In case of brand A, the after - before difference is also negative, but it is significant only in one case out of four. Third, there is some evidence that the (absolute) increase in price elasticity after the boycott was larger in locations with higher computer usage and with more educated population: the difference-in-difference estimate is negative for brands B and C (though is not significant for brand B in one of the two cases). This evidence suggests that locations which are more exposed to social media (i.e., above the median) became more price sensitive after the boycott. For brand A, the difference-in difference estimate is

⁴⁴In the median location, 17% of the 15+ population has a bachelor's degree, and 78% of the households use a PC.

not significant, so it seems that exposure to social media did not lead to a differential effect of the boycott on the demand for brand A.

7 Firms' Incentives

Firms made rapid price concessions once the boycott started. There are three competing hypotheses for this swift reaction. First, firms responded optimally to the higher elasticities. Second, firms were concerned that the boycott might spill over to other product categories and hence reacted (at least partially) to the boycotters' demands. Third, firms may have feared public backlash in the form of government intervention in the market (e.g., re-regulation of prices or elimination of import barriers), of actions taken by the IAA, or, possibly, in the form of class action lawsuits.

In this section we examine these hypotheses. We start with the potential concern of firms that the boycott will spread to other product categories.⁴⁵ To this end we examine the evolution of the sales and prices of white cheese around the time of the boycott. White cheese is a close substitute for cottage cheese and is also produced by the same three dairies. Hence, if consumers were targeting other products besides cottage cheese, we may also see a decline in the sales of white cheese. Figure 11 shows the total weekly quantity of white cheese sales.

The spike in demand just before the boycott is due to the Shavuot holiday which is traditionally a peak demand for dairy products, and for white cheese in particular. Apart from this spike, we do not observe major unusual patterns in the quantities of white cheese sold around the start of the boycott. If anything, there is a small increase in quantity sold, just after the boycott began.

As for the price of white cheese, Figure 12 shows the distribution of white cheese prices around the time of the boycott by brand which we compute using equation (1).

⁴⁵Indeed, according to the press, the overall sales of Tnuva in some retail chains have dropped by 7% – 8% after the boycott started (see <http://www.globes.co.il/news/article.aspx?did=1000682092>). Moreover, press reports in December 2011 reveal that many firms (manufacturers and retailers) have decided to keep a low profile due to the negative sentiment of the public: “We feel that the public today hates all firms”, a retail chain executive was quoted (see <http://www.themarket.com/advertising/1.1599266>).

