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## **The Importance of Consumer Trust: Evidence from Infant Formula in Israel**

by

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# The Importance of Consumer Trust: Evidence from Infant Formula in Israel\*

By

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and

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## Abstract

In this study we provide empirical evidence on the effect of consumer trust on consumption. We use the Remedica event—a tragic event in which a change in the composition of baby formula has caused the death of several infants and a permanent damage for others—to examine the market-wide effect of consumer trust on consumption of baby-food. Our main result is that following the Remedica event, the share of households with infants aged one year or less who consume baby-food dropped by roughly ten percent. We interpret this result as evidence of the effect of a sharp loss of consumer-trust in the entire baby-food market.

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# 1 Introduction

Consumers buy goods that entail potential risks to their health and well-being. To name a few, food may cause serious damages to health, home appliances may malfunction and cause injuries and automobile defects may expose passengers to injurious crashes. Despite these risks, consumers rarely take account of these potential risks. While in many markets, goods are heavily regulated and while the legal system subjects firms to legal liability if they are negligent, a degree of trust in the market and the regulatory authorities is required. In fact, it is hard to imagine how markets for food and other consumption goods in which consumers take into account only price and (occasionally) information on the label, would operate without a considerable degree of consumer trust.

Very little is known, however, about the importance of consumer trust and how it affects consumption and other economic outcomes. One reason for the dearth of evidence is that sharp variations in trust are rare and it is hard to empirically identify its importance holding other things equal. In this study we use a rare and tragic event that led to a sharp loss of consumer trust in the infant formula market to quantify the importance of this phenomenon. In November 2003, the German company Humana, which was marketed in Israel under the label Remedias, made a change in its soy based formula for infants aged 0-12 months. The company stopped adding thiamine to the formula, an essential vitamin that has detrimental neurological effects if not present in the infants diet. This change has caused the death of several infants and a permanent damage for others.

Following these tragic events (hereinafter “the Remedias event”), Remedias sales fell effectively to zero and short after, the company was closed (although the German com-

pany was not). Additionally, in the judicial system, both criminal and civil processes were held. In the criminal process Remedias chief technology officer was convicted of wrongful death (and was not yet sentenced). In the civil process, the company and the victims families reached a settlement.

Why did Remedias disappear? Following the Remedias event, consumers, specifically, parents to young infants stopped buying the Remedias formula. In this study we examine whether this tragic event had additional effects beyond the termination of Remedias. Namely, did it disrupt the trust of consumers in the infant formula? we examine here if following the Remedias event, households with very young infants substitute away from formula to its only available substitute for infants in that age - nursing.<sup>1</sup> If one is willing to assume that other brands of baby formula may serve as excellent substitutes to the Remedias formula, a country wide decrease in the consumption of baby formula may be interpreted as a sign of loss of consumer trust in the baby formula market. This is the premise of the empirical analysis that follows.

Empirically, we quantify the effect of the Remedias event by estimating the impact of this event on the country-wide consumption of baby-food. We use data from the Household Expenditure Survey and we take a standard DD approach. We focus attention to families with children ages less than one year in a relatively narrow window of 8 years around the Remedias event. We analyze the extensive margin behavior to capture the decision between nursing and using formula as the basis of the baby's diet. We compare the change of consumption of baby food after the Remedias event to the change in consumption of a large variety of basic consumption goods. our main finding is that in the extensive margin, after the Remedias event the consumption of baby food dropped by roughly seven percentage points. Given that before the Remedias event roughly seventy percents of the households in our sample bought baby food, these

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<sup>1</sup>In fact, unfortunately data on nursing is unavailable, we can only examine consumption of baby formula

estimates reflect a decrease of ten percent in the consumption of baby food.

This study is related to the vast literature on credence goods (dating back at least to Nelson (1970) and Darby and Karni (1973)) because at the heart of this issue there is information about the goods that is expensive to acquire (see Dulleck and Kerschbamer (2006) for a recent review). Smed et al. (2013) is one example from this literature that examines the impact of trust an organic label on its consumption using panel data of actual consumption and survey responses, showing that increasing the trust in an organic label or documenting its positive effect are effective ways to increase its consumption. Furthermore, this study is related to a huge and growing literature on consumer trust in online commerce.

