

Economic assessment of the dual quality of food products in the Single Market (DualFoodEcon)

Summary results

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1. Introduction

The issue of Differences in Composition of Seemingly Identical Branded Products (DC-SIP) refers to the case of marketing a good, in one Member State, as being identical to a good marketed in other Member States, while that good has significantly different composition or characteristics¹. The main concern is that “in some parts of Europe, people are sold food of lower quality than in other countries, despite the packaging and branding being identical”, as stated by President Juncker.²

This report summarises main results obtained from the project “*Economic assessment of the dual quality of food products in the Single Market*” performed within the Administrative Agreement between DG for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) and the Joint Research Centre (JRC). The purpose of the project was to provide economic assessment of the practice of differentiating the composition or characteristics of seemingly identical branded food products in the single market. This report complements the JRC study “*Results of an EU wide comparison of quality related characteristics of food products*”³ published in 2019.

The analyses of this project were structured in four tasks and each of them forms a separate report as follows:

- Differences in the composition of seemingly identical branded food products: Impact on consumer purchase decisions and welfare (Task 1)
- Analyses of economic rationale behind differences in the composition of seemingly identical branded food products in the Single Market (Task 2)
- Empirical testing of the impact of differences in the composition of seemingly identical branded products on consumers' choices (Task 3)
- Economic determinants of differences in the composition of seemingly identical branded food products in the EU: An econometric analysis (Task 4)

The first and the third tasks focus on the analysis of DC-SIP implications for consumers from a conceptual and empirical point of view, respectively. The second task attempts to explain the rationale for brand owners to use DC-SIP practices. The fourth task takes a horizontal approach by considering both demand factors and production related factors to empirically estimate economic determinants of the occurrence of DC-SIP in the European Union using the results from the EU wide testing campaign⁴. The next sections provide summary results for each report.

¹ <https://eur-lex.europa.eu/eli/dir/2019/2161/oj>.

² https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_17_3165

³ <https://ec.europa.eu/jrc/en/publication/results-eu-wide-comparison-quality-related-characteristics-food-products>

⁴ <https://ec.europa.eu/jrc/en/publication/results-eu-wide-comparison-quality-related-characteristics-food-products>

2. Differences in the composition of seemingly identical branded food products: Impact on consumer purchase decisions and welfare (Task 1)

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The issue of Differences in Composition of Seemingly Identical branded products (DC-SIP) refers to the case of marketing a good, in one Member State, as being identical to a good marketed in other Member States, while that good has significantly different composition or characteristics (European Commission, 2019a). The main concern is that “in some parts of Europe, people are sold food of lower quality than in other countries, despite the packaging and branding being identical”, as stated by President Juncker (European Commission, 2017b).

This report provides a conceptual analysis of whether and how consumer purchase decisions and consumer welfare are affected by the fact that the same brand owner offers seemingly identical branded food products with different composition to different country-markets. Based on the conceptual and empirical knowledge developed in the fields of demand theory, behavioural economics, marketing and consumer psychology, a framework is developed to analyse the formation of consumer quality perceptions, purchase decisions and welfare.

A simple neoclassical utility approach is started from to assess the different possible outcomes of DC-SIP on consumer purchases and welfare. Given the crucial role of quality perception in determining a consumers' valuation of the product, a more detailed analysis of the factors shaping quality perception is performed, based on the Total Food Quality Model. This sheds light on how food quality perception may differ across countries and individual consumers, and how this relates to the issue of DC-SIP. Finally, the report addresses how information asymmetry regarding DC-SIP may lead to the disconfirmation of consumers' expectations once consumers realize or are informed about differences in composition between product versions. The role of deception and unfairness perception on consumer decision making and welfare is analyzed to understand consumers' reactions to DC-SIP.


The different stages of the analysis and results are summarised below:

Literature shows that consumers care about the composition, characteristics and perceived quality of food products they consume, thus DC-SIP might affect consumers' purchase decisions and welfare, if composition, characteristics and perceived quality will differ between product versions offered in different countries. However, the DC-SIP impact is not straightforward and depends on consumer perception formation and preferences and is therefore likely to be heterogeneous across individual consumers and countries.

Neoclassical utility theory

In a utility framework, a rational consumer decides to purchase a product, when the value or utility the consumer believes to obtain from consuming a product is higher than the cost of consuming the product (i.e. the price):

- DC-SIP will negatively affect consumer purchase behaviour and welfare when consumers perceive and value the quality of the own-country product version to be lower than that of the product versions in other countries, as long as a potentially lower price of that version does not offset the lower consumer valuation.
- DC-SIP will not affect or positively affect consumer purchase behaviour and welfare
 - (i) when consumers perceive and value the quality of the own-country product version as equal to versions from other countries,
 - (ii) when consumers perceive and value the quality of the own-country product version as higher to versions from other countries, for example because companies succeed in adapting product versions to the specific preferences in each country, and
 - (iii) when the lower price of the own-country version compared to the price of the versions in other countries offsets the lower consumer valuation of the own-country version.



