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Are Nutrition Claims an Adequate Tool for Public Health?

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Abstract

Objectives. Whether the role of nutrition claim regulations are efficient is an important public health issue. We analyzed the extent to which nutrition claims reach at-risk consumers.

Methods. We used purchase data on breakfast foods in France. We first derived product substitutions from a demand system. Second, we simulated scenarios based on several combinations of prices and nutritional quality of light dairy products. The simulations aimed to assess the impact on nutrient content.

Results. Nutrition claims reach at-risk people, but their consumption is limited by prices and household income constraints. Under assumptions of price and quality modifications, we show that claim regulations that are not too stringent seem to favor a healthy diet more than very demanding claim constraints. This induces a large quality gap between standard and claimed products.

Conclusions. A smaller increase in the nutritional quality of the food can be more efficient for public health than a large improvement. A quality improvement should be achieved at a price level at which such products are affordable to a large share of the population.

Keywords: Nutrition claims, Food policy, Healthy diet

JEL codes: D12, D83

Acknowledgements: The authors would like to thank C. Boizot-Stanzai and A. Chaieb for their technical assistance.
Nutrition and health claims used in food markets are regulated in many countries.\textsuperscript{1} The goals of these regulations are to help consumers to make healthier food choices through improved access to nutrition information and to protect them from misleading health-related claims on packages. A “nutrition claim” is defined as any claim that states that a food has particular beneficial nutritional properties due to the caloric value or the nutrients it contains, or contains in reduced or increased proportions.

Regulations define what constitutes legitimate nutrition claims, taking the following considerations into account: claims about nutritional or physiological effects must be scientifically provable; in order to be advertised with nutrition and health claims, a food must have a healthy and balanced nutrition profile; a nutrition claim is only allowed if the nutrient content of the food differs substantially from the standard foods of the same category.

Given that they are implemented mainly for consumer protection, can the regulation of nutrition claims play an efficient role from a public health perspective? If so, under what conditions? This paper aims to answer this question by analyzing (i) to what extent products using nutrition claims “reach” at-risk consumers and contribute to the adoption of healthier diets and (ii) the potential for increasing the impact of claim regulations by improving the reach to at-risk consumers.

The role and effects of nutrition labels and claims have been studied in many papers in marketing and public policy research. A large share of the literature deals with the

\textsuperscript{1} For instance, in the US, information and nutrition labeling regulation has been implemented initially through the 1990 Nutritional Labeling and Education Act (NLEA), then the 1997 Food and Drug Administration Modernization Act (FDAMA), and the 2003 FDA Consumer Health Information for Better Nutrition Initiative. In Europe, general labelling provisions are contained in Directive 2000/13/EC of the European Parliament and more recently new rules regarding the nutrition and health claims made in the advertising, labelling and presentation of foodstuffs were defined in the so-called "Health Claims Regulation" (Directive 1924/2006/EC).
understanding and the use of nutritional labels and claims by consumers and their impacts on purchase decisions and diets \(^1\,^2\). The research suggests that consumers’ evaluations of a food item are better when a health claim is presented than when no claim is made. The results have recently been extended to foods marketed by restaurants \(^3\,^4\). However, several studies show that the impacts of labels and claims vary according to the consumers. People with higher educational backgrounds, women, and people who place high importance on nutrition and product safety are more likely to rely on nutrition labels and claims \(^5\,^6\). The impacts of factors like income, employment, and household size are less clear. Both positive and negative impacts have been documented in the literature \(^7\). Other research has stressed the negative effects of nutrition claims on consumers’ diets, either due to the risk of misleading \(^8\,^9\) or due to the fact that consumption of less nutritious foods may induce compensation through increased consumption of more caloric and less healthy products \(^10\,^11\).

As far as we know, the issue of nutrition claim product prices has not been thoroughly investigated. However, variants with health or nutrition claims are neither nutritionally equivalent or price equivalent to standard products. For example, in the US regulatory environment, “reduced and fewer calories” can be labeled if the product contains at least 25% fewer calories per reference amount than an appropriate reference food. In Europe, the same claim requires a 30% reduction compared to the standard product.

