The Good Economy Working Paper Series

Working Paper no. 2/2019

Experiments in co-modification:

A relational take on the becoming of commodities and the making of market value

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European Research Council
Established by the European Commission

Abstract

How and where does commodification happen in practice? This paper addresses this question by analysing a set of market research experiments investigating consumers' valuation of farmed cod as part of Norway's plans to develop aquaculture. Whether researchers serve fish in lab cubicles, or instruct consumers to assess their liking of fish in home degustation, these experiments study the commodification process as much as they take part in it. They lend fascinating insight into the minutiae of commodification. Relying on an ethnographic analysis of experimental work, we aim to take things, and not just humans, seriously as participants in commodification. We consider the experiments as both production sites and market sites that serve both to measure and to enhance the value of commodities. This enables us to give a relational account of the enactment of commodities: an analysis of commodification as co-modification. We find a double process of co-modification going on. First, the things and consumers are co-modified: both are transformed by their encounter, and from this a commodity emerges with new, relational qualities. Second, the production site and the marketplace are co-modified as the results from the experiments have implications both for how to produce the commodity and for how to market it.

This working paper series is part of the larger project, headed by Kristin Asdal: *Enacting the good economy: Biocapitalization and the little tools of valuation* (Little Tools). This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement no 637760).

Front page design: Tobias Kaasa Fossheim

1. Introduction

How and where do things become commodities? The question has occupied socio-economic enquiry at least since Marx, who considered that the value of commodities originated in the creative act of labour. But it is also at the core of another, more mundane field of research: marketing and consumer research. The very existence of a whole field studying how to market products to consumers is a reminder, if we needed any, that commodities do not just appear on the market. Marketers have developed a range of methods to study products, consumers, and markets, ranging from market data analysis to focus groups. Among these, experimental methods are particularly intriguing. Experimental methods are used test products or possible future labels and packaging that are not yet available. Empirically, this paper turns to this kind of experiments in order to investigate commodification processes. We approach them as sites for commodification: sites where products become commodities.

How can we do this? This is because market experiments are not only used to study how to market and sell a commodity, but also how to produce it. They pertain *both* to production and to the market. Hence, they are *both* market-sites and production-sites. Thus, market experiments are particularly interesting as they provide us with the opportunity to study commodification and its associated valuation practices without having to locate it either in the production or in the market side. In this, they enable us to address what has been raised as a key theoretical issue, namely that of opening up 'the "black box" of value creation' (Vatin 2013a, p. 47; Vatin 2013b) and to link 'a theory of production and work' with 'a theory of market and value' (Vatin 2013a, p. 40). Raising the issue in this way (linking the theory of market and value), the ambition is precisely that of seeking to escape the age-old discussion in economics about whether value is generated in the production process or whether it stems from the market exchange itself. Instead, what is called for are analyses that 'grasp the process of value creation, both on the market and upstream from it, via the practical operations by which goods and services are measured, valued, and technically and economically elaborated' (Vatin, 2013a, p. 43). For Vatin *et al.* (2013b), this translates into analyses of the entanglement between the creation of value and the measurement of value – what Vatin calls 'valorization' and 'evaluation'.[1]

Even though it is new in this specific theoretical context, the analysis of experiments in market-studies is not a new endeavour in Science and Technology Studies (STS). The analysis of experimental studies in our paper both complements and contrasts in significant ways with previous analyses of economic and market experiments within STS. In their turn to markets and the economy, STS scholars have highlighted the role of experiments in the making of markets. These contributions have helped our understanding of market processes. However, their focus has been on the *humans* partaking in experiments: how humans become 'economic' beings with tastes, opinions, preferences, and a capacity to articulate and calculate them (Muniesa 2014; Teil and Muniesa 2006; Muniesa and Trébuchet-Breitwiller 2010; Teil 1993, 1998; Lezaun 2007; Grandclément and Gaglio 2011; Guala 2007).

[1] To clarify this ambition, Vatin (2013) makes a detour through Marx and Walras. For Marx, value originates in the creative act of labour, and evaluation at the moment of exchange only expresses the value already present in the good. Walras, on the contrary, considers that value only emerges in market exchanges: economic value is the product of the confrontation of evaluations on the market, hence valorisation cannot be distinguished from evaluation. Later, the economy of conventions has proposed yet another perspective, namely that the valorisation of goods on the market requires preliminary agreements on how to evaluate them.