Crucial in this assessment is how individual consumers perceive and value different product versions. **Individual consumers** may have heterogeneous perception of and preferences for food quality and thus ***might be affected differently by DC-SIP across and within countries.***

Total Food Quality model


The formation of quality perception by consumers is a complex and often subjective process: consumers use (an array of) available signals or cues to infer quality perception of food products which ultimately determines their purchase behaviour. The conceptual model on food quality perception of Grunert (2005) is used to analyse the formation of quality perception in the context of DC-SIP.

→ **Vertical dimension of food quality perception** refers to the use of **intrinsic cues** (physical properties of the product) or **extrinsic cues** (e.g. brand name, geographical origin, packaging) to infer food quality perception of a product.

→ **Horizontal dimension of food quality perception** refers to consumers' adjustment of quality perception over time (before and after purchase):

- (i) before purchase consumers' quality assessment is based on observable intrinsic and extrinsic cues;
- (ii) after the purchase the quality perception might be confirmed or disconfirmed when unobservable cues are revealed or after product is experienced (tasted) which will determine repurchase decisions; and
- (iii) credence qualities (e.g. health or organic production processes, occurrence of DC-SIP, or other characteristics which cannot be observed or experienced by the consumers even after consumption of the product) might be revealed by information provision at any stage of the purchase choice process and may lead to adjustment of quality perception and repurchase decisions.

→ Not all cues might be used by consumers AND different cues might be used by different consumers to derive their food quality perception. This implies that the quality evaluation of product versions across and within countries will differ.




Empirical studies show that consumers' product quality perception is often based on extrinsic quality cues such brand, place of origin, packaging, price, product category, which may result in potential intrinsic differences in composition between product versions going unnoticed. Even when the composition of the versions is the same, consumers purchase choices may be different if extrinsic factors differ between versions.

The stronger the quality perception is based on specific extrinsic quality cues, the less likely DC-SIP is noticed, and the less likely consumers' purchase decision and welfare will be affected by compositional differences between branded products.

Information asymmetry related to DC-SIP


The complexity of consumer decision making in a context of many informational cues and time constraints and in the presence of strong extrinsic cues, will lead to DC-SIP likely going unnoticed to most consumers, particularly when consumers do not have possibility to physically compare product versions from different countries. Moreover, certain compositional differences (e.g. related to the origin of ingredients used) may be impossible to be observed, even when consumers have the possibility to compare and experience different product versions.

When consumers become exposed to the DC-SIP issue through communication with other consumers or media coverage, this might result in consumer dissatisfaction and generate a consumer reaction which cannot be easily captured in the above utility framework but which might affect their purchase decisions and welfare.



Marketing and consumer psychology literature suggests that the presence of DC-SIP may lead to **consumers' perception of deception** (disconfirmation of expected value) and **perception of unfairness** (resulting from product versions not being equal across countries)

This may explain why in some cases relatively strong consumer reactions might be observed, even if differences in composition are small and/or not detectable by consumers. Such reactions to DC-SIP are expected to be stronger in markets where the (perceived) low-quality version is offered as compared to countries where the (perceived) high-quality version is offered.



Depending on how strong perceptions of unfairness and deception are, and depending on several contextual factors, consumers response may differ:

- ➔ In line with empirical studies on price unfairness, this perceived unfairness (and corresponding reactions) is expected to be stronger in markets receiving (what is perceived as) the lower quality version as compared to markets receiving (what is perceived as) the higher quality version.
- ➔ When perceptions of deception or unfairness are weak, **consumers response may be only a short-term reaction**, after which consumers may revert in the future to their habitual purchase pattern
- ➔ When the perceived unfairness is strong or disconfirmation of expectations and resulting deception is sizable, it might generate **strong and lasting consumer reactions**: reconsideration of purchase decisions, reduced purchase intentions, switch to other brands, reduction of brand trust and image of the company, breakdown of consumers' trust on the uniformity or status they associated with brands.
- ➔ However, even in the presence of high perceived unfairness and the disconfirmation of expectations, **consumers do not necessarily respond by changing their purchase behaviour** due to various reasons: budget constraint, habits or cultural factors, unavailability of better alternative products, or the DC-SIP negative experience may play only a limited role in their motivations for product choice.

Drawing on the conceptual and empirical literature across fields, this report reveals that the impact of DC-SIP on consumer choices and welfare is not straightforward. While consumers care about food quality, differences between product versions are likely to go unnoticed if consumers are not explicitly informed on them. Moreover, even when differences are observed, consumers may not have the same preference orderings for the different versions. Finally, also the price at which product versions are offered matter. This heterogeneity means that average purchase and welfare implications may differ across country-markets, and that individual consumers are likely to be differentially affected.