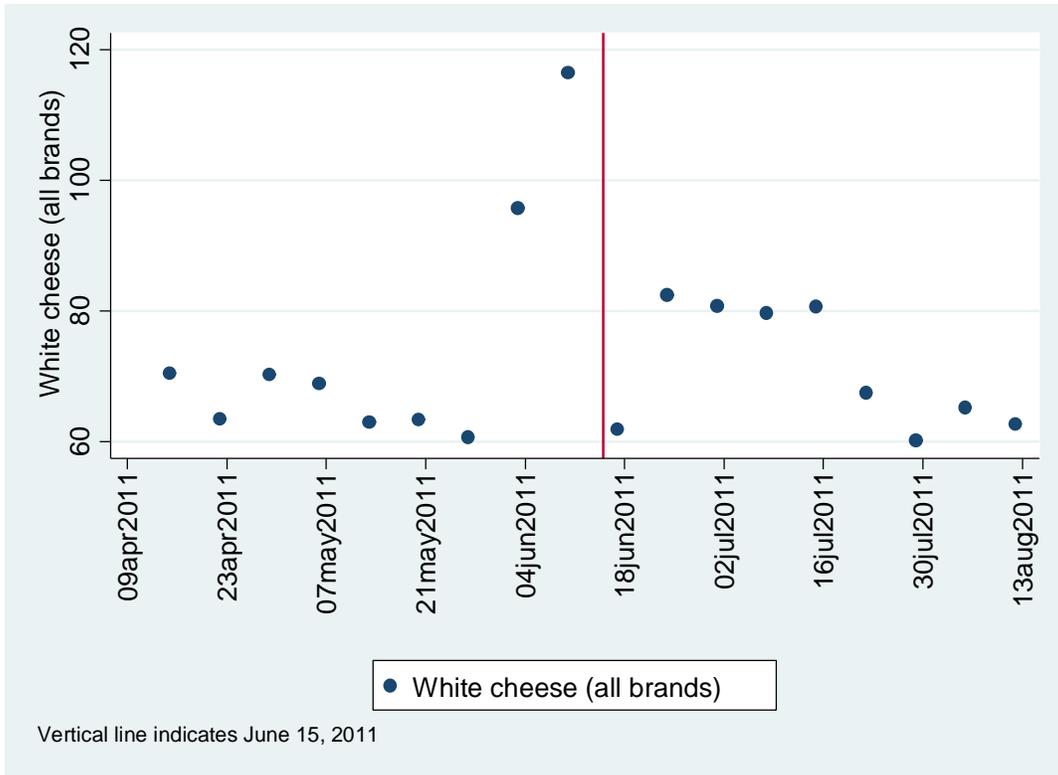


Figure 11: Weekly total quantity of white cheese sold (in tons)

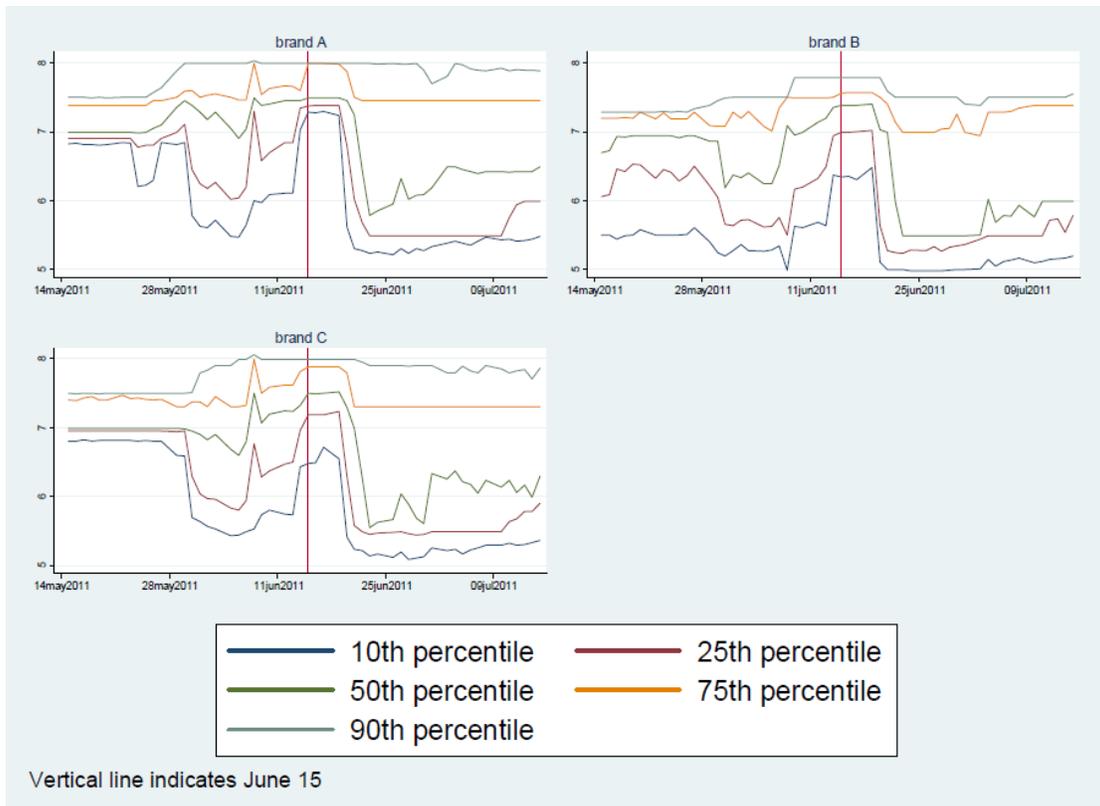


Figure 12: Distribution of white cheese prices by brand around the boycott period

White cheese prices increased for a few days after the start of the boycott, perhaps in response to substitution of consumers away from cottage cheese. The price increases are more pronounced at the lower percentiles of the price distribution. Prices then drop around the time new groups were formed in Facebook, calling for the boycott of additional dairy products, specifically demanding that the price of white cheese drop to around 5 NIS as well. It appears that firms did not initially fear a spillover (they even raised white cheese prices, as sales increased around June 15), but once the boycotters started expanding their demands to other dairy products, we observe price declines in the white cheese category as well.