The focus on the performance of economic agencies has somewhat overshadowed the very things being exchanged (Asdal 2015). Given their roots in actor-network theory and its concern with materiality and more-than-human capacities, this is surprising. Nevertheless, STS-studies of markets have tended to reduce market-things to their ultimate fate, which is to be valued and exchanged. The same bias so to speak goes for valuation studies as these have predominantly focused on how human agencies transform things in order to attribute value and exchange them. However, if we are to provide a substantially better understanding of commodification processes, we need to extend the analyses of economic agencies to the very things being exchanged, considering them as participants in commodification processes. In doing this we take our cue from earlier work in valuation studies that has already started pursuing investigations in this direction, taking things themselves seriously in valuation-processes (Vatin 2013b; Escala 2013; Leymonerie 2013; Caliskan 2010).

Thus, what this paper aims at is to work towards an understanding of commodification that cuts across production and market, and that takes both human agencies and things seriously. To draw these two conceptual and empirical ambitions together, we work with the notion of 'co-modification'. Asdal (2015) developed this notion to stress that commodification is a relational practice. The notion *co*-modification urges us to pursue a relational approach. More specifically it plays on the commodification notion and addresses how turning things into commodities requires the modification of both human market actors and non-human entities. 'Co-modification' draws our attention to the nitty-gritty of commodification practices, and as such it is meant to allow us to explore 'how valuation practices can be grasped not only as social constructions, but also as object formation' (Asdal 2015, p. 185). In her 2015 chapter, Asdal studies co-modification in innovation strategy documents linked to efforts to develop the Atlantic cod into a farmed commodity. The innovation strategy documents, Asdal shows, work to enable and value farmed cod as a commodity, and do so by enabling a co-modification of the cod biology and the market. Asdal's analysis shows that market research and experiments were made integral to the innovation strategies.

Here, we extend this analysis of co-modifications to the experiments themselves. We suggest that this analytical take will enable us to get a better handle on the commodification process: As a process where production and exchange are analysed together as part of the valuation process and where humans and non-humans shape one another.

In the following sections, we will relate directly to Vatin's conceptual framework and his way of distinguishing between evaluation understood as practices of measuring, on the one hand, and valorisation understood as creating and enhancing value, on the other hand (Vatin 2013a). Our point then, similar to Vatin in his theoretical argument, is that in the experiments these practices constantly interact. The notion of co-modification is suggested precisely to grasp these interactions analytically.

Empirically, our investigation of commodification as *co*-modification focuses on three experimental studies asking how prospective consumers perceived and valued the farmed version of codfish – hence, whether and how farmed cod could be made into a viable and profitable commodity. Production, in this case, is to be understood as the series of operations in which the fish is processed, from its breeding to its filleting, conditioning and packaging. The three studies are based on minute reconstitutions of the commodification of codfish. They record as much information as possible on the commodity-to-be, on consumers, and on their encounters as these were staged, not in actual shops or with actual fishmongers, but in largely artificial settings.

2. Market experiments: Acting with things

As we hope to demonstrate in the following empirical analysis, the market experiments we study are largely about valuation, including measurement. The experiments produce encounters between cod and consumers, document these in accounts analysing how much consumers appreciate the commodity-to-be, and produce quantified valuations from these encounters.

Using Vatin's terminology, we can approach market experiments as valuation situations – situations engineered to provoke valuations – aimed at evaluating and valorising a product. Vatin distinguishes between two operations that the notion of valuation conflates: evaluation and valorisation (Vatin 2013a). Evaluation refers to the assessment of value; it corresponds to a static judgement, attributing value to a thing in a specific state. Valorisation, on the other hand, is for Vatin the act of producing value. It is a dynamic process involving transformations to enhance the value of a thing. Vatin stresses that these two processes are at play throughout the process of value creation and urges us to focus on their interplay and tension.

Precisely the tension between measuring, assessing and evaluating on the one hand, and transforming, enhancing and valorising on the other, is at the core of the experiments we study. They stage encounters between a product and consumers using experimental objects and subjects, in order to reproduce real-life encounters. This is to measure the encounters and ultimately to suggest ways to successfully commodify the product. To account for this tension we must put the very things at the centre of our analysis. This implies focusing on how things – here, farmed cod – are not only acted *upon* but acted *with* in valuation situations. What this suggests – which is something we will come back to – is that the codfish is not simply a passive commodity, but actively *suggestive* regarding the things happening to it.

3. From commodities to co-modification: a few theoretical and analytical moves

The experiments we investigate are part of the commodification process. Hence, our take on these has implications for how we conceive of commodities. When discussing the notion of commodity, Karl Marx remains a central reference. *Das Kapital* starts with an elaborate discussion of the nature of the commodity, which is closely linked to Marx's definition of value. For Marx, commodities are products of labour that have a use-value and are intended principally for exchange. More specifically and historically products of labour could become commodities at the time in history 'when the labour spent on the production of a useful article becomes expressed as one of the objective qualities of that article, i.e., as its value' (Marx 1971(1887), p. 67).