Despite the presumable importance of consumer trust (or the cost of losing it), very little empirical evidence on this issue exists. Freedman et al. (2012) analyze a large increase in children product recalls in 2007 and find that for manufacturers that had recalls, unit sales of the types of toys involved in the recall fell relative to their sales of toys in other categories, yet, with no spillover effect to products in other categories. Ferrer et al. (2016) examine how the mad cow disease affected the composition of the food basket and the demand for fresh meat (see also Schlenker and Villas-Boas (2009)).<sup>2</sup>

To our knowledge this study is the first to show how a negligent failure in one company can have a dramatic and persistent market-wide impact. Such market wide responses may entail policy implications as they illustrate that firms are not held

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<sup>2</sup>We note that Gossner et al. (2009) document the The Melamine Incident - an event in China that bears some resemblance to our project - where an increased incidence of kidney stones and renal failure among infants has been publicly reported in China from early September 2008 onward. The source of the illness was traced to the contamination of infant formula with melamine. It may be interesting to run a similar analysis in the Chinese case.

accountable, via the legal system, to the entire potential social damage of their negligent behavior.

The remainder of the paper is structured as follows. Section 2 provides description of the data; section 3 describes the empirical approach; section 4 reports evidence on the impact of the Remedial tragedy on consumption and section 5 concludes.

## 2 Data

The study uses data from Israel's household expenditure survey in the period 1997-2007. Particularly, it uses the "diary" data. As part of the survey households are requested to collect, in a period of two weeks, all the receipts from their purchases. Based on the receipts households fill a diary, recording all their expenditures during that period by categories. Thus, these data contain a detailed record of the households expenditures in a two week period, by good category. For example: how much a household spent on "diapers" or "baby food" during the two-week sampling period.

Table 2, summarizes the characteristics of households in our sample, namely those with at least one infant aged less than a year. As the table show, there are roughly 1,500 household in the pre- and post-periods. As the table shows, households in the pre- and post-periods are quite similar in the number of children, the level of schooling of the mother and father, their expenditures and their socio-economic status.

Figure 1 depicts the annual shares of households in the sample who consume baby food as well as several other selected basic consumption goods. As the figure illustrates, in the pre-period, roughly seventy percent of households consumed baby food. in the

post-period, this rate decreases to about sixty percent. the share of households who buy other basic goods like diapers or milk appear to remain stable over the sample period.

### 3 Empirical Approach

We focus attention to households who have at least one infant aged less than one year. We study the impact of the Remedía event on the consumption of baby food by examining the change in utilization of baby food, the treatment group, relative to the consumption of various other consumption goods such as diapers and milk, the “comparison” groups. We implement the analysis using a standard differences-in-differences methodology. In the basic specification we estimate the model:

$$(1) \quad y_{it} = \alpha + \beta_1 Event + \beta_2 treat + \beta_3 EventXtreat + \epsilon_{it}$$

where  $y_{it}$  is a measure of consumption. Specifically we use an indicator for buying baby food, i.e. a dummy variable that equals one if a household  $i$  in year  $t \in 1997, 2007$ , buys baby food.  $Event$  is a dummy variable for observations in the post Remedía event period, i.e.  $Event$  equals 1 if the consumption took place in the year 2004 or afterwards and 0 otherwise. The estimates of  $\beta_3$ , the coefficient of  $EventXtreat$ , capture the relative effect of the Remedía event on the outcome variable in the treatment group relative to the comparison group.

## 4 Results

Here we report the results of the empirical analysis by a graphical illustration and an analytical estimation. Figure 2 illustrates our main results. The figure depicts the share of households who buy baby food against the share of households who buy a variety of selected basic consumption goods, in log terms. As the figure illustrates, the impression from plotting the consumption of baby food against any of these products is that there is a drop in the consumption of baby food relative to any of these products.

In Table 2 we provide the empirical analysis. Consistent with the graphical impression in Figure 2, the estimates in the two panels of the table, each using a different group of basic consumption products,<sup>3</sup> show a drop of 8-10% in the consumption of baby food. The results are robust to the inclusion of year and product fixed effects as well as household characteristics. Given that in the pre remediation event period, 70% of households were buying baby food, these estimates reflect a drop of roughly 12%.

## 5 Conclusion

In this study we provide empirical evidence on the effect of the Remediation event on the market-wide consumption of baby-food. Our main result is that following the Remediation event, the share of households with infants aged one year or less who consume baby-food dropped by roughly ten percent.

We interpret this result as evidence of the effect of a sharp loss of consumer-trust

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<sup>3</sup>Group 1: all milk and egg products, Group 2: bread, meat, sugar, all fruit and vegetable.

in the entire baby-food market. These results illustrate the potential implications of the market-wide damage that a negligent behavior of a single firm may cause. In turn, these results may call for rethinking policies regulating the behavior of firms in various “sensitive” markets such as the market for baby formula.