In addition to the question of whether consumers would or would not prefer and purchase a different version than the one offered on their market, the existence of different product versions with potentially different quality valuations in itself may be a source of consumer dissatisfaction. The report explains from conceptual point of view how the presence of DC-SIP may lead to consumers' perception of deception and unfairness which may negatively affect brand trust and affect consumer reactions, purchase behaviour and welfare in the short or longer term. Consumers may voice their concerns, decide not to buy specific products, products from a certain brand, or even loose trust in global brands and turn to local goods instead. Depending on how strong the feelings of deception and unfair treatment are, these reactions may be very weak or strong, and may be only short term after which consumer revert to habitual purchasing patterns, or be long-lasting.

3. **Analyses of economic rationale behind differences in the composition of seemingly identical branded food products in the Single Market (Task 2)**

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1. This report presents the results of a review of the economic literature about the problem of Difference in Composition of Seemingly Identical Branded Product (DC-SIP). The problem is also referred to as *dual* quality. The DC-SIP problem emerges when a firm supplies products of different characteristics (such as ingredients, recipe, weight) without consumers being properly informed about the differences. The difference must be 'relevant', meaning that consumers might take a different purchasing decision if informed correctly.
2. Academic literature about DC-SIP is almost non-existent. Consequently, this report focuses on contributions that are indirectly related to the topic and yet are able to foster an understanding of the economic principles of DC-SIP. The report provides a conceptual analysis in order to explain the rationale for brand owners to use DC-SIP practices; it does not bring empirical evidence as it is not available in the literature.
3. The DC-SIP problem has an objective component (the difference in composition/weight) and a subjective component (consumer information and choice). The report addresses the economics of the objective component in Chapters 1, 2, and 3. The subjective component is discussed in Chapter 4. Chapter 5 presents an illustrative example of the possible consequences of regulation. The possible policy implications of the findings presented in this report are emphasised throughout the report.
4. Chapter 1 reviews the industrial organisation (IO) literature regarding firms' "strategic quality choice". From an IO perspective, product composition is a dimension of quality. It should be noted that in the IO literature quality is not necessarily hierarchical: products of different quality are just different (without one being necessarily better than the other). The core topic of the review presented in this chapter is the determination of market equilibrium when firms can compete on quality. the review reaches the following conclusions:
 - a. Differences in composition within the Single Market *may* be socially efficient if consumer preferences, cost functions, market structure, and institutions are spatially heterogeneous. However, this result requires consumers to be perfectly informed.
 - b. The number of varieties that firms can offer to consumers is limited. As a consequence, regulating DC-SIP may not result in a higher number of varieties in the market. Furthermore, the constraint on the number of varieties implies that firms must choose the most profitable ones. Because the profits from each variety might vary over space, firms may have an incentive to supply different varieties in different Member States.
5. Chapter 2 focuses on multi-country models of parallel trade and quality discrimination. The literature builds on the market equilibrium models in Chapter 1, assuming that firms can sell to different groups of consumers. In the absence of arbitrage, DC-SIP can be rationalised as optimal differential treatment of consumers by firms in separated national markets based on the features of demand.
 - a. Quality discrimination among consumers in different markets is the result of profit-maximising behaviour by firms taking advantage of differences in demand conditions when markets are separated.

- b. A firm with market power optimally reacts to policies (or to changes in institutional/legal environment) that impose a constraint on firm behaviour by adjusting the decision variables that are not subject to the policy. For instance, a policy that limits the ability of a firm to engage in price discrimination between national markets (e.g., ban on territorial supply constraint practices) may induce a quality response by a firm with market power, potentially leading to larger quality differences between national countries.
 - c. It is conceivable that national variations could be introduced by a firm in response to a policy that limits the ability of a firm to engage in price discrimination (e.g., ban on territorial supply constraints) between national markets. This response would represent as an attempt to maintain firm's ability to discriminate between markets in a situation in which national markets are otherwise well integrated. Nevertheless, whether introducing DC-SIP is useful for firms to maintain firm's ability to discriminate remains an empirical question. This could be the case if DC-SIP were able to undermine the ability or willingness of retailers to procure the product in the country where the product is cheaper. For example, a retailer could possibly be unwilling to source a product with varying quality to avoid consumers being dissatisfied.
6. Chapter 3 expands the discussion about international models by reviewing the marketing management literature. International marketing and international business researchers and practitioners have long debated the question of whether to adapt ('go local') or to standardise ('go global') the marketing mix across countries. Adapting some elements of the marketing mix (e.g., product) but not others (e.g., brand) can be rationalised as an optimum strategy of an international firm to improve performance.
 - a. The main factors supporting the 'Go Global' approach (standardization of products accross countries) are the benefits of cost reduction, improved resource allocation, cultural convergence, and technology development. The main factors supporting the 'Go International' approach (adaptation of products to local conditions) are related to the persistence of a large degree of difference in consumer taste, needs, and preferences across markets, the existence of country-specific laws and customs, and heterogeneity in the ecological and competitive environments.
 - b. A third vision emerged more recently supporting the idea that firms engage in both adaptation and standardisation as both have positive relationships with performance. A theoretical framework by Schmid and Kotulla (2011) identified four factors affecting the decision between standardisation and localisation: (a) cross-national homogeneity of demand; (b) potential for cross-national economies of scale; (c) cost of modification of the product; (d) foreign price elasticity of demand.
 - c. A key finding in the literature is that the marketing mix is jointly determined, meaning that any regulation concerning quality or product composition (e.g. ingridients) is also expected to affect price, placement, and promotion (and ultimately market shares). The magnitude to which these components are affected depend on market conditions and product type.
7. The discussion in Chapter 4 focuses on consumer purchasing decision under imperfect information. A review of the extensive literature concludes that consumer perception and purchase motivation are key variables in DC-SIP issues. When extrinsic attributes have an important signalling role about the quality of the product, firms might be unwilling to communicate to the consumer changes in ingredients and recipe (intrinsic attributes), if this impacts on the perception of price, health, origin, the values of the brand, and ultimately the perception of quality and therefore on the purchase intentions of the consumer.
8. Chapter 5 presents a numerical example illustrating the equilibrium in a two-country market. The aim is to discuss the possible implications of DC-SIP regulation. The results of the simulation are conditional on the