With his concept of 'commoditization', Appadurai (1986) sought to shift the focus from a question about labour, the production site and the forms and functions of exchange towards the things that are exchanged. This led him to define 'commodity' in a particular way; that is, not as a consequence of the feature of the things in themselves, but as a situation: the situation, in the social life of any thing, in which its exchangeability for some other things is its socially relevant feature (Appadurai 1986, p. 13). This entails a dynamic conception of commodities: things become commodities at certain points in their 'social life' and in certain contexts. They can move in and out of the commodity status and, by circulating, can change status according to how they are valued in prac-

tice. The attention is then not so much on commodities as on 'commoditization': on the operations, practices and settings through which things are made fit for exchange.

This perspective influenced STS-scholars in their explorations of the practices and devices that frame market transactions (Caliskan and Callon 2009, 2010; Callon *et al*. 2007). While Caliskan and Callon write of the 'qualification of goods' rather than of 'commoditization', they share with Appadurai a conception of the circulation of things as a process of continuous requalification and valuation. They argue that economic exchange requires that goods are made passive, stabilised and disentangled from their context, but also re-entangled with their new owners (Caliskan and Callon 2010; Callon 2005).

The shared focus on economic exchange in their analyses of markets do however come with the somewhat sad consequence that things tend to be reduced to their exchangeability. The key interest is how things end up having a market price and become exchangeable. Things thus remain rather passive, and their materiality is mostly accounted for when it resists commodification.

In order to move towards a more relational account that consider things as more actively engaged in commodification processes, which is precisely what we are after, we need to consider production processes as sites where the exchangeability and potential market value of commodities are negotiated, and as moments when the success of commodification is not guaranteed. This is why relying on Vatin's work is fruitful. Indeed, his suggestion to understand valuation as combining evaluation and valorisation stems from the ambition we referred to already above, namely that of opening up the 'black box' of production (Vatin 2013a). Focusing on what is evaluated and valorised in the experiments and how is our strategy to move towards a relational conception of commodification: in other words, commodification as *co*-modification.

The notion of co-modification then serves a double purpose. First, it serves to bring the commodities back into the analysis (without focusing on market transactions exclusively), and in a way which does not render these as passive, but as actively taking part in commodification processes. Second, it allows us to extend the analysis of commodification to encompass both a production process and a marketplace. By approaching commodification as *co*-modification, we investigate how things, prospective consumers, and the setting in which transactions occur are worked with together.

4. Our material: three experimental market studies on farmed Atlantic cod

This paper analyses three experimental studies carried out in the early 2000s. The studies were funded by either the Research Council of Norway or the Norwegian Seafood Council as part of their interest in developing markets for farmed cod. They all resulted in academic publications, and for one in a report, which informed ensuing innovation strategy reports (Asdal 2018). We analysed how these publications gave account of the experimental work. Besides, we interviewed nine of the scientists involved and visited some of the laboratories where the experiments took place. We also interviewed researchers who had not been involved in these experiments, but use similar methods. In total, we conducted 13 interviews about the practicalities of market experiments. In the following sections, we rely on the published papers and on the interviewees' accounts of experimental work to retrace the experiments, from their setting up to the presentation

of their results in scientific papers.

We refer to the three studies as Studies A, B and C. Study A was a laboratory study led by economists in close collaboration with sensory scientists, with a partner from the cod farming industry. It took place in a sensory laboratory: a room divided in isolated cubicles all connected to a kitchen. It combined methods from two fields. First, it drew on food and sensory science, a field which studies how people react to food when tasting it: As part of the concrete experiment participants tasted fish and were asked to assess it as food. Then next, the experiment also included an experimental economic part, using economic incentives to elicit participants' 'willingness to pay'.

Studies B and C were field experiments carried out by marketing researchers and food and sensory scientists. They began with a sensory appraisal of the fish by experts, after which the fish was shipped to participants who tasted it at home and filled in surveys about their valuation of the fish. The main difference between studies B and C is the group of consumers considered. Study B investigated the preferences of Dutch consumers cooking and tasting the fish at home. In study C chefs in up-market restaurants from three different European countries cooked and tried the fish in their own restaurants.

5. Becoming a commodity: Five experimental steps

We distinguish between five steps in which both the product (codfish) and the consumers (experimental subjects) are acted with. First, the preparation and staging of the experiments. Second, the pre-valuations of the fish and people separately. Third, the core of the experiments: the encounter of fish and people. Four, the characterization of the commodity in the experiments, and, last, its generalisation into a discussion of the commodity outside the lab. At every step, concerns about the quality of the commodity are intertwined with concerns about the quality of the experiment.

5.1. Pre-modifications: Staging the experiment

The experiments start by bringing together a product and consumers. A great deal of care goes into this, as both have to be modified before the experiment takes place.