Thus, the regulations define what we can call the “minimum (nutritional) quality standard” (MQS) required to obtain the claim authorization. The MQS has a direct effect on market segmentation and price differentiation between standard products and variants with a nutrition claim. Indeed, the more stringent the MQS, the greater the R&D and production costs and the greater the retail price of the product with a nutrition claim. For instance, on the French market, the difference between the plain and the light variants of fresh dairy products varies
from 5 to 30%. From a public health perspective, the regulation of nutrition claims is based on the trade-off between imposing high nutritional quality, likely leading to higher retail prices, and imposing moderate nutritional quality, leading to lower retail prices.

In an attempt to analyze this trade-off, we use data on breakfast food purchases in France. We first analyze product substitutions between the major categories of breakfast foods, including variants with nutrition claims such as light products, according to different types of consumers. We determine the ability of products with nutrition claims to reach at-risk consumers (households with obese or overweight members) and how their consumption is influenced by the relative prices within this set of foods. In the second step, we use the own and cross-price elasticities calculated in the first step to simulate several combinations of price and nutrition claim quality for light dairy products. We assess their impacts on the nutrient content of purchases. Adopting a public health perspective, our analysis shows the conditions under which more or less stringent regulations could be more efficient than those currently in place.

DATA AND METHODS

Data on breakfast consumption in France

We consider a set of French breakfast products and examine the choices consumers face at this moment of consumption. The relevant set of foods strongly associated with each meal has been under study. According to this work, the main foods consumed in French breakfast are drinks, dairy products and cereals. The drinks set covers mainly hot drinks such as tea or coffee, or cold drinks such as water, soft drinks and juices. For the sake of homogeneous comparison of products, we exclude non-dairy drinks and deal with other, solid breakfast
foods instead. In this framework, dairy products include yogurts, dairy desserts, fresh cheese, and milk. Cereals products include breakfast cereals, bread, rolls, pastries, and biscuits. Similar products may be quite different on nutritional grounds. To capture the nutritional differentiation, we introduce two variants of some products: more caloric foods are considered less healthy (standard) and calorie-reduced with a health claim are assumed to be healthier (light). A product will be considered “light” when categorized as “reduced in fat”, or “without added fat”, or “low-fat”. In 2004, health claims on dairy products for breakfast defined healthier variants through fat content (yogurts, fresh cheese, and dairy desserts). The light variants represented between 5.1% (dairy desserts) to 35.3% (yogurts) of the annual quantities purchased.

We use data from the 2004 TNS Worldpanel French consumption panel. This dataset registers daily food purchases, and uses a scanner to provide information on quantities and expenditures for at-home consumption. Health and nutrition claims belong to the description of the product registered by a variable coded by TNS. In this study, a product will be considered “light” if it is registered as “reduced in fat”, or “without added fat”, or “low-fat”. In order to deal with product interactions, we distinguish between nine groups in the breakfast set. Among dairy products, we distinguish between five categories: milk, plain yogurts, flavored yogurts (both of the latter categories including fresh cheese), other dairy desserts, and light variants (of flavored yogurts and other dairy desserts). Among cereal-based products, we distinguish between four categories: breakfast cereals, bread, biscuits, pastries and rolls. Our sample includes 4,651 households.

**The demand model**

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2 Home production and away-from-home consumption are not registered by TNS. However, in France, the breakfast meal is very often consumed at home.
We estimated a demand system with the AI specification in order to obtain price and expenditure elasticities as well as cross-price effects. Since each household does not necessarily consume all products and since we observe null consumption, we modeled a censored demand system. Each demand equation is augmented by a selectivity regressor derived from a probit estimate, which was obtained in an earlier step. The additivity restriction was satisfied by a special procedure.