Next we turn to the possibility that firms reacted to the higher elasticities and lowered prices accordingly. Having estimated demand elasticities before and after the boycott, we can follow the Industrial Organization tradition, and use the price elasticities, together with first order conditions at the product level, to impute markups, before and after the boycott. This exercise allows us to assess how much of the observed price decline is explained by the change in preferences (elasticities). The proportion of the price decline that cannot be attributed to changes in elasticities can – as a residual – be interpreted as firms’ reactions to the concern about public backlash.

Rearranging the first-order conditions for profit maximization with respect to the pre-boycott price of brand b , p_b , we obtain the standard inverse elasticity rule $\frac{p_b - c_b}{p_b} = \frac{1}{\eta_b}$, or $p_b = \frac{\eta_b c_b}{\eta_b - 1}$, where c_b represents marginal cost of brand b , and η_b is the pre-boycott own price elasticity.⁴⁶ Using this rule, we can now back out marginal costs for each firm assuming, realistically, that it did not change following the boycott, and solve for the expected price increase associated with the changes in demand elasticities.

Specifically, the post-boycott price of brand b , p'_b , should be equal to

$$p'_b = \frac{\eta'_b c_b}{\eta'_b - 1} = \frac{\eta'_b}{\eta'_b - 1} \frac{(\eta_b - 1) p_b}{\eta_b},$$

where η'_b is the post-boycott own-price elasticity of demand of brand b .⁴⁷

⁴⁶We estimate constant elasticities demand system, so that elasticity of demand for each brand is independent of prices. We do not think this creates a problem for the following reasons. First, we estimate different elasticities before and after the boycott (prices were substantially higher before the boycott than after). Second, to check the robustness of our findings we also estimated a richer demand system, with the added terms $\delta_{ij} \log p_i \log p_j + \delta_{ik} \log p_i \log p_k$ (the modified demand system can be interpreted as a flexible polynomial in logs). The resulting elasticity of demand is then given by $\beta_i - \delta_{ij} \log p_i \log p_j - \delta_{ik} \log p_i \log p_k$. Several of the interactions and cross prices elasticity estimates were not statistically significant, due to high collinearity. However, using the point estimates to compute elasticities leads to very similar elasticities (less than 1% away).

⁴⁷ p'_b might be a conservative estimate of the post-boycott price since we assume that prices were optimal before the boycott. But if, due to concerns about public backlash, brand b was already marked down by 100α percent below the optimal price as implied by the elasticity of demand before the boycott then the estimate of marginal cost should be $c_b = \frac{p_b(\eta_b - 1)}{\alpha \eta_b}$. Since $\alpha < 1$, this marginal cost estimate is higher than the one that we are using and hence we obtain a conservative estimate for p'_b . The implication is that our estimates of the concern for public backlash after the boycott are, if anything, biased downward.

The exercise is trivial for firm A since we did not find a significant change in A 's own price elasticity. Thus, it appears that the price decline of brand A was fully due to an attempt by the management to contain the potential repercussions of the boycott.

Noting from Table 2 that the pre- and post-boycott price elasticities of demand were $\eta_B = 3.632$ and $\eta'_B = 4.707$ for brand B , and $\eta_C = 4.3$ and $\eta'_C = 5.071$ for brand C , the post-boycott prices should have been 92% of the pre-boycott price for brand B and 95% of the pre-boycott price for brand C . Since the actual price of brands B and C came down 24%, a lot more than the 8% and 5% the first order conditions imply, we can conclude that the boycott directly influenced the pricing of brands B and C above and beyond what was implied by the higher own-price elasticities of demand.

The finding that prices were set substantially below the ones implied by the elasticities of demand highlights the fact that the tradition of using first order conditions to impute markups may miss important considerations about the business environment, which are not reflected in the demand function. In our case, these missing considerations seems to have been the concern about public backlash in the form of a damage to firms' image, the possibility of government intervention in the market, and the potential for class action lawsuits. Interestingly, we mentioned in Section 2.1 that according to the press, the IAA raid on Tnuva's headquarters seized a McKinsey report advising Tnuva back in 2008 to raise prices by at least 15%, due to low elasticity of demand. In retrospect, it seems that this advice may have contributed to the public backlash. Thus, a message of this paper is that insofar as pricing decisions are made solely on the basis of demand elasticities, ignoring features of the business environment, not easily captured by first order conditions, may lead to undesirable outcomes.