Pre-modifying the codfish

The fish is prepared to be sold and eaten, with the added requirement of measurability and reproducibility. The care in this preparation is carefully brought into the resulting papers that describe and minutely retrace the journey of the cod. For instance, in study B:

> 'The cod was caught in Finnmark and had an average weight of 2.5 kg after catch. Then it was farmed- raised from July 2001 for a period of 8-9 months and fed manually. The feed consisted for 80-90% of capelin. Starvation period before slaughtering was four weeks. On Tuesday 2nd of April 2002 the first batch of cod was slaughtered. […] The cod with head on […] was stored on ice before and during transport by plane to the Netherlands. […] stored at chilling facilities at Amsterdam Schiphol Airport. […] April Seafood partners in IJmuiden processed the wild and farmed cod respectively (filleting and packaging in modified atmosphere

> (MAP)) under supervision of RIVO. Each package contained a cod fillet portion of approximately 150 grams.' (Luten *et al*. 2002, p. 45).

This care is about controlling the experimental situation as much as it is about ensuring that the cod is at its best. In this way the materiality and the biology of the fish come into play in very concrete ways.

The three studies compared wild and farmed cod. Studies A and B both explicitly took into account the seasonal variations of wild cod. A challenge was that wild cod gives lower quality fillet during the spawning season. Hence, in study B, the experimenters decided to use Icelandic instead of Norwegian cod due to the fact that in the colder waters of Iceland, the spawning season did not coincide with the time planned for the experiments. Study A used a different strategy, including seasonal variations in the set-up by organising experiments in the winter and spring.

When shipping, preparing and packaging the fish, the experimenters are working with a perishable product. They try to bring it in 'in good shape, at the right time, in sufficient quantities' (Interview 4, lab study). Because of the experimental setting, they also take care to ensure stable quality and freshness throughout. In field experiment C, where consumers try the fish at home, experimenters synchronised the shipping so that it took the same time for all the fish to get to their destination (Bjørklund *et al*. 2007, p.56). To keep the fish in good shape until it is eaten, they are careful not to break the cold chain and to ensure that consumers have time to use the fish before it turns bad. In lab experiments, the experimenters 'supplied cool bags and ice packs' (interview 12) so that participants could safely bring the fish they purchased back home. In field study B, 'for each household a polystyrene box was prepared containing a freezer pack, one package of cod per person, an instruction form, one set of questionnaires per person and envelopes. The boxes were labelled with the name of the household and transported Tuesday afternoons to six distribution points from where each household could collect the box the same day.' (Kole *et al*. 2003).

The packaging is crucial both for the commodification of the fish and for the experiments themselves. The package needs to conform to regulations – for instance displaying a use-by date. But it is also part of the experimental design, especially because it determines what information participants get about the fish. Controlling this information enables experimenters to test how it influences consumers' perception and appreciation – for instance using different labels for different groups of consumers. As one experimenter from study A explains:

> 'We received the product labelled in a certain way, but we did not want consumers to have this information, we had an idea of the information we wanted to give them […] we had recreated a label […]. Concretely, it means, well, preparing these labels, removing the commercial labels to replace them with these labels.' (Interview 12).

The last step in the pre-modification of the fish for the experiment is its cooking. Experimenters monitor the cooking procedures and make sure they are reproducible. From cooking times to level of saltiness, everything is tried and calibrated ahead of the experiment 'to really have the taste of the fish' (interview 12): the cooking method should be the same across the experiment, and it should give a palatable result without altering the fish too much. In the lab study A, the researchers hired a cook, and the fish 'was steamed, without sauce, without spices, except salt, it was just slightly salted. (…) we did trials, to find a level of saltiness that was (…) relatively neutral' (interview 12). In

the field experiments where participants cooked the fish at home, written instructions explained how to prepare the cod. For instance, in study B, 'the participants were asked to fry the cod and not to use sauces with strong taste. It was allowed to use mild spices like salt and pepper' (Luten *et al*. 2002, p. 46).

Pre-modifying the consumers

The experimenters similarly select and prepare the people who participate in the study. The three studies focus on how different types of consumers perceive farmed cod, so the participants are selected according to this interest. In studies A and B, the participants are 'naïve' tasters, expected to provide a candid assessment representative of standard consumers. In both experiments, they are selected from consumer panels or databases and screened to be representative of fish buyers. For instance, the paper resulting from study A explains that 'all the participants said they were part of the food decisions in their household, eat fish at least once a month and purchase fish at least every second month' (Alfnes *et al*. 2018, p. 4). Study C considered a specific set of consumers: restaurant chefs. The experimenters considered them as experts in fish preparation, 'important gatekeepers because what they put on the menu becomes available to a large number of consumers' and 'a segment where cod farmers might obtain the relatively high prices needed to develop their businesses' (Bjørklund *et al*. 2007).