The dependent variables are the budgetary shares on the nine categories of products in the breakfast set. The explanatory variables are quality-adjusted prices, the characteristics (such as age and education) of the household’s main food purchaser, the composition of the household (proportion of members according to their age category), regions and urban location, and household income (expressed per unit of consumption using the Oxford/OCDE scale).

We used the body mass index (BMI) as the proxy for identifying the population of overweight or obese individuals, i.e., those at health risk. We built two measures, one based on the panelist’s BMI and the other based on higher BMI observed among the remaining household members, on the assumption that household purchases may differ in their power to reflect the degree of concern for health status depending on the member concerned. The sample is described in Table 1.

The simulations

Using the mean quantity bought with actual prices and the own and cross-price elasticities, we calculated the mean household’s purchase modification for each one of the nine product
categories, when one of the prices is modified. Using standard conversion tables giving the mean nutritional value of each product category, we transformed the quantities purchased by households into their nutrient equivalent. A food price modification can be induced by taxation or subsidizing policies. We do not examine demand side policies here. Instead, we consider supply scenarios in which the price modification is linked to a change in light variant characteristics, specifically the MQS, which defines the light claim for dairy products. For each scenario, we calculated the impacts on the quantities bought by the mean household, and then calculated the variation in the nutrient content of the breakfast set.

It is likely that some combinations of price modification and changes in nutritional characteristics are not feasible (due to the production costs induced by the change in characteristics). In order to test for consistent scenarios of price and quality modifications, it would be necessary to assess the production cost variations linked to such changes in nutritional quality. We do not consider this point here, limiting our analysis to identifying which combinations could improve the nutritional content of the breakfast foods purchased.

RESULTS

Expenditure, price elasticities and substitution between breakfast products

Expenditure elasticities (Table 2) are higher for breakfast cereals, milk and light dairies. We find that a 1% increase in the budget dedicated to the breakfast set induces a 1.4% increase in
the quantities purchased for breakfast cereals and milk, 1.2% for flavored yogurts and light variants, and only 0.6% for biscuits and 0.4% for dairy desserts.

Among dairy products, direct price elasticities (Table 2) show a higher sensitivity of light variants and flavored yogurts as well as cereal-based products, such as rolls and pastries and breakfast cereals. Following a 1% price increase, purchases of these products decrease by 1.6%, 1.5% and 1.1%, respectively. For the same price variation, milk purchases decrease by only 0.8%. Many cross-price elasticities are significant, which corroborates the relevance of the breakfast set identified here, and sheds light on interactions between products. Note that substitution relationships are predominant. We observe that dairy products and cereal-based products relate more strongly within their own category than within another. Plain and flavored yogurts, as well as dairy desserts and the light variants, are all substitutes. Any price increase induces a reallocation of purchases. In particular, an increase in the price of light variants induces increased demand for dairy desserts. We observe an isolated and weak complementarity between breakfast cereals and plain yogurts.

**Result 1.** Light variants purchases is the food category which benefits more from an increase in breakfast expenditure. Their consumption is very sensitive to prices. When their price increases, the light variants are strongly substituted by dairy products, whose caloric, fat and sugar content is greater.

Breakfast food purchases are determined by several socio-demographic characteristics. Most products reflect the presence of young members in the household: positive for dairy desserts, breakfast cereals and biscuits, negative for all kinds of yogurts and light variants. A male panelist is associated with a higher share of cereal-based products, dairy desserts, flavored
yogurts and milk. The budgetary share of plain yogurts and cereals increases with a higher level of education, while the budgetary share of rolls, pastries and biscuits decreases. This suggests an association with healthier choices. The impact of BMI varies according to the products considered. An obese or overweight panelist, as well as a high BMI of other members, negatively influences the budgetary shares of plain yogurts and breakfast cereals. In the case of the other members, being overweight induces a higher budgetary share dedicated to dairy desserts. Note that geographic and spatial variables determine purchases, except for light variants.