assumptions in the model and are not general. They must be interpreted as an example of possible unintended consequences of regulation, not as predictions of policy outcome.

- a. We found that DC-SIP reduces social welfare and may have unexpected redistribution effects across firms and across consumers. It is possible that groups of consumers benefit from DC-SIP strategies. Similarly, it is possible that local firms may enjoy higher profits if the international firm engage a DC-SIP strategy (e.g. when tailoring versions to local demand conditions).
- b. It is possible that regulation imposing the same product composition in all Member States is socially inefficient, especially if the demand and/or production costs are spatially heterogeneous. Such regulations may harm certain consumer groups and local firms in specific circumstances.
- c. Policies ensuring that consumers have enough information to assess products properly (Information Disclosure) are socially efficient but may have a redistribution effect too. However, these policies might be difficult to implement in practice.
- d. In theory, information disclosure regulations perform better than mandatory quality regulations.

4. Empirical testing of the impact of differences in the composition of seemingly identical branded products on consumers' choices (Task 3)

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Difference in composition of seemingly identical branded (food) products (DC-SIP) has been a source of growing concern in the EU over last years. In 2013, the European Parliament drew attention to the fact that findings of various surveys show that "consumers are concerned on a long-term basis about possible differences in the quality of products with the same brand and packaging which are distributed in the single market" (European Parliament 2018). In 2016, leaders of the EU Member States (MS) brought up the DC-SIP issue in the European Council and agreed to further investigate the existence of the practice and to eventually find a solution at the European level. In 2017, President Juncker during his State of the Union Address explicitly referred to the issue of companies selling seemingly identical products with a different composition in different MS. To provide a snapshot into how widespread this situation was in the EU, the Joint Research Centre (JRC), in close collaboration with experts from Member States' competent authorities and stakeholders of the food chain, developed a harmonised methodology for the comparative testing of DC-SIP in food across MS (European Commission 2018). The result of the application of this methodology to different products found that 9% and 22% of evaluated food products had differences in composition but had identical or similar front package, respectively. The rest of evaluated food products were either identical (33%), had similar compositional characteristics (9%) or had a different composition and also a different front package (27%) (European Commission 2019).

This report aims to contribute to the existing studies on difference in composition of seemingly identical branded (food) products (DC-SIP) by verifying whether the presence of DC-SIP influences consumers' preferences and willingness to pay for a different version of a same branded product. To this purpose, the study applies both a discrete choice experiment (DCE) and a sensory testing experiment (referred to as "lab experiment") in six MS (i.e. Germany, Hungary, Lithuania, Romania, Spain and Sweden) with a total of 10600 respondents to analyse: (i) consumers' willingness to pay (WTP) for different versions of the same branded food products, and (ii) cross-regional/country comparisons of the effect of DC-SIP.

A selection of six different food products was made by combining a provisional list of 72 food items (available at the time of the experimental design) prepared by the JRC for the EU wide testing campaign⁵, with results from a market survey and six focus groups run in each of the six MS. The market survey⁶ helped to identify the most commonly purchased food categories and brands, the focus groups contributed to refine the selection of branded food product by providing insights on consumers' awareness (e.g. prevalence, causes, consequences), expectations and perceptions associated with the DC-SIP issue and consumers' experiences with DC-SIP issues: product categories affected, product attributes, associated emotions, action taken (if any). The results from the EU wide testing campaign (European Commission 2019) was used as a source of information on products' composition across the selected countries.