Following the selection, experimenters prepare the participants to be good experimental subjects. Study A relies on experimental economics techniques – namely, experimental auctions – to elicit participants' willingness to pay for different types of fish. The participants thus received money to ensure they were able to purchase fish. They were also trained, to ensure that they behave as rational economic agents and express their actual willingness to pay. This is line with Teil and Muniesa (2006) who analysed the training of participants in similar economic experiments. The very laboratory room is designed to make participants act as individual consumers with their own preferences and opinions. As one researcher explained:

> 'people are turned towards the wall or with partition screens in front, and they are in individual booths so that they do not influence each other, either with expressions or saying "mmmm", etc. It was impossible, when you eat face to face, you can absolutely not judge independently' (interview 2).

Even in field experiments such as studies B and C, participants are prepared. The experimenters use written instructions and questionnaires to control how participants use the fish. In study B, 'The consumers were asked to consume the farmed and wild cod on two consecutive days' and 'before Saturday 13th April' (Luten *et al*. 2002, p. 45). The questionnaires that they filled in included a question about how they had prepared the cod.

The preparation also involves adjusting the experimental setting to the consumers. This is most striking in study A, which took place in a lab, and where experimenters picked 'experimentation times that could correspond to meals' (Interview 5) and told participants that they would be offered a full meal (more food was then provided after the experiment so that participants had enough to eat). This is to make sure that not only the fish, but also the participants, are at their best.

Despite all the care devoted to preparing fish and participants for the experiments, irregularities remain. Both fish and people can be changeable and whimsical. Cod, one sensory scientist explain, 'is never the same', and 'from one day to the next – well maybe

not in one day, but after a few days in keeping, it can change' (interview 5). Consumers' preferences can also change from one day to the next, 'Because [consumers] are not in the same state, because the day before they ate cod, so today it's the second time they eat cod, they do not find it as good…' (Interview 5).

5.2. Pre-valuations: Quantifying the fish and the consumers before they meet

In addition to the very concrete pre-modifications through which the product and consumers are brought into the experimental set-up, the experimenters carry out what we suggest to call pre-valuations. While they prepare the fish and the participants for the experiment, they characterise them quantitatively, redefining them according to sets of quantifiable attributes. In these pre-valuations, the fish and the consumers are kept apart. There is no commodity at this stage, only people and fish, each with their own characteristics.

Pre-valuing the fish

The pre-valuation of the fish focuses on quality understood as a characteristic of the fish itself, independent of its relation to consumers. In this case, quality is a material characteristic of the flesh of the fish. To quantify it, experimenters use tools that enable them to operationalise quality as a series of observable and quantifiable characteristics. They move this vague notion into observable capacities of the cod.

A good example of such quality valuation is the 'Quality Index Method' (QIM) used in studies B and C. The QIM is well established in the literature and used in the industry to check the freshness of raw fish. The method is presented, for example, in Martinsdottir *et al*. (2003), and its application to cod in Cardenas Bonilla *et al*. (2007). Its implementation requires three things: a panel of experts; a fish; and a scheme associating characteristics of the fish to a quantified score. Distinct schemes are developed for each fish species. They direct the experts' gaze towards specific parts of the fish (e.g. its skin, its flesh, its eyes or its gills) and even to specific characteristics of these fish parts (e.g. their texture, colour or odour). They also list possible descriptions of these characteristics. Having observed the fish, experts pick the description that fits best. For instance, referring to Cardenas Bonilla *et al*. (2017), does the fish smell 'fresh, neutral', 'seaweedy, marine, grass', or 'sour milk'? Each possible description corresponds to a number – a 'score'. Having checked all the relevant characteristics, the expert panel obtains 'an overall sensory score' (Bjørklund *et al*. 2007, p. 6). Each sample of cod is thus modified into a number summing up its freshness. This operation makes the samples comparable, enabling experimenters to formulate hypotheses. For instance, in study C, 'based on the QIM assessment, the farmed cod sent to England could be expected to receive lower scores on freshness from the chefs' (Bjørklund *et al*. 2007, p. 58).

Pre-valuing the consumers

When it comes to the people participating in the experiments, what interests the experimenters is their representativeness of the targeted population. Studies A and B use panels of consumers; the experimenters documented the ages, genders and occupations of subjects and compared them to the general population. Using surveys on what they call 'attitudes and perceptions', they also assessed whether the subjects were reliable

representatives of fish consumers: did they participate in food decision for their household? How often did they buy fish?

To qualify the consumers, the experimenters also document how they define and evaluate fish quality. In studies A and B, they used surveys about how consumers assessed fish quality, about what they considered important when eating fish, and about their opinions on fish farming and its impact on the environment, safety, price or quality. In study C, focused on restaurant chefs, the experimenters also used in depth interviews to inquire into the chefs' ways of assessing fish quality and into their views on fishing and aquaculture.