The probability of purchasing light variants is very sensitive to household characteristics\(^3\). Households with children have a lesser probability of purchasing light variants. An obese panelist increases the probability of purchasing light dairies, while there is no evidence of correlation with a high BMI among other members. The consumption of light variants is positively correlated with income, though this group is less often consumed by educated people. This result is also found in the US context\(^{18,6}\) concerning low-fat milk. Finally, an urban environment has a positive influence.

**Result 2.** From a public health point of view, the consumption of light variants is affected by two contradictory effects. On the one hand, they target at-risk people, as we have seen a positive correlation between the consumption of light variants and the presence of an obese member in the household. On the other hand, their consumption is clearly limited by the income constraints of the households, and by their prices.

\(^3\) Results available upon request.
Prices, claim product consumption and nutritional quality

Thus, economic issues limit the possible effects of products with health claims, even if the nutritional messages are well understood by at-risk people. This leads to the question of how relevant the MQS imposed on nutrition claim authorization actually are.

By imposing a large gap between the light and the plain forms, it is possible to increase the nutritional quality of the light products and reduce the caloric (or fat or sugar) intake by people who consume these variants. On the other hand, the increase in price, linked to a higher nutritional quality, can favor substitutions with less healthy products and induce higher caloric intake. What balance between quality and price can maximize the nutritional effects of health claims?

Answering this question requires determining the retail prices of firms according to various MQS levels. Prices depend on production costs and pricing strategies, which differ according to the markets and are out of the scope of this paper. However, it is possible to identify the quality and price scenarios that affect the nutrient intakes.

We calculated the variation in the caloric content of purchases of the mean household for various scenarios of price modifications and MQS of nutrition claims. In Table 3a, we examine claim regulations that are less stringent than the ones currently in place, assuming an increase of 5%, 10%, and 15% of the caloric value of the light dairy products. In Table 3b, we examine claim regulations that are more stringent than the ones currently in place, assuming a decrease of 5%, 10%, and 15% of the caloric value of the light dairy products. For each of these caloric value changes, we calculated the caloric content variation for the mean
household due to the modification of relative prices: a decrease from 5% to 15% in the cases of less stringent claim regulations and an increase from 5% to 15% in the cases of more stringent claim regulations.

We assess whether the nutritional impact when we observe a decrease in caloric content for the mean household is beneficial (the same analysis has been made for fat, saturated fat, and carbohydrates). We note negative values of the total caloric content (in bold in Table 3a and 3b) in various cases. For instance, a 5% increase in the caloric value of light dairy products, combined with a 15% decrease in their price, leads to a 30% increase in the caloric content directly linked to light dairy products (because their consumption increases), but also to a 1% decrease in the caloric content on the overall breakfast set (due to the substitution of less healthy foods by light dairy products).

A more stringent claim regulation, formalized here through a decrease in the caloric value of light variants, does not seem to improve the nutritional content of purchases. Indeed, such an effect is only observed for a large modification in caloric content (-15%) and a very low variation in price (+5%). However, a less stringent claim regulation, formalized here through an increase in the caloric value of light variants, seems to make healthy diet easier by increasing the consumption of light dairies and decreasing the total caloric content of purchases within the breakfast set. These values seem to be modest, but the light variants of dairy products contribute less than 5% to the total caloric content of the breakfast set.

**Result 3.** On the basis of substitution between foods within the breakfast set, it appears that more stringent MQS used for claim regulation will not improve the nutritional content of consumer purchases linked to price and quality variations. Conversely, under assumptions of
price and quality modification (such as the positive effect of the price reduction exceeding
the negative effect of the quality decrease), less stringent MQS seem able to favor a healthy diet
through a reduction in the caloric (or fat) content of purchases.

