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The Role of Trust and Moral Obligation in Beef Cattle Feed-lot Veterinarians' Contingent Adoption of Antibiotic Metaphylaxis Recommendations

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Abstract. In light of concern over possible public health consequences arising from the use of antibiotics in the animal industries, we examine the willingness of beef-cattle feed-lot veterinarians to forgo the recommendation of antibiotic mass treatment to their beef-feed-lot clients as a contingency based on the demonstration of a definite harm to human health. We explore this contingency as an example of the negotiation by health professionals of conflicting obligations to public health, animal well-being, and the economic pressures of feed-lot medicine. We base our study on survey data (n=103) collected from a national sample of U.S. feed-lot veterinary practitioners. Factors that predict willingness are primarily psycho-social, including social influence, moral duty, and trust or distrust, characterized as competency. We define the dimensions of trust across an array of salient others determined by the structural and regulatory context of the American cattle feeding industry.

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Introduction

Veterinarians play multiple roles in their practice. They are charged with providing care to their patients, yet many must also meet the obligations and other pressures that arise from practising medicine as a business. Furthermore, in the case of new or controversial treatment technologies, they may also negotiate among potentially conflicting obligations under conditions of social and scientific uncertainty. *How do veterinarians achieve a balance between an obligation to promote patient well-being and potentially conflicting instrumental values under conditions of social uncertainty?* We explore the role of trust and moral duty in this dynamic within the context of a common and contentious practice, the recommendation by cattle veterinarians to their beef-feed-lot operator clients to administer antibiotic metaphylaxis during an era of mounting concern over the public health consequences of antibiotic resistance.

Animal Production Medicine and the Antibiotic Controversy

Metaphylaxis, also commonly known as mass treatment, is a procedure often recommended by veterinarians employed in the food-animal industries. With metaphylaxis, all animals determined to be at an unacceptable high risk of developing a bacterial disease are administered a therapeutic dosage of an antibiotic. Metaphylaxis differs from the administration procedure used in human health settings and among companion animals in that a population of animals, often referred to as a herd, pen or lot, is treated in advance of disease rather than an individual patient after disease has been diagnosed (Radostits, 1994). Metaphylaxis is not to be confused with the more controversial administration of antibiotics to populations of animals at subtherapeutic levels to prevent disease in cattle at risk of exhibiting clinical signs of disease or to promote weight gain (Radostits, 1994).

In the U.S., veterinarians are allowed to prescribe, sell, and administer antibiotics. These antibiotic practices place the practitioners of production medicine at the nexus of controversy. Criticism of agricultural antibiotic use has been extant at least since the late 1960s with the publication in the U.K. of the Swann Report (1969), the Center for Science in the Public Interest's (CSPI) more recent advocacy for a U.S. ban of subtherapeutic use (FDA-CVM, 1999), and recent editorials against agricultural antibiotic use in popular newspapers such as the *New York Times* (Kristof, 2009; Kennedy, 2010; *New York Times*, 2010). Currently, the U.S. Food and Drug Administration Center for Veterinary Medicine (FDA-CVM) has issued a guidance document that states antibiotics should only be administered to assure animal health and should be overseen by veterinarians (FDA-CVM, 2010), a position that does not necessarily impact metaphylaxis, but suggests a move toward greater regulation of agricultural antibiotic use (Harris, 2010).

Debate addresses two recipients of moral obligation for veterinary practitioners: public health, and the well-being of animals (Rollin, 2001). From the public health standpoint, critics of the use of agricultural antibiotics are concerned selective pressure from antibiotics used in animal production will result in populations of antibiotic resistant bacteria that endanger public health (Avorn et al., 2001; Gorbach, 2001). Proponents of agricultural antibiotic use argue the pathways by which an antibiotic resistant strain of bacteria could make its way into human populations are evident; however, little to no evidence currently exists that quantifies the extent to which this has occurred (Hays and Black, 1989). The claim of insufficient evidence was the

pre-eminent argument put forward to justify continued use in animal agriculture by the American Veterinary Medical Association (AVMA) and a number of pharmaceutical and animal agriculture industry groups before the U.S. Food and Drug Administration during the comment phase of their update of the New Animal Drug Application policy. Supporters of continued use argued the source of the resistant pathogens plaguing human health are bacterial reservoirs made resistant through imprudent use of antibiotics on the part of physicians and human patients (Dean and Scott, 2005).