In those pre-valuations, the fish and participants are kept apart. However, like the pre-modifications that set up the experiment, these pre-valuations are only performed in view of the core operation of the experiments: characterising what happens when fish and consumers meet. The fish and the people are pre-valued so that they can be used to value one another. The pre-modifications and pre-valuations enable experimenters to observe to what extent fish and consumers are co-modified by their encounter.

5.3. Co-modifications: When the fish and the consumer meet

Finally, in the experiments, consumers and fish meet: the consumers taste the fish. Consumers are equipped with tools of valuations – scales, instructions, training – that enable them to value the cod and explicate how they relate to it. These tools of fall into two categories: tools for feelings and appreciation; and tools for monetary valuation. The experimenters call them "hedonic valuations" and 'economic valuations', respectively. Both valuations play a crucial part in the co-modification of fish and consumers. In this section, we show that the use of these tools ascribes new characteristics to the fish and to the consumers, and that these characteristics are relational.

Let us start with the tools for valuing feelings and appreciation. After tasting the fish, the participants fill in scale-based questionnaires that list series of characteristics, for instance in study B: 'unattractive – attractive', 'bad color – good color', 'dull – exciting', 'dry – juicy', 'unnatural – natural'. For each of these characteristics, the participants are instructed to give a value on a quantitative scale, typically from 0 to 10 or 0 to 7. These scales do several things.

First, as Muniesa (2014) and Muniesa and Trébuchet-Breitweller (2010) have shown in similar settings, they turn participants into self-measuring instruments able to translate their qualitative valuation into numbers. This is precisely why they are called 'hedonic': participants are asked to turn their attention towards their own feelings and appreciations. However, what we would like to underscore is that this operation is relational, in that the fish is part of the provocation of these feelings. Second, the scales perform a slightly different fish with new qualities (indeed, the attributes measured here differ from those evaluated by expert panels). Here, the quality of the fish is not about its conditions or about a technical assessment. Instead, it is fully relational, and only emerges when the participants and the fish meet. Thus, the scales are not only tools of valuation but also tools of co-modification: they make it possible to quantify how the fish affects the participants; this quantification then ascribes new characteristics to the fish.

Tools for monetary valuation re-describe the fish according to one quality: willingness-to-pay. This variable corresponds to the maximum amount that one consumer would pay to acquire the fish; it is specific to the consumer and to the product. The studies we

consider use different tools to elicit it. In study B, the survey simply ask participants for an amount. Study A uses a more elaborate technique: the experimenters provoke situations where participants 'have real economic incentives to reveal their preferences truthfully' (Alfnes and Rickertsen 2011, p. 3).[2] They do so using auctions and choice experiments that are designed so that what is defined as the most rational strategy is to state one's 'true' preference. In this setting, much like in those analysed by theorists of the performativity of economics (Caliskan and Callon 2009, 2010; Garcia-Parpet 2007; MacKenzie *et al*. 2007), the participants are performed as rational economic agents via the use of money, incentives, gaming instructions and training. This is considered necessary for a monetary value of the fish to emerge. Here again, the fish comes out of the experiment with new, relational qualities: it becomes a commodity, with a market value in the small marketplace constituted in the experiment. The emergence of this fish depends on the modification of the participants by the experimental setting but also by the fish that they tasted. In this case too, the monetary valuations are tools of co-modification.

This points to another way in which the measured characteristics of the fish-with-consumers are relational: they emerge in specific experimental conditions. The co-modified fish is performed by valuation tools in combination with the experimental conditions. The experiments is not designed to compare valuations from one person to the next, but to analyse how consumers value a product differently in different situations. For this, the experimenters use valuation tools in different set-ups, and compare the co-modified fish and consumers across these set-ups. Looking back at the staging of experimental situations analysed in section 5.1 above, we can then see how the preparations actively take part in the co-modification process.

For instance, studies A and B tested how the information on the package participated in valuations of the cod. The experimenters analysed how participants' valuations of the fish varied according to the information they were given. Thus, in study A, different information was provided in the different experimental sessions. In the first session no information on origins was given, whereas in the second and third sessions, some participants were informed about origins and production methods. In study B, the experimenters separated participants in several groups; some groups received two fish labelled merely as 'cod', some received one labelled as 'cod' and the other as 'farmed cod', and some received one labelled as 'wild cod' and one labelled as 'farmed cod'. The question was then how these differences would affect the valuations resulting from the experiments.

Study A made the experimental set-up matter in a different way. As we explained above, one major concern in the preparation of experiments is to control the variability of both fish and subjects. In study A, this variability was incorporated into the relational valuation of the fish. Experimenter tested how seasonal variations in the quality of fish affected consumers' appreciations by organising sessions in the winter and in the spring. They also investigated the instability of individual preferences by organising two rounds of experiments with the same participants and comparing the results. This underlines our point that the codfish is constantly *acting with* the consumers and

[2] Study A was led by economists, and economists consider that questionnaires are not a reliable way to elicit willingness to pay. In line with the principles of experimental economics, they consider that you need incentives in order to observe what people would really do (as opposed to what they think or say they would do).

with the experimenters. It is not a straightforward commodification process but a co-modification process.