DISCUSSION

The method we used in this paper relies on three restrictive assumptions. First, we assumed
that a change in the caloric (or fat or saturated fat) content of breakfast foods has no effect on
the overall diet. This is not necessarily true. Consumers can compensate for a decrease in the
caloric content of the breakfast meal by increasing their intakes during the other meals (Shide
and Rolls 1995). Second, we assumed that the price elasticities do not vary when the MQS
defined for light variants is modified. It means that we assume that the consumers are more
sensitive to the presence of a nutrition claim rather than to the more or less stringent MQS on
which the claim is defined. Third, we assumed that the quality of the other products remains
identical when the MQS of light dairies is modified. In other words, we assumed that the
firms do not change the quality of the other products in reaction to the MQS modification.

Despite the limitations linked to these assumptions, the results provide interesting insights and
contribute to the debate on claim regulations. Light variants consumption registers
correlations with the whole set of socio-demographic variables, such as education, income
and BMI, in particular. We observed that households with overweight or obese members
purchase significantly higher quantities of most breakfast foods, including light variants\(^4\). But

\(^4\) Test of means, results available upon request.
we also noted that economic constraints can limit light product consumption and favor the substitutions of less healthy foods.

On the basis of own and cross-price elasticities of the breakfast foods purchased by French households, we have shown that less stringent claim regulations may have a greater effect on nutritional contents if they allowed for smaller price differentiation between the standard products and the light variants. It is clear that regulatory constraints must protect consumers by allowing firms to introduce claims only if the food profile is well-balanced. But the risk of very demanding nutrition claim constraints favors a large quality gap between standard and claimed products and makes light variant foods less affordable to lower income people.

Our analysis should be replicated for other sets of foods. Nevertheless, our results suggest that a smaller increase in the nutritional quality of food, affordable for a large share of the population, can be more efficient for public health than a large improvement of food quality if this improvement induces a price level that renders such products affordable to only a small share of the higher income population. Up until now, the claim regulations have been mainly considered from a consumer protection perspective (in order to avoid misleading labeling by firms). This issue is crucial. However, we add a new consideration to this debate, which can be important from a public health perspective and provide useful alternatives to the consumer taxation debate.

References


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<th>Standard Error</th>
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<td>(% members in age group)</td>
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<td>0 to 13 years</td>
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<td>14 to 24</td>
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<td>0.19</td>
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<td>25 to 39</td>
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<td>0.30</td>
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<td>40 to 65</td>
<td>0.38</td>
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<td>Superior to Baccalaureat</td>
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<td>0.50</td>
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<tr>
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<tr>
<td>South west</td>
<td>0.09</td>
<td>0.29</td>
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### TABLE 2- Compensated price elasticities. expenditure and income elasticities at the mean point