Another salvo in this debate involved an August 2007 study from the University of Illinois, which found resistance genes present among bacteria in lagoons and groundwater adjacent to intensive swine operations (Koike et al., 2007). This study was cited in an 18 September editorial in the *New York Times* calling for the end of population-level antibiotic treatment in confinement agriculture (*New York Times*, 2007).

The well-being of animals constitutes another focal point of this controversy. In their testimony before the FDA, the AVMA and agricultural trade and industry groups contended antibiotic treatments are necessary for promoting the well-being of the animals in their charge (FDA-CVM, 1999). Critics of the role of antibiotic use in animal agriculture also admit antibiotics may sometimes be necessary. Rollin (2001) holds that it would be unethical to deny an animal suffering from a bacterial infection the appropriate antibiotic treatment. However, he argues the crowded conditions under which animals are raised in large-scale confinement operations create conditions of stress and intensive contact that promote infectious diseases while militating against animal well-being. According to Rollin, these conditions, especially the large number of animals in confinement, demand an economy-of-scale approach to treatment, thereby necessitating the use of metaphylaxis procedures. In turn, the acceptability and adoption of metaphylaxis makes large-scale confinement agriculture possible.

Obligations, Social Pressure and Trust under Conditions of Uncertainty

In the U.S., licensed veterinarians take an oath:

> 'Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health, the relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge' (AVMA, 2003).

The structure of this oath stipulates the principal aim of veterinarians is to promote the 'benefit of society', by engaging in a series of beneficial actions. These obligations are refined in the Principles of Veterinary Medical Ethics of the AVMA (2003).

Feed-lot veterinarians also face a further set of demands in achieving a balance between the competing obligations that arise from their involvement in an antibiotic economy. Antibiotics, which they may not only prescribe but also sell or distribute, are a commodity and veterinarians may profit financially from antibiotic transactions. Furthermore, their cattle patients are also commodities often owned, or at least managed, by their feed-lot manager clients.

Controversies regarding the relationship between antibiotics, animal well-being and human health speak to these obligations, placing veterinarians in a double bind.

When forming their beliefs about the appropriateness of an antibiotic treatment, they must account for the immediate relief of animal suffering among their patients, and they must also promote public health. Furthermore, they must somehow balance these obligations against the personal and fiduciary obligations they hold towards their feed-lot operator clients, and against the social pressures derived from the financial demands of their veterinary business and demands to treat or not treat from a host of other actors.

A set of further complications arises from the social and technological uncertainties attendant with antibiotic use in the cattle feeding industry. Given their multiple obligations, if feed-lot veterinarians are to come to a well-considered decision on how to proceed with a treatment, they must account for all of the possible consequences of recommending that treatment. As there are currently many disagreements among experts regarding the consequences of antibiotic metaphylaxis on human health, feed-lot veterinarians must evaluate the reliability or trustworthiness of information from multiple and potentially conflicting sources. The practice of feed-lot medicine also involves the contingencies that arise from depending on multiple actors. Veterinarians advise feed-lot operators on medical protocols, but metaphylactic treatment often relies on the feed-lot operator and other employees to interpret treatment regimens, and to calculate dosages and administer treatments.

Moral Obligation, Social Expectation and Trust

We developed a rational-choice model to clarify the role of social expectations, trust and moral obligation in attitude formation toward metaphylaxis. Given conflicting pressures from a range of social actors, we ask what factors influenced the antibiotic decision-making of the beef-cattle feed-lot veterinarians in our study?

Contingent Adoption

To develop our model, we began with the adoption and diffusion of innovations research programme, which provided a well-tested rational choice model that has often been applied to agricultural technology decisions under conditions of uncertainty. The initial formation of attitude toward the adoption of an innovation has been defined as the persuasion stage, where 'innovation evaluation information' is used by an innovator in their valuation of the consequences of a particular technology (Rogers, 1995).

The final stage of the persuasion stage has been described as symbolic adoption, which refers to the innovation's initial acceptance (Klonglan and Coward, 1970; Sapp and Korsching, 2004). We further refined these concepts to examine how actors evaluate multiple outcome contingencies. Our source of inspiration was the literature on contingent valuation where resource economists ask respondents to evaluate their willingness to pay within imaginary markets to determine values for goods that lay outside markets. Kahneman et al. (1993) demonstrated contingent valuation of public goods to be of little value for placing a monetary value on goods, but to be strongly indicative of attitudes towards these goods. We refer to this contingent valuation as contingent adoption when we specify that a respondent considers a particular uncertain contingency as an outcome of a technological decision.