8 Summary and conclusions

We study a consumer boycott organized through Facebook aimed at forcing manufacturers and retailers to lower prices in a concentrated market. We find that, on average, prices dropped virtually over night by about 24% (from around 7 NIS per container to about 5.5 NIS per container). The price decline was not uniform across stores and store formats. It was particularly large in the main supermarket chains, especially in the hard discount stores. Only after the main manufacturers announced a decrease in their wholesale prices, the retail price also fell in the small format stores, and remained at the new low level until the end of our sample period.

Demand declined by about 30% during the initial week of the boycott, relative to its predicted level had the boycott not occurred. The decline in demand was more pronounced in stores located in areas with more educated and less religious population and higher penetration of PC's, internet, and mobile phones, where exposure to social networks is likely to be high. Although demand gradually rebounded within 6-8 weeks, demand elasticities have nonetheless become much

larger than they were before the boycott. This increase is particularly large for cross-price elasticities which, on average, increased fivefold relative to their pre-boycott level. This increase in price elasticities can either be due to increased price awareness or to a permanent change in consumers' preferences. We find that the change in preference only explains part of the price decline. The rest can be attributed to firms' fear of the boycott spreading.

Overall, it appears that the consumer boycott was successful. Although the boycotters' demands to lower the price of cottage cheese to 5 NIS per container were never met in full, two years after the boycott, the price of cottage cheese remains relatively low: for example in April 2013, the average price of cottage cheese was 6.1 NIS, which is almost 13% below its pre-boycott level. This is particularly striking given that over the same period, the prices of many other dairy products have increased, some quite substantially.⁴⁸

⁴⁸For instance, in April 2013, the price of unsalted butter was 25% higher than its level in May 2011, the price of natural yogurt was 18% higher and the average prices of fresh milk and hard cheese were 8% higher than in May 2011. See The Center for Resaerch and Information, Israeli Knesset, (2013).

A Summary of main events

Summary of main events

Date	Event
May 31, 2011	News articles describing the surge in food prices in Israel begin to be published
June 7-9, 2011	Shavuot holiday (traditionally a peak demand for dairy products)
June 14, 2011	A Facebook event is created, calling for a boycott of cottage cheese, starting on July 1, 2011
June 14, 2011	Several supermarket chains announce special sales of cottage cheese and other dairy products
June 15, 2011	The number of users who join the Facebook event approaches 30,000 ⁴⁹
June 16, 2011	The leaders of the Facebook event announce that the boycott will start immediately and recommend buying cottage and white cheese only if their prices drop under 5 NIS ⁵⁰
June 17, 2011	The number of users who join the Facebook event passes 70,000 ⁵¹
June 24, 2011	Mrs. Zehavit Cohen, the chairperson of Tnuva's board, announces in a TV interview that Tnuva will not unilaterally lower the price of its cottage cheese Following the interview, three new groups who call for boycotting all of Tnuva's products were formed in Facebook Tnuva lowers the wholesale price of cottage cheese to 4.55 NIS; soon after, Strauss and Tara follow suit ⁵²
June 27, 2011	The government appoints the Kedmi committee to review competition and prices in food and consumption markets in Israel
June 30, 2011	The number of users who join the Facebook event surpasses 105,000 ⁵³
July 14, 2011	The "tents protest" starts on Rothschild Boulevard in Tel Aviv
July 17, 2011	The Kedmi committee recommends reforms in the dairy market
July 30, 2011	Mass rallies in major cities across Israel to protest the rising cost of living and demanding social justice
Sept. 3, 2011	Around 300,000 people demonstrate in Tel Aviv against the rising cost of living and demanding social justice. This demonstration marks the peak of the social protest
Early Sept., 2011	12 student's associations announce their intention to boycott Tnuva until it lowers its prices ⁵⁴
Sept. 25, 2011	The Israeli Antitrust Authority raids Tnuva's central office as part of an open investigation of the extent of competition in the dairy industry
Oct. 2, 2011	Mrs. Zehavit Cohen announces its resignation as the chairperson of Tnuva's board. Tnuva announces that it will cut the prices of all its products by 15%.

⁴⁹See www.ynet.co.il/articles/0,7340,L-4082323,00.html and <http://www.themarket.com/markets/1.656978>

B Data Appendix

In this Appendix we describe the process by which the initial working sample was generated. We start with 22,788,084 observations, where each observation records the daily total volume of transactions recorded by the cash register on a specific item, in a specific store, in a specific day. An item is identified by its unique barcode.