<table>
<thead>
<tr>
<th></th>
<th>Milk</th>
<th>Plain yogurts</th>
<th>Light variants</th>
<th>Flavored yogurts</th>
<th>Dairy Dessert</th>
<th>Bread</th>
<th>Breakfast Cereals</th>
<th>Rolls and pastries</th>
<th>Biscuits</th>
<th>Expenditure elasticity</th>
<th>Income elasticity</th>
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<tr>
<td>Milk</td>
<td>-</td>
<td>0.165***</td>
<td>0.080***</td>
<td>0.150***</td>
<td>0.092***</td>
<td>0.086***</td>
<td>-0.024</td>
<td>0.193***</td>
<td>0.091***</td>
<td>1.407***</td>
<td>0.306***</td>
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<tr>
<td>Plain yogurts</td>
<td>0.212***</td>
<td>-</td>
<td>0.152***</td>
<td>0.240***</td>
<td>0.210***</td>
<td>0.069***</td>
<td>-0.095***</td>
<td>0.187***</td>
<td>0.174***</td>
<td>1.106***</td>
<td>0.240***</td>
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<tr>
<td>Light variants</td>
<td>0.199***</td>
<td>0.275***</td>
<td>-1.610***</td>
<td>0.075</td>
<td>0.344***</td>
<td>0.183***</td>
<td>0.129**</td>
<td>0.268***</td>
<td>0.136**</td>
<td>1.183***</td>
<td>0.257***</td>
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<td>Flavored yogurts</td>
<td>0.302***</td>
<td>0.372***</td>
<td>0.062</td>
<td>1.471***</td>
<td>-</td>
<td>0.140***</td>
<td>0.119***</td>
<td>0.110***</td>
<td>0.268***</td>
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<td>0.267***</td>
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<td>Dairy Dessert</td>
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<td>0.264***</td>
<td>0.244***</td>
<td>0.110***</td>
<td>0.883***</td>
<td>0.002</td>
<td>0.072**</td>
<td>0.032</td>
<td>0.006</td>
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<td>Bread</td>
<td>0.197***</td>
<td>0.123***</td>
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<td>0.134***</td>
<td>-0.003</td>
<td>-0.829***</td>
<td>0.045</td>
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<td>0.158**</td>
<td>0.828***</td>
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<td>Breakfast Cereals</td>
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<td>0.153***</td>
<td>0.149**</td>
<td>0.148***</td>
<td>0.127**</td>
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<td>0.361***</td>
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<td>Rolls and pastries</td>
<td>0.252***</td>
<td>0.191***</td>
<td>0.151***</td>
<td>0.059**</td>
<td>0.023</td>
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<td>0.182***</td>
<td>-1.059***</td>
<td>0.205**</td>
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<td>Biscuits</td>
<td>0.100***</td>
<td>0.149***</td>
<td>0.057**</td>
<td>0.147***</td>
<td>-0.003</td>
<td>0.076**</td>
<td>0.150***</td>
<td>0.172***</td>
<td>0.848***</td>
<td>0.596***</td>
<td>0.130***</td>
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</tbody>
</table>

Note. *, **, *** : significant at 10%, 5%, 1%. 
TABLE 3- Impact of variations in prices and in caloric value of light dairy products on the breakfast set

Values in standard police: Variation of caloric intake linked to light dairy product consumption on the overall breakfast set for the mean household
Values in bold: Variation of the caloric content

TABLE 3a- Less stringent nutrition claim regulations

<table>
<thead>
<tr>
<th>Price reduction of &quot;light&quot; dairy products</th>
<th>-5%</th>
<th>-10%</th>
<th>-15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>13%</td>
<td>21%</td>
<td>30%</td>
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<tr>
<td>Increase in the caloric content of &quot;light&quot; dairy products</td>
<td>-0,20%</td>
<td>-0,50%</td>
<td>-1%</td>
</tr>
<tr>
<td>10%</td>
<td>18%</td>
<td>27%</td>
<td>36%</td>
</tr>
<tr>
<td></td>
<td>-0,06%</td>
<td>-0,40%</td>
<td>-0,80%</td>
</tr>
<tr>
<td>15%</td>
<td>24%</td>
<td>33%</td>
<td>42%</td>
</tr>
<tr>
<td></td>
<td>-0,04%</td>
<td>-0,20%</td>
<td>-0,60%</td>
</tr>
</tbody>
</table>

TABLE 3b- More stringent nutrition claim regulations

<table>
<thead>
<tr>
<th>Price increase of &quot;light&quot; dairy products</th>
<th>-5%</th>
<th>-10%</th>
<th>-15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>-12%</td>
<td>-20%</td>
<td>-27%</td>
</tr>
<tr>
<td>Decrease in the caloric content of &quot;light&quot; dairy products</td>
<td>0,20%</td>
<td>0,60%</td>
<td>1%</td>
</tr>
<tr>
<td>10%</td>
<td>-17%</td>
<td>-24%</td>
<td>-31%</td>
</tr>
<tr>
<td></td>
<td>0,10%</td>
<td>0,50%</td>
<td>0,80%</td>
</tr>
<tr>
<td>15%</td>
<td>-21%</td>
<td>-28%</td>
<td>-35%</td>
</tr>
<tr>
<td></td>
<td>-0,02%</td>
<td>0,30%</td>
<td>0,60%</td>
</tr>
</tbody>
</table>
ALISS Working Papers

2009


2008