Moral Obligations

Rogers (2003) identified the relative advantage that arises from the adoption of a new technology as the principal value that motivates attitude formation during the persuasion stage. However, we expect veterinarians to take other values including moral principles into account in their attitude formation such as their oath bound duty to promote public health.

Such values are expressed in the relationship between moral obligation and behavioral intentions. In regard to client-based professions such as the insurance industry (Kurland, 1995), law (Robin et al., 1996) and nursing (Werner and Mendelsson, 2001), strong moral obligations are associated with positive behavioural intentions, indicating the value placed by these professionals on their obligations to clients. Outside the professional sphere, the relationship between moral beliefs and behavioral intentions has been demonstrated in a number of studies (Sparks et al., 1995; Sparks and Shepherd, 2002; Conner et al., 2003; Kaiser and Scheuthle, 2003; McMillan and Conner, 2003).

The values expressed by humans in their interactions with animals have been addressed by a number of researchers. Much of this work has arisen from the scholarship on animal welfare and animal rights, including that of Rollin who has expounded on the conflicted obligation of veterinarians to treat patients with antibiotics while limiting the scope of treatment to protect human health consequences from antibiotic overuse (Rollin, 2001, 2007). Empirical work has identified a variety of ways in which humans value animals. Animal rights activists have expressed a commitment to an equivalent value status between humans and animals in opposition to many farmers who grant greater status to humans (Hills, 1993), and Serpell (2004) has identified two dimensions to the human valuation of animals: affective or emotional responses, and instrumental responses.

As a profession, medicine is normatively distinguished from livelihoods where self-interest may be the acceptable behavioural norm (Arrow, 1963). Among veterinary professionals, limited attention has been given to the role obligations to others, especially to animals, may play in the formation of behavioral intentions within settings where self-interest or other non-patient or client interests may compete against professional obligations.

Social Expectation

The influence of salient others has been prominently featured within the diffusion of innovations research programme as an explanation for the formation of attitudes towards technological innovations. Salient others and opinion leaders are resources that allow potential adopters to reduce the uncertain consequences of adoption (Rogers, 1995). Diffusion of innovations scholarship has identified a number of means by which salient others influence innovation attitudes, including social pressure from peers and other important figures, as well as the information provided by experts and opinion leaders (Burnkrant and Cousineau, 1975; Bearden et al., 1986). There is limited research on the role social expectation plays in determining veterinary behaviour, although one study has identified the importance strong international professional ties play in countering social pressures to act counter to appropriate veterinary behaviour among veterinarians in African nations (Leonard, 1993).

Trust and the Reduction of Uncertainty

We do not expect feed-lot veterinarians to be only concerned with their own obligations as they formulate beliefs about antibiotic metaphylaxis. We expect feed-lot veterinarians to also account for the behaviour of others when they process intentions. Trust and distrust are paired concepts that many social scientists use to describe possible attitudes towards others in a position of responsibility towards ourselves (Earle and Cvetkovich, 1995). Our reliance on scientific and bureaucratic forms of expertise is necessitated by the increasing complexity of our modern social and technical universes (Weber, 1963; Freudenburg, 1993).

Research on trust has identified multiple dimensions to attitudes about reliance. One dimension is the expectation of competency, where others are expected to possess some modicum of skill in their appointed tasks and to base the information they provide on well-founded beliefs (Barber, 1983; Johnson, 1999; Allum, 2007). Within the diffusion of innovations literature, this corresponds to the claim that adoption behaviour is influenced by salient others, especially opinion leaders (Burt, 1987; Rogers, 1995; Kraut et al., 1998). Work by Brown and Michael (2003) has examined the role relative proximity to knowledge production plays in trust, and perception of an information source's competency is a determinant of symbolic adoption (Sapp and Korsching, 2004).

A second dimension of trust has been identified as the care dimension (Johnson, 1999) or as fiduciary responsibility (Barber, 1983), speaking to ethicist Annette Baier's definition of trust as a form of responsibility legitimated on the goodwill of the trusted individual (Baier, 1986). Empirical accounts of the role of trust in the willingness of others to behave responsibly within complex economic networks are rare, especially in regards to the formation of behavioural intention. One exception is Hart and Saunders (1997), who examined interorganizational business networks, and discovered trust in actors' willingness to behave responsibly with regards to sharing of confidential business information predicted the adoption of technologies reliant on sharing this information.