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Table 1: Descriptive statistics

	Pre Remedia (1)	Post Remedia (2)	Diff (3)
Children under 18	2.862	2.839	0.022 (0.070)
Mother years of schooling	12.117	12.569	-0.452 (0.179)
Father years of schooling	11.295	11.571	-0.276 (0.253)
Family size	5.066	5.054	0.011 (0.084)
HH expenditure	1850.563	1846.336	4.227 (62.218)
Share development town	0.749	0.783	-0.035 (0.015)
Observations	1,511	1,512	

NOTE: This table provides descriptive statistics of the households in the pre- and post-Remedia period.

\* Significant at 5%.

\*\* Significant at 1%.

Table 2: The impact of the Remediation event on baby food consumption, DD Estimates, extensive margin

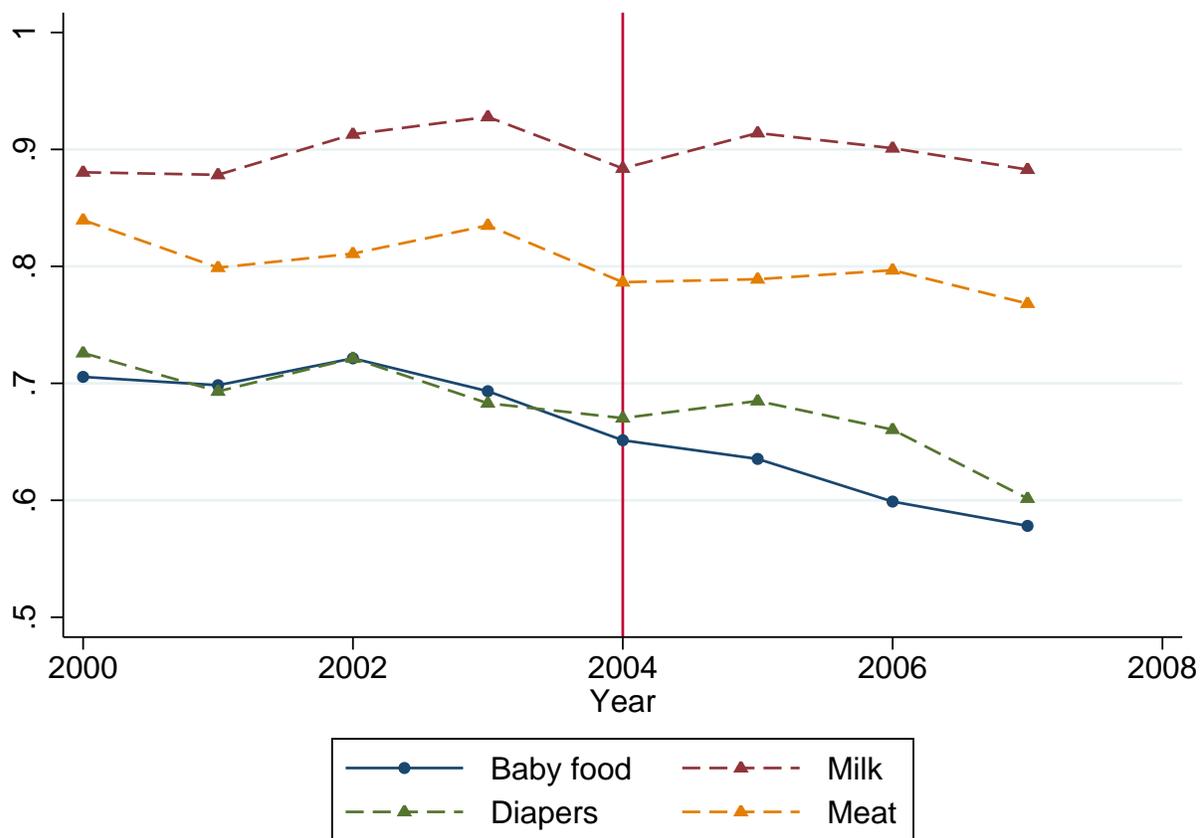
	Basic products 1			Basic products 2		
	(1)	(2)	(3)	(4)	(5)	(6)
Remediation event X Baby food	-0.077** (0.018)	-0.077** (0.015)	-0.077** (0.015)	-0.096** (0.014)	-0.096** (0.013)	-0.096** (0.013)
Year FEs	No	Yes	Yes	No	Yes	Yes
Product FEs	No	Yes	Yes	No	Yes	Yes
HH Characteristics	No	No	Yes	No	No	Yes
Observations	48,368	48,368	48,368	380,898	380,898	380,898

NOTE: This table summarizes the DD estimates corresponding to Equation 1 of baby food consumption. The two product categories are (1) all milk and egg products; (2) bread, meat, sugar, all fruit and vegetable.