5.4. After the experiment: Co-modified fish and consumers and the becoming of the fish-commodity

What emerges from the experiments? It is in fact a quite specific version of the cod: a quantified cod. To put it differently, the experiment modifies the cod into a quantified entity – and the same happens to its consumers. To draw results and conclusions, the experimenters use statistical data processing to create tables and graphs that enable them to draw all the valuations generated in the study together. As a result of this work, yet another fish emerges: the fish as a commodity whose value is potentially enhanced. This fish only exists in relations with its potential consumers. This result is the purpose of the experiment. Starting from a concrete fish, the experimenters modify it into a different entity: a commodity.

This commodity-fish can differ significantly from the one measured and described before the experiment. Study B provides a rather funny example of this. There, sensory experts found that 'farmed cod has a whiter color, looks more milky, is less juicy and is experienced as more fibrous during chewing' (Luten *et al*. 2002, p. 58). From their perspective, focused on the flesh, there was a clear difference between farmed and wild cod. Yet consumers did not find such difference: they 'seemed to appreciate farmed cod as good as wild cod and occasionally slightly better for a very few attributes. These results did not follow the results from expert evaluation' (Luten *et al*. 2002, p. 59). While technically different, after the experiments, wild and farmed cod can be considered as similar commodities: 'the profile of farmed and wild cod, based upon attributes evaluated by consumers, is similar' (Luten *et al*. 2002, p. 59).

The consumers too can appear different when relating to the fish. When the experimenters compare the consumers by themselves and the consumers with the fish, the two do not always match. They then have to reconfigure their idea of the consumers. The things consumer actually care about when tasting the fish are not always the things they said they cared about, or, to quote one of the papers from study B: 'Actual behaviour in product evaluation does not match with self-reported explicit believes and attitudes considering what is important in eating fish' (Kole *et al*. 2003, p. 30). For instance, Study B finds that information on freshness did not affect the way consumers perceived the fish, even though participants indicated that freshness was one of the main characteristics they considered when buying and eating fish. The way experimenters try to interpret this discrepancy is also revealing of the relational character of the valuations extracted from the experiment. Indeed, in their discussion of the results, they ask whether the discrepancy results from a lack of clarity of the information provided to participants, or from a lack of experience on judging freshness on the consumers' part (Kole *et al*. 2003, p. 25). In other words, they wonder if the difference is about the product or about the consumers: the results are so tightly relational that it becomes difficult to take the consumers and the fish apart.

5.5. Turning valuations into valorisations: Producing market-value

The experimental results lead to more general conclusions and recommendations about the cod as a commodity beyond the experimental sites. The experimenters handle generalisation carefully. They do not consider their results as describing cods and con-

sumers in general, but rather as suggesting ways to enhance the value of farmed cod as a commodity. They use the valuations produced within experiments to suggest ways of valorising farmed cod – that is, using Vatin's definition, to transform it in order to increase its value (Vatin 2013a). Thus, they draw 'marketing implications' (Bjørklund *et al*. 2007, p. 64), identify 'opportunities and challenges for cod in the French market' or suggest 'possible strategies for cod' (Rickertsen *et al*. 2016, p. 78). The conclusions include practical suggestions about how to work with the farmed cod as a commodity. These suggestions are always relational, considering the cod in relation with its consumers and its markets. Hence, the commodity cannot be reduced to the fish: it is a relational entity resulting from the co-modification of a fish and its consumers. If we follow the conclusions from study C, a good commodity is one whose advantages are 'exploited by seeking out consumers who value' them (Bjørklund *et al*. 2007, p. 65) – and even by *making* consumers value them.

Information appears as a key device to act on both the fish and the consumers. It modifies the fish by making some of its characteristics apparent. For example, one paper concludes that, since 'wild and farmed fish were perceived as best along different dimensions', 'information can also be used to increase the value of farmed fish' (Rickertsen *et al*. 2016, p. 78). Another states that 'since farmed cod is still relatively unknown in the marketplace, it is of paramount importance to communicate [its] advantages' (Bjørklund *et al*. 2007, p. 65).

The same paper suggests instructing consumers about the right way to prepare farmed cod, so that it is at its most enjoyable. Having found that farmed cod needs less cooking than wild cod, researchers advise to provide cooking instructions to prevent overcooking that 'could be a disappointment for consumers'. They even call for more in-depth sensory studies on 'the effect of cooking time on eating properties of farmed cod so that more specific advice can be provided to customers' (Bjørklund *et al*. 2007, p. 65). It is necessary to change consumers' habits to maximise their enjoyment of farmed cod: the paper suggest using information to co-modify consumers and cod.