Trust's objects are multidimensional. Many empirical accounts of trust treat the trusting relationship as a social dyad. This is a likely outcome of the role trust plays in the literature on risk management and communication, where the presiding focus is on the relationship between the public and risk experts or risk managers. However, the complex of regulatory, public, business and other actors involved in many public controversies suggests the relationship between the 'truster' and multiple groupings of actors may impact belief formation.

Bryan Wynne's (1989) ethnographic account of the effects of an animal movement ban on sheep farmers in North Cumbria following the Chernobyl deposition of radioactive cesium on their farm lands found the varying degrees of trust placed in multiple actors was a factor in explaining the acceptability of the movement ban. The differences in trust allocated to distinct and competing sources of information has been demonstrated by Priest et al. (2003) to predict biotechnology acceptance, and Brown and Michael (2001) have explored the impact of new technologies on deep-held cultural beliefs and the consequential fragmentation of credibility. Following the insights of Wynne, Brown and Michael, and Hornig et al., we expect the variable trust placed by feed-lot veterinarians in a range of pertinent social actors to inform their contingent adoption of metaphylaxis recommendations.

Metaphylaxis and Contingent Attitude Formation

To characterize the negotiation between the instrumental interests of feed-lot production medicine and the value of public and animal health, we constructed a model that specifies the change in the willingness of veterinarians to alter their recommendation practices contingent on a definite harm to public health. Our dependent variable measures the intention to recommend to feed-lot clients a reduction in the number of high-risk cattle that receive metaphylaxis for disease prevention, contingent on a proven and definite risk to human health.

Theoretical Construct

In our model, veterinarians' considerations of public well-being as they evaluate metaphylaxis recommendations was the outcome. This attitude was designed to capture symbolic adoption (Klonglan and Coward, 1970; Sapp and Korsching, 2004). Veterinarians were further instructed to take 'good science' as an evidentiary standard for their valuation of this contingency. This term was chosen because of its ubiquity as a marker of scientific legitimacy among the feed-lot veterinarians and feed-lot operators we interviewed. The outcome was contingent adoption of metaphylaxis recommendations; more specifically, the willingness of a feed-lot veterinarian to reduce their recommendations of antibiotic metaphylaxis contingent on proven and definite risk to public health.

Six categories of constructs were expected to be principal determinants of contingent adoption. The first category of predictive construct examined the pressure on feed-lot veterinarians that arises from their presence within a competitive industry. Rogers (1995) argued beliefs about competitive advantage are central to the formation of attitudes towards the adoption of innovations. To account for the pressure of competitive advantage on feed-lot veterinarians' belief formation, we developed belief constructs to account for the specific advantages of metaphylaxis, the general necessity for metaphylaxis, and the economic pressures to use metaphylaxis.

The social character of the feed-lot industry suggested a range of conceptual categories for predicting contingent adoption. The first of these was social expectation (Burnkrant and Cousineau, 1975; Bearden et al., 1986; Ajzen et al., 2004). The belief that salient others expect a feed-lot veterinarian to recommend metaphylaxis was expected to be an associate of contingent adoption.

A second normative category was that of moral obligation. We expected the explicit demands placed on veterinarians by their oath to the veterinary profession and feelings of moral obligation to the animals in their care to effect contingent adoption. The construct of moral obligation was developed to examine its impact on the contingent adoption of metaphylaxis by feed-lot veterinarians. Moral obligation, contextualized as the duty of veterinarians to their patients (feed-lot cattle) to recommend metaphylaxis to their clients (feed-lot operators), was expected to determine the contingent adoption of metaphylaxis recommendations.

The third and fourth social-normative categories were based on the literature on trust. Following Wynne (1989), Brown and Michael (2001) and Priest et al. (2003), we expected the varying degrees of trust placed in a range of other actors within the feed-lot economy to impact contingent adoption. Across a range of actors, two categories of trust were expected to account for contingent adoption: trust in informa-

tion sources (Sapp and Korsching, 2004) and trust that others will behave as stated (Hart and Saunders, 1997).

We also included a range of demographic, structural, and control constructs into our model. Years of experience and age have been demonstrated to predict the adoption of an innovation (Rogers, 1995). Feed-lot size and the size of the veterinary practice may enable an adopter to absorb some of the potentially negative fall-out from adopting a new technology (Rogers, 1995).