\* Significant at 5%.

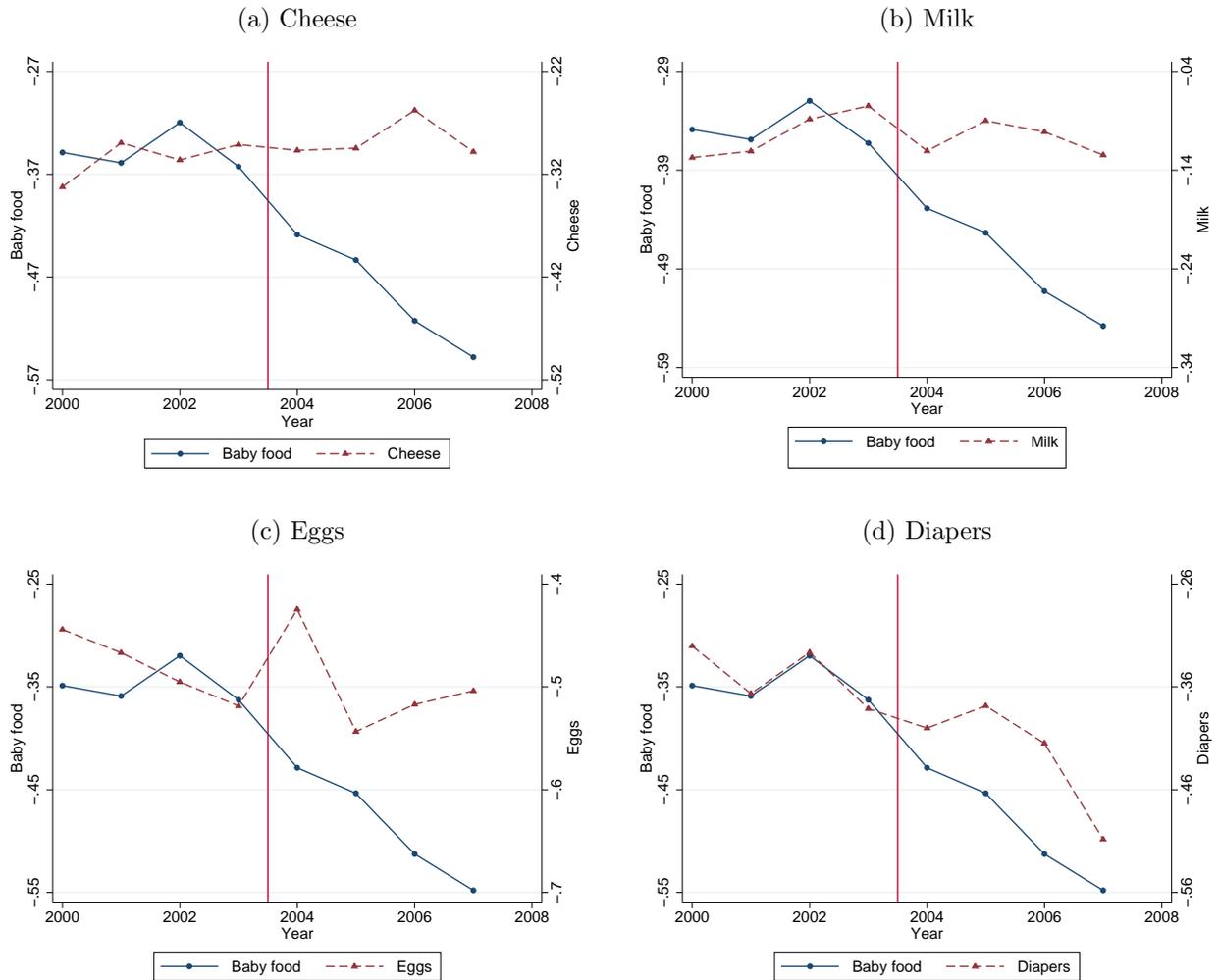
\*\* Significant at 1%.

Figure 1: Food consumption extensive margin selected items



Panels (a)-(d) of the figure plot the share of households that buy baby food, as well as various examples of basic food products, in the period 2000-2007.

Figure 2: Food consumption, extensive margin



This figure plots the share of households that buy baby food against various examples of basic food products, in log terms in the period 2000-2007.