Another suggestion for increasing the market value of farmed cod is to dissociate it from the overall negative perception of aquaculture. To this end, the papers suggests both modifications in production and on the marketplace, in which we see the imbricated concerns for the cod and for the consumers at play. Both studies B and C recommend improving the image of farmed by adapting production systems 'towards positive consumer perceptions' (Kole *et al*. 2003, p. 31) and by communicating 'the benefits and realities of cod farming' (Bjørklund *et al*. 2007, p. 66). On the market side, one article recommends repositioning farmed cod on the market: instead of associating it with the 'farmed' label, it should be positioned in a category that highlights its advantages or 'its own particular added values'. Further, in this repositioning of farmed cod, 'the contrast with wild captured fish should be avoided' (Kole *et al*. 2003, p. 31). This last recommendation contributed to the rebranding of farmed cod as 'fresh cod' – a label that both erased the distinction between farmed and wild cod, and emphasised availability and quality (two key advantages of farmed cod) (Asdal 2015; interview 9).

6. Conclusion

The experiments we have retraced may appear very weird – funny, even. But while our close descriptions emphasised their weirdness, this was not with a derisive intent. Indeed, the great work and care that experimenters devote to staging artificial valuation

situations reflects the weirdness of commodification itself. Commodification, it turns out, rests on a myriad of mundane operations that perform, on the one hand, stable, packaged and synchronised products, and, on the other hand, available, interested and readied consumers.

The experiments show how commodification deeply modifies both things and people. It is not just that they have to be formatted for the situation (i.e. stabilised, packaged, equipped, synchronised). What we observed is that both the products and the consumers acquire new characteristics as an outcome of the experiments. They become something else together, and in this process a commodity takes shape. This is what we have suggested to call 'co-modification'. It comes out clearly when comparing the experiments results with the pre-valuations describing product and consumers ahead of the experiment.

However, the conclusions from the studies – and their limits – make it clear that they are only one part of the commodification/co-modification process. The commodity that emerges from them is largely confined to the lab. Extracting it from this setting would require modification work on a much larger scale, which the studies' conclusions sketch out. The modifications suggested to bring the commodity out into the world apply to production methods, consumer skills, market segmentation, or information provided on packages, displaying the range of actors involved in co-modification.

What our analysis shows then is that the term 'commodity' does not make sense in isolation. The fish does not enter the experiment as a commodity: it becomes a commodity in relations with consumers and with tools of valuations within a specific experimental setting. 'Commodity' is thus a relational term, and commodities need to be studied as such both theoretically and empirically. The notion of 'co-modification' allows us to do so. It can be used in a weaker sense, to alert us to the relational character of the commodification process and to signal that there is more to market that the human hand. But what we show here is that it can also be used in a stronger sense: that is, that commodification is a process of actively modifying things, people, production methods and markets. In the experiments we have analysed, there is in fact a double process of co-modification. First, things and consumers are co-modified: not only are they modified and valued in order to be included in the experimental set-up; once they meet, they are also modified together as each acquire new qualities. Second, the site of production and the site of exchange are co-modified. This comes out most clearly in the presentation of the results and implications of the study, which suggest action on the production side and on the market side to make the commodity more profitable. In the studies' conclusions, it becomes almost impossible to distinguish what is about the fish from what is about the consumers and what is about the market from what is about the production process. They all take part in the emergence of a new entity: the farmed cod as a commodity, or the co-modified cod, which, it turns out, is not just made of fish.

Our study of the experimental settings also provides insight in the valuation of commodities. Valuation is central to the experiments, but to analyse it, it is useful to follow Vatin (2013a) in distinguishing between 'evaluation' (the static measurement of value) and 'valorisation' (the dynamic enhancement of value). Indeed, the experiments perform several operations of valuation. Their stated objective is to measure how consumers value a commodity-to-be; they do so using tools of valuing feelings and appreciations and tools of economic valuation. In fact, these measurements/evaluations are what makes co-modification visible and tractable: quantification makes it possible to see how the consumers and the fish are transformed by their encounter. At this point, eval-

uation links up with valorisation, in that the setting put in place to measure valuations transforms the fish and the consumers. The commodity – and its values – emerge from this evaluation setting. This close interplay between evaluation and valorisation in the becoming of a commodity extends beyond the lab. The emergence of the commodity at the outset of the experiment enables experiments to formulate recommendation on how to transform the commodity in order to increase its value – that is, on how to valorise it. As much as the evaluation afforded by the experiment, this valorisation requires co-modifications: to transform the commodity, one needs to act with the fish and with the consumers, with the market setting and with the production methods.

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