1. **Negative values.** 77 observations had negative values for 3 key variables (number of items sold, total weight sold, total number of containers sold). The values of these variables were set to missing.
2. **Duplicates.** 955 observations had one additional duplicate observation and 290 additional observations had three additional duplicate observations. The 1,825 additional “copies” were deleted and only one original observation was kept.
3. **Repeated observations.** Each observation should represent the total transactions in each store per day and item. That is, all the transactions for a given item are aggregated to a daily total. However, 105 (store, date, item) observations appear more than once. We keep these repeated observations (but not exact duplicates since the revenue and weight may vary) in the sample.
4. **Small revenue.** We delete 1,859 observations with total daily revenue of less than 1 NIS.

After these changes were made to the original sample we were left with 22,784,400 observations.

C Computation of the BI index

We compute the observed and predicted quantities for each brand separately and then add them up to get the (aggregate) *BI* index. We illustrate with brand *A*.

First, q_t is the daily quantity sold of brand A cottage cheese observed in the data. Second, $\hat{q}_0(p_t)$ is the predicted quantity sold of brand A under the pre-boycott demand at post-boycott prices p_t . This predicted quantity is computed in two steps. Denote by $\hat{q}_0(p)$ the fitted (predicted)

⁵⁰See <http://www.themarket.com/markets/1.656978> and <http://www.ynet.co.il/articles/0,7340,L-4083268,00.html>

⁵¹See www.ynet.co.il/articles/0,7340,L-4082323,00.html and <http://www.themarket.com/markets/1.656978>

⁵²See <http://www.haaretz.co.il/misc/1.1178816>

⁵³See <http://www.haaretz.co.il/misc/1.1178816>

⁵⁴See <http://www.calcalist.co.il/local/articles/0,7340,L-3530639,00.html> and <http://news.walla.co.il/?w=/3/1858515>

quantity demanded estimated using the pre-boycott estimates. The expected increase in quantity attributed to the observed price decline (a move along the demand curve) is given by $\widehat{q}_0(p_t) - \widehat{q}_0(p_{t_0})$, where p_{t_0} are prices at a pre-boycott time t_0 . Thus, predicted sales are:

$$\widehat{q}_0(p_t) = q_{t_0} + [\widehat{q}_0(p_t) - \widehat{q}_0(p_{t_0})],$$

where q_{t_0} is the observed average quantity sold at the pre-boycott time t_0 .

We use the demand function to estimate changes in quantity, rather than its level, because in this way we do not need to use the numerous estimated fixed effects, and we rely on observed quantities until the start of the boycott, making the predicted quantity at post-boycott prices more reliable.

We use the estimated parameters of the demand function appearing in the first three columns in Table 2 to compute the expected change in demand between the initial period t_0 and t , $\widehat{q}_0(p_t) - \widehat{q}_0(p_{t_0})$,

$$\widehat{\ln q_A}(p_t) - \widehat{\ln q_A}(p_{t_0}) = \widehat{\beta}_A (\log p_{At} - \log p_{At_0}) + \widehat{\gamma}_B (\log p_{Bt} - \log p_{Bt_0}) + \widehat{\gamma}_C (\log p_{Ct} - \log p_{Ct_0}),$$

where $\widehat{\beta}_A$, $\widehat{\gamma}_B$ and $\widehat{\gamma}_C$ are, respectively, the own and cross-price elasticities from the first column in Table 2 before the boycott started, and $\log p_{At_0}$, $\log p_{Bt_0}$, $\log p_{Ct_0}$ are prices in the pre-boycott period, being set equal to the mean price during June 9 – June 13, 2011.

We then have, for brand A ,

$$\widehat{q}_0(p_t) = q_{t_0} + e^{\widehat{\ln q_A}(p_t) - \widehat{\ln q_A}(p_{t_0})},$$

and similarly for the other brands.

We then add up the observed and predicted quantities over the three brands and compute the aggregate BI index. The daily variation in quantity sold during the week is also reflected in the BI index. We therefore remove “day-of-the-week” effects by using the residuals from a regression of the BI index on day-of-the-week fixed effects. Furthermore, for ease of exposition, in Figure 9 we show a normalized BI index obtained by subtracting its value on June 14, 2011.

D Interactions with additional demographics

Table D1 shows the effects of internet subscription, number of mobile phones, religiosity, and share of older population in each locality on the own price elasticity of demand for cottage cheese. The results are quite similar to those reported in Table 4 for the other two demographic variables.