Methods

Sample

Our analysis was based on a cross-sectional exploratory analysis of a survey delivered to practitioners of cattle feed-lot veterinary medicine. A random sampling of veterinarians, chosen to achieve a sampling error of 3%, resulted in a list of 325 feed-lot veterinarians from 37 different U.S. states. Respondents were identified from the membership lists of the American Association of Bovine Practitioners (AABP) and the Academy of Veterinary Consultants (AVC). Addresses were corroborated through Internet searches and state veterinary licensing boards. We followed the Dillman technique (2000). An initial contact letter was followed by a copy of the questionnaire, a follow-up postcard, and then another questionnaire, resulting in a sample size of 103 with a *post hoc* statistical power of .95 in a regression model of up to eight independent variables, when variance explained equals or exceeds .20.

After excluding veterinarians who indicated they no longer practice feed-lot medicine, we arrived at a response rate of 42%. This response rate is high for surveys of veterinary professionals. For example, a response rate of 31% was returned on a recent email survey of U.S. veterinary faculty after a fourth and final contact (Heleski et al., 2006). We also suspect many of our non-respondents no longer practice feed-lot medicine, but neglected to return their questionnaires.

Instrument

We developed this survey in two stages. We began with a series of open-ended interviews. Thirty-two interviews were conducted with individuals involved in feed-lot medicine, including feed-lot owners/operators, veterinarians, regulators and policy makers at federal agencies including the U.S. FDA, the Centers for Disease Control and Prevention, and the U.S. Department of Agriculture (USDA), as well as pharmaceutical company employees and executives. Among these questions, participants were asked to elaborate their beliefs about the role of antibiotics in feed-lot medicine and the attendant risks of antimicrobial use for public health. They were also asked to 'describe your role and obligations to others in the management of antimicrobial resistance', to identify their obligations to animals, organizations, financial partners, and public welfare, and to identify the impact of government bodies, political agendas, non-governmental institutions and pharmaceutical companies on their antibiotic use (a full list of questions is available from the first author on request).

These interviews were used to identify beliefs about the costs and benefits of specific antibiotic practices as well as the actors involved in the enactment of these practices. Veterinarians identified a range of actors involved in their daily feed-lot

practice, including sources of influence or expertise, and non-veterinarians who dispense antibiotics and advice on antibiotic use to feed-lot operators.

We used the content of these interviews and previously determined correlates of the diffusion of innovations to develop our mail-out survey. This survey was pretested with 10 veterinary medical faculty members who specialize in beef production medicine. In the survey, we focused on a number of antibiotic practices and beliefs. These included metaphylaxis, which we defined within the survey as 'the use of an injectable antimicrobial, or sometimes an orally administered antimicrobial, at therapeutic levels, following a strategically timed dosage regimen expected to reduce morbidity and/or mortality in a group of animals determined to be at high risk for disease(s) caused by bacteria'.

Measurement of Variables

As current research into the antibiotic decision-making of beef-cattle veterinarians is lacking, new variables were developed to measure factors expected to contribute to an explanation of contingent adoption. Variables were developed in part, as modified versions of pre-existing variables used in a range of rational-choice models including adoption/diffusion, social trust, moral obligation and the theories of reasoned action and planned behaviour. Variables were also developed based on inferences from field research and the prior experience of two of the authors as feed-lot veterinary consultants.

For the dependent variable, feed-lot veterinarians were asked 'If "good science" was to show a definite risk to public health from using antibiotics at feedlots, over the next year would you voluntarily plan to recommend that your clients change the number of cattle treated when recommending metaphylaxis to prevent disease in groups of high risk cattle?'. Veterinarians were queried on a six-point scale ranging from 'greatly increase', followed by 'increase', 'no change', 'decrease', 'greatly decrease', to 'eliminate use'.

Independent variables included moral obligation, beliefs about the necessity of metaphylaxis, number of cattle treated, industry experience measured in years of feed-lot practice, expectations of social peers and opinion leaders, confidence in information from social peers and opinion leaders, confidence in others to behave with prudence, and structural and demographic measurements found to be significant correlates of technology adoption.

To determine moral obligation, we asked veterinarians to evaluate 'how strongly do you agree or disagree with the following statement about values? I have a moral duty to recommend metaphylaxis to prevent disease in high-risk cattle' (five-point scale: 'strongly agree' to 'strongly disagree').

To determine beliefs about the necessity of metaphylaxis, we asked if it was 'necessary to use metaphylaxis to prevent disease in high-risk cattle' (five-point scale: 'strongly agree' to 'strongly disagree'). Using the same scale, we asked if economic pressures make it difficult for them to not recommend metaphylaxis for high-risk cattle to prevent disease.