⁵ For more information on the EU wide testing campaign, see European Commission (2019)

⁶ The total sample consisted of 1,200 respondents (200 respondents in each MS). The target group was the general population aged 18-74 years old. The sample was representative of each MS in terms of age and gender distribution

Due to limited capacity a respondent has in processing information the maximum number of products to be test in the online DCE and lab experiments was fixed at six. The final list of products include: Danone Activia Strawberry, Fanta Orange, Knorr spaghetti Bolognese, Lay's potato chips salt, Milka Choco Cookies, and Findus fish fingers.

Experimental Design for the discrete choice experiment

We designed a discrete choice experiment (DCE) with three attributes per product as detailed in Table 1 (i.e. price, nutritional information and brand). These attributes were combined in different choice cards that included three product versions (one country version and two from different countries) and a no-buy option (i.e. the possibility for a consumer not to choose any of the studied versions). To gain insights into the impact of DC-SIP on product choice, we implemented an experimental design, which changes the way the information on nutritional information and list of ingredients were presented. Three different ways of presenting this information were tested: (i) basic information (main ingredients only), (ii) extended information (all ingredients as reported) and (iii) extended information with main ingredients highlighted. In addition, for each of the information treatments we included a version where the DC-SIP was highlighted by including a “made for” claim was tested (see Table 2). The order of the choice cards, the order of the product profiles within a choice card, and the order of products were randomized across participants. Each individual made 18 choices, six for each of the three products.

Table 1. Attributes and levels used for the construction of the choice set

Attribute	Levels
Price	Six price levels per product (based on actual price levels found in the studied markets)
Nutritional information and list of ingredients	Three levels (based on the actual information of the products marketed in the respective countries)
Brand	Present / not present (product specific brand – see table 1)

Source: Authors' elaboration

Table 2. Experimental design for the different treatments used in the discrete choice experiment

Treatment	Sample size	Information	Made for claim	Choice card to which applies
A	500	Short list (main ingredients)	No	All products (18)
B	500	Short list (main ingredients)	yes	All products (18)
C	125	Long list (all ingredients)	No	Lays potato - Danone Activia (6)
D	125	Long list (all ingredients)	Yes	Lays potato - Danone Activia (6)
E	125	Long list- with main ingredients highlighted	No	Fanta Orange - Knorr Spaghetti Bolognese (6)
F	125	Long list – with main ingredients highlighted	yes	Fanta Orange - Knorr Spaghetti Bolognese (6)

Source: Authors' elaboration

Similarly the assignment of products per country is reflected in Table 3. The allocation of products to countries has been based on the availability of the branded product in each country, and on the information from market survey data on the frequency of consumption of these products across the sampled population.

Table 3. Assignment of products tested in each country

Countries	Product 1	Product 2	Product 3
Germany Lithuania Hungary	Favlored Yoghrt (Danone Activia Strawberry) 4 units of 125 gr each	Prepared pasta dish (Knorr Fix spaghetti Bolognese) 1 jar of 330 gr	Choco Cookies (Milka) 1 pack of 168 gr
Sweden Spain Romania	Crisps (Lays Potato Chips Nature) 1 bag of 170 gr	Orange flavored soft-drink (Fanta Orange) 1 PET bottle of 33 cl	Fish Fingers (Findus) 1 box of 450 gr

Source: Authors' elaboration

Using the data from the choices made by each individuals we estimate 10 conditional logit models per country, using the following utility function:

$$U_{ijk} = \beta_0 No_buy + \beta_k Version_k + \beta_4 P_j + \beta_5 Brand_k + \varepsilon_{ij} \quad [1]$$

where i is each of the choices made by the individual (1 to 6); $Version_k$ represent the different country specific product composition⁷ P_j is the price of each of the three alternatives plus a no buy option whose price is fixed at, and $Brand_k$ a dummy variable that takes the value of 1 if the presented product is branded and zero other-wise.

The expected mean of the willingness to pay (WTP) of each attribute was calculated as follows:

$$WTP_{ijk} = \frac{\beta_{ijk}}{\beta_{price}} \quad [2]$$

Experimental Design for the Lab Experiment

Complementary to the online experiment we run a field experiment in four out of the six countries on a total of 500 participants for each country. The countries selected for the lab experiment were Germany, Spain, Romania⁸ and Hungary.

As in the case of DCE, also in this case the sample was split of into two treatments:

- a) Group 1: Blind⁹ (N=200)
- b) Group 2: No blind (N=200)

Consumers were paid a fixed amount for participating and eventually buy products. Thus, consumers were asked to make a real purchase choices for all the products presented. Eventually only one of the products under investigation was bought. This product was randomly selected ex-post. The purpose of having a real money experiment is to avoid hypothetical bias.

From the list of products used in the online DCE four products were selected, namely: Fanta orange, Danone Activia strawberry, Lays potato chips and Milka chocho cookies, and tested two pair of products in two pair of countries, following the distribution of Table 4. Each of these products has three different versions, each of them coming from a different country (in the table below, the different versions/provenance of each product is presented in bracket). For instance, a participant in Germany have three version of Danone Activia Strawberry (from DE, HU, LT) and three versions of Milka Choco cookies (from DE, HU, LT).