Table D1: The effect of demographics on cottage cheese own price elasticity

	% of households with Internet subscription			Average number of mobile phones per household		
	Own price elasticity A			Own price elasticity A		
	Before boycott	After boycott	After-Before	Before boycott	After boycott	After-Before
Below median	-1.84***	-1.887***	-0.047	-1.587***	-1.849***	-0.262
Above median	-1.218***	-1.448***	-0.23	-1.536***	-1.52***	0.016
Above-Below	0.622***	0.439**	0.183	0.051	0.329	0.278
	Own price elasticity B			Own price elasticity B		
Below median	-4.083***	-4.976***	-0.893***	-3.641***	-4.942***	-1.301***
Above median	-3.171***	-4.393***	-1.222***	-3.609***	-4.437***	-0.828***
Above-Below	0.912***	0.583***	-0.329*	0.032	0.505***	0.473*
	Own price elasticity C			Own price elasticity C		
Below median	-4.825***	-5.342***	-0.517**	-4.299***	-5.197***	-0.898***
Above median	-3.65***	-4.792***	-1.142***	-4.285***	-4.927***	-0.642***
Above-Below	1.175***	0.55***	-0.625***	0.014	0.27*	0.256
	% of Jewish men aged 15 and over who study in a “yeshiva”			% of those aged 65+		
	Own price elasticity A			Own price elasticity A		
	Before boycott	After boycott	After-Before	Before boycott	After boycott	After-Before
Below median	-1.386***	-1.763***	-0.377*	-1.644***	-1.63***	-0.014
Above median	-1.831***	-1.67***	0.161	-1.506***	-1.795***	-0.289
Above-Below	0.445***	0.093	0.583**	0.138	-0.165	-0.303
	Own price elasticity B			Own price elasticity B		
Below median	-3.401***	-4.791***	-1.39***	-3.86***	-4.759***	-0.899***
Above median	-3.893***	-4.789***	-0.896***	-3.42***	-4.673***	-1.253***
Above-Below	-0.492***	0.002	0.494***	0.44***	0.086	-0.354*
	Own price elasticity C			Own price elasticity C		
Below median	-4.109***	-4.893***	-0.784***	-4.395***	-5.183***	-0.788***
Above median	-4.468***	-5.351***	-0.881***	-4.206***	-4.982***	-0.776***
Above-Below	0.359*	-0.456***	-0.097	0.189	0.201	0.012

Standard errors clustered at the store level. * p<0.10; ** p<0.05; *** p<0.01

Tables D2–D4 present the estimated coefficients of the demand functions using interactions between the price regressors (and constant) and a full set of Above/Below (the median for each demographic variables) and After/Before (the boycott) indicators.

Table D2: Own and cross cottage cheese price elasticities and demographics						
Brand	Dependent Var: log quantity					
	% households using a PC			% with first academic degree		
	(1) A	(2) B	(3) C	(4) A	(5) B	(6) C
Constant (Before and Below)	12.508***	12.793***	13.483***	11.443***	11.784***	12.388***
Constant \times Above	-3.551***	-3.991***	-4.721***	-2.5***	-3.119***	-3.553***
Constant \times After	-2.328***	-1.543***	-1.153***	-0.476*	-2.381***	-1.581***
Constant \times Above \times After	1.056***	0.066	0.825*	-0.882***	1.308***	1.353***
Log Price A (Before and Below)	-1.855***	0.266**	-0.042	-1.928***	0.152	-0.072
Log Price A \times Above	0.681***	0.571***	0.457*	0.717***	0.720***	0.430*
Log Price A \times After	-0.068	1.927***	1.799***	-0.144	2.222***	2.091***
Log Price A \times Above \times After	-0.134	0.816**	0.397	0.089	-1.278***	-0.815*
Log Price B (Before and Below)	0.128***	-4.067***	0.07	0.105**	-4.129***	0.088
Log Price B \times Above	-0.029	0.923***	0.086	0.022	1.017***	0.099
Log Price B \times After	0.215**	-1.061***	0.541***	0.269**	-0.918***	0.513***
Log Price B \times Above \times After	-0.153	-0.041	-0.147	-0.248*	-0.415*	-0.149
Log Price C (Before and Below)	0.033	0.274***	-4.886***	0.023	0.251***	-4.887***
Log Price C \times Above	0.014	-0.075	1.433***	0.047	0.015	1.384***
Log Price C \times After	0.398***	0.492***	-0.457*	0.408***	0.587***	-0.532*
Log Price C \times Above \times After	0.066	0.201	-0.874***	0.07	0.037	-0.777***
Nobs	426,881	426,881	426,881	409,972	409,972	409,972
R squared	0.88	0.74	0.72	0.88	0.74	0.72