Other elements of the necessity component included questions to measure beliefs about outcomes of metaphylaxis. The outcomes were the improvement of cattle health, profitability for the feed-lot, and cattle well being (five-point scale: 'very likely' to 'very unlikely'). We then asked respondents to assess the importance of these outcomes (five-point scale: 'very important' to 'very unimportant'). We created

a multiplier variable by multiplying the corresponding importance and likelihood variables (Ajzen et al., 2004).

To measure social expectations, we asked 'Which of the following individuals or groups would expect or not expect you to recommend metaphylaxis to prevent disease in high-risk cattle?' (five-point scale: 'strongly expect' to 'strongly not expect'). Actors identified through interviews with key informants included other veterinarians, clients' nutritionists, clients, retained owners, beef packers, beef retailers, consumers, pharmaceutical companies, professional organizations, the FDA and state licensing boards.

Trust in information sources was measured by two questions. We asked veterinarians 'How confident or unconfident are you that the following individuals or groups base their recommendations (or decisions) about antibiotic use on "good science"?' (five-point scale: 'very confident' to 'very unconfident'). Actors included feed-lot clients, other feed-lot operators, nutritionists, themselves, veterinary organizations, drug distributors, technical service veterinarians, other feed-lot veterinarians, pharmaceutical salespersons, cattle-feeder associations, the FDA, the USDA, and the CDC. With the same scale, veterinarians were asked to evaluate treatment regimens, judicious use guidelines and regulations from a variety of sources, including other feed-lot veterinarians, nutritionists, feed-lot operators, pharmaceutical salespersons, technical-service veterinarians, over-the-counter drug outlets, the FDA, veterinary organizations, cattle-feeder associations, and consumer and advocacy groups.

To measure the trust veterinarians place in others' behaviours, we asked, 'How confident or unconfident are you that the following individuals or groups are willing to follow voluntary judicious-use guidelines for antibiotics?'. The scale was identical to the previous confidence questions. Salient actors were technical-service veterinarians, themselves, other feed-lot veterinarians, feed-lot operator clients, other feed-lot operators, nutritionists, drug distributors, pharmaceutical salespersons, non-cattle veterinarians, other cattle veterinarians, stocker-cattle operators, and cow-calf operators.

Analysis and Measurement Assessment

All statistical tests were performed in SPSS (Version 18). Principal component analysis with varimax rotation was used to investigate the dimensionality of the outcome belief scale and the degree to which the variance in the individual scale item was adequately represented by these dimensions. The minimum eigenvalue criterion was 1.0 and factor loadings of .400 or above were considered acceptable. A Chronbach's standardized α score was used to assess the reliability of the factor. All predictors have been reported as standardized estimates.

Results

Confidence Rankings

Of the confidence questions, the two that evaluate confidence in information sources were significant in the regression model. Each question was scored 1 for 'very confident' to 5 for 'very unconfident'. A score of 3 is 'neither confident/unconfident'. Means are reported in parentheses. For confidence in treatment regimens, judicious-use guidelines and regulations, veterinarians were most confident in other veteri-

narians (1.82), veterinary organizations (2.32), the FDA (2.41), cattle-feeder organizations (2.56), nutritionists (2.63), technical service veterinarians (2.72), and feed-lot operators (3.00). They were not confident in drug salespersons (3.09), over-the-counter drug outlets (3.60), and consumer and advocacy groups (3.74).

For confidence that actors base their recommendations on good science, veterinarians were most confident in themselves (1.44), their feed-lot clients (1.59), veterinary organizations (1.82), nutritionists (1.93), technical-service veterinarians (2.10), cattle-feeder associations (2.18), other feed-lot operators (2.25), other feed-lot veterinarians (2.25), the FDA (2.29), the USDA (2.29), the CDC (2.44), pharmaceutical salespersons (2.55), and drug distributors (2.61).

Factor Analysis

A factor analysis was run on the behavioural beliefs questions. This analysis resulted in one factor with an eigenvalue greater than 1, which consisted of the importance and effectiveness of metaphylaxis for feed-lot profitability, animal well-being and cattle health (α=0.670).

A factor analysis using varimax rotation was conducted for the arrays of questions on social expectations/social norms, trust in information sources to base their knowledge on good science, trust in information sources, and trust in the behaviour of others to follow regimens and regulations. The following factors had eigenvalues greater than 1.