⁷ One of the countries was set as benchmark to avoid the dummy variable trap),

⁸ Romania had to be dropped from the sample due to the encountered problems during the execution of the lab experiments.

⁹ As explained below, 'Blind' only means that the Brand of the products will not be shown in the experiment.

Table 4 – Selection of products and different versions

GROUP 1	PRODUCTS
Germany	1. Danone Activia Strawberry (DE, HU, LT)
Hungary	2. Milka choco cookie (DE, HU, LT)

GROUP 2	PRODUCTS
Spain	1.Fanta Orange (ES, RO, SE)
Romania	2. Lays Potato Chips (ES, RO, SE)

Source: Author's elaboration

Sequence of the experiment

Each respondent receives a small device (tablet) where the experiment instructions appear, and he/she record his/her own answers. The cards for each product to be shown on the tablets were design as the one in the online experiment.

Each participant tastes three versions of two different products (six tasting in total for each participant). The sequence of the experiment differs from Group 1 (Blind) and Group 2 (No-blind) (Table 5).

Table 5 – Sequences of the lab experiment for Blind and No Blind groups.

		Sequence of the experiment	
ROUND 1	Step 1 repeated in sequence for product 1 and product 2	Group 1 (Blind)	Group 2 (No Blind)
		Taste the three versions	Taste the three versions
		Rate the three versions on a scale (from 1 to 10)	Rate the three versions on a scale (from 1 to 10)
		Rank them in order of organoleptic preferences (First, second and third preferred based on flavour, smell, appearance)	Rank them in order of organoleptic preferences (First, second and third preferred based on flavour, smell, appearance)
	After testing the two products		
	Step 2	Get information on: price, Ingredients and nutritional content ¹⁰	Get information on: price, Ingredients and nutritional content, ¹¹ DC-SIP definition
ROUND 2	Step 3	Participant are asked to select the version he/she wants to buy	Participant are asked to select the version he/she wants to buy
	Step 1 repeated in sequence for product 1 and product 2	Taste the three versions	Taste the three versions
		Rate the three versions on a scale (from 1 to 10)	Rate the three versions on a scale (from 1 to 10)
		Rank them in order of organoleptic preferences (First, second and third preferred based on flavour, smell, appearance)	Rank them in order of organoleptic preferences (First, second and third preferred based on flavour, smell, appearance)
		After testing the two products	
	Step 2	Get information on: price, Ingredients and nutritional content, ¹² DC-SIP definition	Get information on: price, Ingredients and nutritional content, ¹³ DC-SIP definition and brand
	Step 3	Participant are asked to select the version he/she wants to buy	Participant are asked to select the version he/she wants to buy

Source: Author's elaboration

Results

Results of the DCE experimental design (Table 6) show that for the majority (23 out of 30) of cases when there is no claim (treatments A, C and E) DC-SIP has no impact on consumers. This means that consumers are indifferent to the national version as compared to the one used as reference. For the few cases where the impact of DC-SIP was detected no geographical or product pattern was spotted. However, when more information is given (treatments C and E) consumers seem to be overloaded with information and difference in composition plays a less important role.

¹⁰ This information were displayed together with the ranking/rating that the participant gave in Step 1

¹¹ This information were displayed together with the ranking/rating that the participant gave in Step 1

¹² This information were displayed together with the ranking/rating that the participant gave in Step 1

¹³ This information were displayed together with the ranking/rating that the participant gave in Step 1

Table 6. Summary of results from the DCE

Treatment	Impact of DC-SIP	No impact of DC-SIP
A	6	12
B	13	5
C	1	5
D	4	2
E	0	6
F	4	2

Source: Author's elaboration

When consumers are primed about the differences by signaling with the “made for” that the different versions have been tailored to different countries (treatments B, D and F) the impact of DC-SIP increases with preference for one or other versions being detected for 21 out of the 30 country-product models. In six cases there is a preference for the domestic version of the product, in two for the non-domestic version and in the remaining there are negative preferences for the domestic (7 cases), non-domestic (5) versions or both (1). Again we fail to see any clear pattern of the effect of DC-SIP. Therefore, when consumers are aware of this difference in the composition of products they do react, however we cannot disentangle the country of origin effect from the DC-SIP issue.

In the Lab experiment the DC-SIP was assessed through a between- and within-subject estimations. As for a “between-subject” designed experiment, each individual is exposed to only one treatment (i.e. DC-SIP information). With this type of design, as long as group assignment is random, causal estimates are obtained by comparing the behaviour of those in one experimental condition (the so called “blind”) with the behaviour of those in another (“not blind”). In a “within-subject” designed experiment, each individual is exposed to more than one of the treatments being tested, being treated and untreated. With such designs, as long as there is independence of the multiple exposures, causal estimates can be obtained by examining how individual behaviour changed when the circumstances of the experiment changed. Table 7 provides a summary of the estimated effects. The estimates of the between-subject comparison translates in relating the results of one treatment in different rounds (Table 7). Whilst the within-subject aims at comparing different treatment but in the same round.