Daily price data are used. The sample period is from January 1, 2010 until April 30, 2012, excluding the boycott period (May 15, 2011–October 2, 2011) and the period corresponding to a strike at a major manufacturer (March 18, 2012–April 3, 2012). The coefficients for the interactions with the “After” indicator represent the additional effect after the boycott, while the coefficients for the interaction with the “Above” indicator indicate the additional effect for locations with above the median value of the corresponding demographic variable. All regressions include “day of the week” and store effects whose values are allowed

to change after the boycott, as well as a set of week dummies to capture weekly aggregate effects over the sample period. Standard errors clustered at the store level

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table D3: Own and cross cottage cheese price elasticities and demographics

Brand	Dependent Var: log quantity					
	% of households with Internet subscription			Average number of mobile phones per household		
	(1)	(2)	(3)	(4)	(5)	(6)
	A	B	C	A	B	C
Constant (Before and Below)	9.604***	10.158***	10.538***	12.057***	11.597***	12.821***
Constant × Above	2.901***	1.871***	2.210***	-2.682***	-2.051***	-2.943***
Constant × After	-1.515***	-2.313***	-1.652***	-0.755***	-0.883***	-0.915**
Constant × Above × After	1.059***	1.668***	1.161**	-0.829***	-1.508***	-0.406
Log Price A (Before and Below)	-1.840***	0.334**	0.075	-1.587***	0.514***	0.133
Log Price A × Above	0.622***	0.418***	0.199	0.051	-0.007	0.0435
Log Price A × After	-0.047	1.795***	1.727***	-0.262	1.316***	1.628***
Log Price A × Above × After	-0.183	0.55	-0.3	0.278	0.476	0
Log Price B (Before and Below)	0.136***	-4.083***	0.087	0.128***	-3.641***	0.107
Log Price B × Above	-0.045	0.912***	0.042	-0.036	0.032	0.013
Log Price B × After	0.193*	-0.893***	0.517***	0.163*	-1.301***	0.490***
Log Price B × Above × After	-0.098	-0.329	-0.092	-0.019	0.473*	-0.033
Log Price C (Before and Below)	0.03	0.279***	-4.825***	0.066	0.233***	-4.299***
Log Price C × Above	0.012	-0.091	1.175***	-0.068	0.013	0.014
Log Price C × After	0.389***	0.465***	-0.517*	0.393***	0.515***	-0.898***
Log Price C × Above × After	0.087	0.272*	-0.625**	0.092	0.143	0.256
Nobs	426,881	426,881	426,881	426,881	426,881	426,881
R squared	0.88	0.74	0.72	0.88	0.74	0.72

See notes to Table D2

Table D4: Own and cross cottage cheese price elasticities and demographics

Brand	Dependent Var: log quantity					
	% of Jewish men aged 15 and over who study in a “yeshiva”			% of those aged 65+		
	(1)	(2)	(3)	(4)	(5)	(6)
	A	B	C	A	B	C
Constant (Before and Below)	10.885***	10.774***	11.398***	9.440***	9.861***	9.721***
Constant × Above	-1.243***	-0.832***	-1.277***	2.731***	2.053***	3.153***
Constant × After	-0.204	-1.440***	-0.890*	-1.586***	-2.051***	-1.184***
Constant × Above × After	-1.490***	-0.949**	-0.448	-0.482*	0.913**	0.619
Log Price A (Before and Below)	-1.386***	0.557***	0.101	-1.644***	0.437***	0.422**
Log Price A × Above	-0.445**	-0.212	-0.048	0.138	0.142	-0.541**
Log Price A × After	-0.377	1.576***	1.783***	0.014	1.550***	1.561***
Log Price A × Above × After	-0.538*	0.335	0.052	-0.303	0.059	0.094
Log Price B (Before and Below)	0.106***	-3.401***	0.165**	0.121***	-3.860***	0.13
Log Price B × Above	0.007	-0.492***	-0.046	-0.024	0.440***	-0.025
Log Price B × After	0.174*	-1.390***	0.417***	0.107	-0.899***	0.550***
Log Price B × Above × After	-0.035	0.494**	0.047	0.103	-0.354	-0.134
Log Price C (Before and Below)	0.053	0.182***	-4.109***	0.011	0.249***	-4.395***
Log Price C × Above	-0.055	0.112	-0.359	0.047	-0.011	0.189
Log Price C × After	0.499***	0.730***	-0.784***	0.515***	0.487***	-0.788***
Log Price C × Above × After	-0.071	-0.233	-0.097	-0.144	0.174	0.012
Nobs	399,753	399,753	399,753	428,359	428,359	428,359
R squared	0.87	0.74	0.72	0.88	0.74	0.72