The analysis of social expectations and social norms identified three factors (α=0.783). Factor 1 consisted of groups downstream from the feed-lot, such as meat packers, consumers and retailers, in addition to institutions that regulate or guide feed-lot-veterinarians, such as the FDA, state licensing boards and professional organizations. Factor 2 consisted of individuals directly involved in the feed-lot, specifically clients, cattle owners who function as a kind of indirect client, and nutritionists who are involved in day-to-day feed-lot management. Factor 3 consisted of other veterinarians, pharmaceutical companies, and veterinary professional organizations with a weak factor loading for the third component.

The analysis of veterinarian confidence that salient others base their recommendations on good science resulted in four factors (α=0.814). Factor 1 consisted of government agencies. Factor 2 consisted of different kinds of veterinarians, with the exception of a weak factor loading for cattle-feeder associations. Factor 3 consisted of feed-lot operators, with a very weak factor loading for nutritionists and respondents themselves. These are individuals who advise operators on the health of feeder cattle. Factor 4 consisted of nutritionists, drug distributors, pharmaceutical salespersons, and cattle-feeder associations.

The factor analysis for confidence in the judicious-use guidelines or regulations of salient others resulted in three factors (α=0.740). Factor 1 included nutritionists, feed-lot operators, over-the-counter drug outlets and consumer and advocacy groups. This factor consisted of non-experts. Nutritionists and feed-lot operators may be involved in the administration of antibiotics, but veterinarians do not characterize them as antibiotic experts. Factor 2 included other feed-lot veterinarians, pharmaceutical salespersons and technical-service veterinarians. These are individuals involved with drug distribution. Factor 3 consisted of the FDA, cattle-feeder associations and veterinary organizations. These are groups with extensive access to antibiotic expertise.

The factor analysis for behavioural trust resulted in four factors (α=0.804). Factor 1 consisted of nutritionists, drug distributors, pharmaceutical salespersons, and non-cattle veterinarians. These are non-experts involved in drug distribution. Factor 2 consisted of technical-service veterinarians, respondents themselves, and other feed-lot veterinarians, all of whom are experts in feed-lot production medicine. Factor 3 consisted of the two groups of cattle producers that precede feed-lot operators in the supply chain. Factor 4 consisted of feed-lot operators in general, with a weak factor loading on feed-lot nutritionists.

Regression Model

Prior to interpreting our regression model, we examined our dependent and independent variables to insure each met acceptable standard assumptions for normality, and we assessed our models for conformity with linearity, homoscedasticity of errors and independence of residuals assumptions. Table 1 reports the results of our stepwise linear regression model. We were able to predict the dependent variable measuring the willingness of feed-lot veterinarians to decrease their recommendation of metaphylaxis if good science were to demonstrate a definite harm with an adjusted r^2 of .480.

Several items were associated negatively with the likelihood that feed-lot veterinarians would decrease their metaphylactic treatments. These items included: the strength of the economic pressure to recommend metaphylaxis; the strength of the

Table 1. Regression model with dependent variable 'If good science were to show a definite risk to public health from using antibiotics, over the next year would you voluntarily plan to recommend that your clients change the number of cattle treated?'.

	B	Std. Error B	Standardized Beta
Economic pressure to recommend high-risk metaphylaxis	–.167	.079	–.221*
Social expectation of other veterinarians, pharmaceutical companies and veterinary professional organizations to recommend metaphylaxis	–.324	.079	–.455***
Moral obligation to recommend high-risk metaphylaxis	–.255	.075	–.364***
Trust in information			
Confidence government agencies base their recommendations on good science	–.243	.074	–.335**
Confidence in regimens and recommendations of nutritionists, feed-lot operators, over-the-counter drug outlets, and consumer and advocacy groups	–.255	.072	–.369***

Notes: * $p<0.05$, ** $p<0.01$, and *** $p\leq0.001$. Adjusted r^2=0.480, n=62. Dependent variable is coded: 2=greatly increase, 1=increase, 0=no change, –1=decrease, –2=greatly decrease, –3=eliminate use; moral duty is coded: 1=strongly agree, 2=agree, 3=neither agree/disagree, 4=disagree, 5=strongly disagree; expectation is coded: 2=strongly expect, 1=expect, 0=neither expect/not expect, –1=not expect, –2=strongly not expect; confidence is coded: 2=very confident, 1=confident, 0=neither confident/unconfident, –1=unconfident, –2=very unconfident; economic pressure is coded: 1=strongly agree, 2=agree, 3=neither agree/disagree, 4=disagree, 5=strongly disagree.

moral obligation to recommend metaphylaxis regardless of negative consequences to human health; the strength of the expectations of other veterinarians, pharmaceutical companies and professional organizations to recommend metaphylaxis; the confidence that government agencies base their claims about antibiotics on 'good science'; and the confidence in treatment regimens provided by non-experts in feed-lot production medicine such as nutritionists, feed-lot-operators, OTC drug outlets and consumer advocacy groups. All items measuring fiduciary trust, structural and demographic characteristics were insignificant in the model.