Table 7 – Estimation of the treatments in the lab experiment

	Treatment 1 (T1) – (Blind)		Treatment 2 (T2) – (Blind)	
	Round 1 (R1)	Round 2 (R2)	Round 1 (R1)	Round 2 (R2)
Type of information	Price	Price	Price	Price
	Nutritional content	Nutritional content	Nutritional content	Nutritional content
	Ingredients	Ingredients	Ingredients	Ingredients
		DC-SIP	DC-SIP	DC-SIP
				Brand name
	Estimation of DC-SIP effect		Estimation of the Brand effect	
	Between-subject	Within-subject	Between-subject	Within-subject
	R1-T1 vs R2 T1	R1-T1 vs R1 T2	R2-T1 vs R2 T1	R2-T1 vs R2 T2

Source: Authors' elaboration

From the estimations results it emerges that in Germany when respondents do not have information about the DC-SIP they are indifferent between the three versions, but when consumers are primed about the differences of the alternatives offered respondents privilege their domestic version. In the case of yogurt, participants were willing to pay 0.74 euro cents more as compared to the Hungarian version (reference version). Results also show that for Germans there is no significant difference between the Lithuanian and Hungarian versions. The WTP for the not-buy option decreases of more than 1.5 euro when the DC-SIP information is disclosed. Thus, one can conclude that

informing consumers regarding the country-version (DC-SIP) does not significantly change the WTP. Similar conclusions can be reached in the within sample comparison. In the within-subject comparison (T1 R2 vs T2 R2), which reveals the effect of the brand names on individual purchase decision, it is observed that the brand does not change preferences of the different versions, nor the reaction to information about DC-SIP.

Results for cookies are similar. In this case, what is observed in the base treatment (T1-R1) is that participants prefer not to choose any of the alternatives. Results do not change when the DC-SIP is revealed (within-subject comparison). In the between subject comparison, as in the case of yogurt, participants start to prefer the national version in respect to the alternatives. The brand effect in this case tends to reinforce this result. The WTP of the German version increases although results appear less robust than the one for yogurt. Nevertheless, also in the case of cookies a comparison of WTP across treatments reveals that no statistically significant effect of the DC-SIP and the brand effect.

In summary for Germany, one can conclude that the DC-SIP information in both within and between subject comparisons seems not to have a strong effect of individual decision, while the brand effect reinforces the idea that German people prefer the German version of the product.

Spanish respondents seem to prefer their home version of Fanta orange as compared to the Romanian. The individual preference for this version increases when the information on the DC-SIP is revealed (between-subject comparison) while the effect of brand seems to slightly reduce the preference for the Spanish version of the Fanta orange. Regarding lay potatoes, Spanish respondents show a strong preference for their country version and this preference increases when the DC-SIP is revealed (between-subject comparison). The same results are obtained in the within subject comparison. Knowledge of the brand does not change the WTP for the country versions.

In the case of Spain one can conclude that the information regarding the DC-SIP has a statistically significant result on the value of the Spanish product, which increases significantly when the information about the country version is revealed. This result is obtained both in the between- and the within-sample comparison. Preference for the Swedish products are not affected by information regarding DC-SIP or the brand.

In the case of Hungary results are a bit surprising. Respondents do not respond to price variations, meaning that they ignored completely the cost of the different alternatives. Due to this unexpected and unusual result in an incentive compatible experiment, further analysis are needed.

Conclusions

Difference in composition of seemingly identical branded food products (DC-SIP) has been a source of growing concern in the EU over last years. This was particularly the case after tests conducted in several Member States (MS), which have confirmed the presence of differences in composition of some branded food products sold in home market as compared to products of the same producer and the same brand but sold in different Member State.

While the JRC's comparative testing brought evidence on the scale of the DC-SIP issue across EU, there was still a lack of empirical evidence on consumers' reaction on the DC-SIP. This report bridges a link between the theoretical hypothesis with empirical analysis on the effect of DC-SIP on consumers' preferences and willingness to pay for a different version of a same branded product. With the two experimental design - online discrete choice experiment (DCE) and a real lab experiment - it was possible to address the following research questions:

- Do consumers have the same or different preferences for the different versions of seemingly identical branded food products and are they willing to pay for the preferred alternative version?
- Does informing consumers about the practice of DC-SIP affect their preferences for a product version?

For a successful implementation of the DCE and lab experiment, it was necessary to perform some preliminary analysis (preliminary phases). The objective of these preliminary phases was to proceed to an objective selection of six countries and six products to be included in the experiments. In particular during these phases, the following steps were undertaken: (a) country selection for both experiments; (b) market survey on a predefined list of products to

detect the most commonly sold food categories and brands; and (c) focus group discussions to fine-tune the final list of products and obtain consumers' perceptions on DC-SIP.