See notes to Table D2

E An IV estimator

The IV estimation is based on the following procedure. We use information on the retail chain to which store s belongs and compute, for each brand, the (quantity-weighted) mean cottage price in stores that belong to other retail chains and are located in other cities (IV1), the (quantity-weighted) mean price in stores that belong to other retail chains but are located in the same city (IV2), and the (quantity-weighted) mean price among all stores in other cities (IV3).⁵⁵ The assumption is that these mean prices are not related to store (or chain)-specific unobserved demand factors in ε_{jst} . We then estimate a first-stage regression, one for each brand, where a store's price is regressed on each of these mean prices for the three brands, as well as on all the fixed effects used in the estimation presented in Table 2. In addition, we interacted the mean price with store dummies to generate variation in the predicted prices across stores in the same city and retail chain. In a second-stage we estimate (2) using the store-specific predicted prices from the first-stage instead of the observed prices.

Table E1 presents the results. Columns (1)-(3) show IV estimates based on the mean cottage price in stores that belong to other retail chains and are located in other cities (IV1), while columns (4)-(6) show IV estimates based on the mean price in stores that belong to other retail but are located in the same city (IV2). IV estimates based on the mean price among all stores in other cities are similar to IV1 and therefore not reported. The reported standard errors reported are incorrect because they do not account for the fact that we use a predicted price (i.e., we use second-stage residuals instead of the true residuals).

⁵⁵Our data do not provide information on the retail chain to which a store belongs. Using public information available in the Internet we managed to identify the retail chain to which 659 out the 1127 stores belong. There are 44 different retail chains, though the two largest chains own 17 percent of all stores in our data. We suspect that most of the remaining stores do not belong to a retail chain but we cannot be completely sure.

Table E1: IV estimates of cottage cheese own and cross price elasticities

Dependent Variable: log quantity						
Brand	IV1			IV2		
	(1)	(2)	(3)	(4)	(5)	(6)
	A	B	C	A	B	C
Constant	12.800 ^{***}	10.778 ^{***}	15.484 ^{***}	11.332 ^{***}	9.024 ^{***}	14.080 ^{***}
Constant × after	-2.409 ^{***}	-2.404 ^{***}	-6.908 ^{***}	-0.942 ^{**}	-0.473	-5.749 ^{***}
Log Price A	-2.976 ^{***}	-0.103	-2.157 ^{***}	-1.785 ^{***}	1.594 ^{***}	-0.807
Log Price A × after	0.453	2.822 ^{***}	5.370 ^{***}	-0.243	1.389 ^{**}	4.105 ^{***}
Log Price B	0.078	-3.546 ^{***}	0.116	0.349 ^{***}	-3.579 ^{***}	0.091
Log Price B × after	-0.080	-1.000 ^{***}	-0.340	-0.127	-1.363 ^{***}	0.143
Log Price C	-0.176	-0.236 [*]	-5.797 ^{***}	-0.079	-0.042	-5.617 ^{***}
Log Price C × after	1.123 ^{***}	1.067 ^{***}	1.934 ^{***}	0.387	0.806 ^{**}	1.483 ^{***}
Number of observations	356,090	333,371	332,301	308,542	298,625	299,319

Daily price data are used. The sample period is from January 1, 2010 until April 30, 2012, excluding the boycott period (May 15, 2011-October 2, 2011) and the period corresponding to a strike at a major manufacturer (March 18, 2012-April 3, 2012). The coefficients for the interactions with the “after” indicator represent the additional effect after the boycott. All regressions include “day of the week” and store effects whose values are allowed to change after the boycott, as well as a set of week dummies to capture weekly aggregate effects over the sample period. Standard errors clustered at the store level.

*p<0.10; ** p<0.05; *** p<0.01

The estimated own price elasticities are qualitatively the same as, and of similar order of magnitude to, the OLS-fixed effect estimates in Table 2, except for brand C where the elasticity declines (in absolute value) after the boycott. Cross price elasticities are sometimes negative. The estimates are sensitive to the choice of IV.

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