Combining all these preliminary steps, a final list of six products to be included in the experiments was obtained with the purpose to test for the relevance of DC-SIP. This list included the following products: Danone Activia Strawberry, Fanta Orange, Knorr spaghetti Bolognese, Lay's potato chips salt, Milka Choco Cookies, and Findus fish fingers.

The main findings of the experiments implemented in the report can be summarised as follows:

- The impact of DC-SIP on consumers' valuation and purchase decision is heterogeneous across the studied products and MS.
- For the majority (23 out of 30) of cases when there is no claim (addition of "made for" indication on the product packaging) DC-SIP has no impact on consumers
- However, it is true that for a limited number of country-product pairs (6 out of 30) consumers do value differently DC-SIP products. This preference is not systematic for their domestic version, as in some cases consumer prefer the version sold in another country.
- The analysis of these six cases shows no evident geographical patterns of difference in preferences for DC-SIP products, nor regarding the preference for the version sold in the consumer's own country where the experiment took place (evidence mainly from the discrete choice experiments).
- When consumers were informed about the differences between product versions with the use of the "made for" claim, a majority of cases show a preference for one of the product versions (16 out of 30 country-product pairs).
 - In half of the cases where there is a difference in preference, the preference is for a non-domestic version (i.e. Lithuanian consumers prefer least the version for their country of the three products) tested). In other five cases (two in Germany and three in Hungary) consumers prefer their domestic version.
- Results suggest that the presence of the "made for" claim reduces the value attached to brands in 19 out of the 30 comparisons. The contrary holds for the remaining 11.

This report analysed the DC-SIP impact on consumers purchase choices for a selected number of branded products and MS. As a result, the analyses of this report are valid only for the products and MS included in the experiments and cannot be straightforwardly extrapolated to other products and MS.

5. Economic determinants of differences in the composition of seemingly identical branded food products in the EU: An econometric analysis (Task 4)

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Over the last several years, practices related to the differences in composition of seemingly identical branded food products (DC-SIP) observed across different Member States (MS) have been under intensive attention from policy makers and stakeholders in the EU. The interventions from the European Parliament (European Parliament, 2013; European Parliament, 2017; European Parliament, 2018) and the European Council (Council of the European Union, 2016) stressed the importance to tackle the DC-SIP issue and requested the European Commission to investigate these practices and to find a solution at European level.

The objective of this report is to provide potential explanations behind the occurrence of DC-SIP across MS. More specifically, the report utilises data from the EU-wide testing campaign of differences in the components of various products (European Commission, 2019) in combination with economic data collected from different statistical sources (e.g. Eurostat, Eurobarometer, World Bank, Global Dietary Database) to examine economic drivers of DC-SIP in the European Union. The final dataset contains 19 different MS and 127 products. Econometric estimation — probit estimator — is performed on this combined dataset to quantitatively identify economic drivers of the occurrence of DC-SIP. Potential economic drivers of DC-SIP are identified from economic literature and factors related to consumer demand (Colen, Chrysoschoidis, & Ciaian, 2019), production, and MS (Colamatteo, et al., 2019) are included. The following consumer demand factors are considered: difference in GDP per capita, dietary index, attitude index and price level between countries. The following production factors are considered: shared official language, shared border, distance, company size, product complexity (product will less than 3 ingredients).

The key results of the report are as follows:

- The difference in GDP per capita is included to account for potential differences in willingness to pay for the product across countries. The difference in income levels between two countries has a statistically significant positive effect on the probability of the occurrence of DC-SIP products. If two countries have identical income levels, the predicted probability that the product versions offered in these two countries are different is 39%. As the income increases, the probability of the occurrence of DC-SIP between the country-pairs increases. For the country-pair with the greatest income difference, which is the country-pair Denmark and Bulgaria, the predicted probability for a product to be different is 52%.
- Two variables are included to control for cross-country differences in consumer preferences: dietary index and attitude index. The attitude index is statistically insignificant in all model specifications. Differences in the current diet are, on the other hand, positive and statistically significant, which implies that a greater difference in the diet between countries increases the probability that a firms offer different product versions.
- Although the difference in price level among two MS has a positive effect on the occurrence of DC-SIP, the magnitude of this effect is relatively small. The small magnitude implies that

the probability of the presence of DC-SIP between country pairs increases the greater the price difference is between the countries, but this effect is minor.

- As the distance between the two MS increases, the probability that the versions are identical decreases. This relationship is expected as products sold in MS farther apart are less likely to come from the same production plant.
- If a product is produced by a company with turnover greater than 22 billion, the probability for a product being different in the country-pair increases by around 8%. Similar, less complex products—products with less than three ingredients—are about 25% less likely to be different for a given country-pair.
- A greater difference in front packaging leads to a greater probability of DC-SIP presence. Compared to identical front packaging, a product with similar packaging is around 22% more likely to be offered in different versions, while products with different front packaging are around 37% more likely to be different versions between country-pairs.



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