Discussion and Conclusion

The analysis examined how some veterinarians contend with potentially conflicting values as they evaluate antibiotic treatment options. We explored these deliberations through the concept of contingent adoption, an attitude defined as the intention to adopt or cease a particular technological behaviour under specified consequences, here stipulated as definite harm to human health. Although structural and demographic measurements did not predict metaphylactic recommendations, psycho-social characteristics, defined within the agro-industrial context of feed-lot medicine, successfully predicted the willingness of feed-lot veterinarians to forgo the recommendation to their clients of antibiotic metaphylaxis to at-risk cattle if this behaviour were to have definite negative consequences for public health.

Our findings that feed-lot veterinarian perceptions of economic pressure to recommend metaphylaxis would militate against their willingness to reduce such treatments, regardless of other considerations confirm the well-founded claim of the diffusion of innovations literature that relative advantage is an innovation characteristic that encourages the formation of positive attitudes towards a particular technological practice (Rogers, 1995). As expected from the results of earlier research, pressure from others who are positively inclined towards antibiotic use such as other veterinarians, professional organizations, and pharmaceutical companies also promoted the use of metaphylaxis (Burnkrant and Cousineau, 1975; Bearden et al., 1986; Ajzen et al., 2004). However, a more complex story unfolded as we explored other factors in our model of contingent adoption. Moral obligation was of particular importance. This finding entails a balancing act between moral duty and economic pressure. To the extent that veterinarians consider metaphylaxis to be a moral obligation, this obligation will not come into conflict with the pressure to prescribe metaphylactic treatments. However, as a veterinarian's moral obligation to administer metaphylaxis diminishes, they become more likely to consider the reduction of metaphylaxis, counter to economic pressure.

Like Arrow's physicians (1963), feed-lot veterinarians are rational actors constrained by duty. Their behaviour and attitudes can be understood as the product of production forces such as the economic benefits that accrue from antibiotic use, and their understanding of the moral obligations and social pressures implicit in their participation within a feed-lot production economy. Current rational-choice models of moral obligation focus on a general obligation. A person is asked if they are morally bound to perform a particular behaviour. Whereas moral obligation in a generally defined sense is understood to be a predictor of attitudes and behaviours (Sparks et al., 1995; Sparks and Shepherd, 2002; Conner et al., 2003; Kaiser and Scheuthle, 2003; McMillan and Conner, 2003), little empirical work has examined the balancing of moral obligation to one party against the conflicting social expectations of others.

The veterinarian oath stipulates a veterinarian's moral obligation is principally to the 'benefit of society' and their duty to the well-being of animals is to be carried through so as to promote this overall benefit (AVMA, 2003). Subsidiary benefits that support this moral object include animal health and the relief of animal suffering, or essentially the promotion of animal well-being, and public health. It is not entirely clear from this oath if any of the subsidiary goods are to supersede another, although the benefit to society would suggest overarching importance is placed on human health. Such a hierarchical approach to attitude formation did not take place among the feed-lot veterinarians we surveyed. Moral duty to cattle well-being was an important predictor of contingent adoption; and the obligation to human well-being stipulated as a contingency in our measure of contingent adoption did not entirely supersede the duty to recommend metaphylaxis. When faced with a conflict, feed-lot veterinarians calculated a balance between obligations to humans and cattle.

When veterinarians form attitudes towards antibiotic metaphylaxis, they not only consider their own obligation to treat their patients, but also consider the expectations of other parties within the feed-lot production economy, and the trustworthiness of these parties. We conceptualized the attitude towards these obligations as trust, specifically as trust in information and fiduciary trust. Although the item measuring fiduciary trust was not significant, we found two measures of trust in information to be of importance in veterinarians' contingent adoption of metaphylaxis.

If feed-lot veterinarians believed government agencies base their beliefs on good science, then they were more likely to reduce recommendations of antibiotic metaphylaxis, contingent on a legitimate claim that such a treatment will harm human health. Furthermore, feed-lot veterinarians were more likely to recommend a reduction, contingent on definite harm to human health, as their trust in non-experts increased. The presence of these two groups in the regression model supports previous research that indicates the differential role that trust in distinct actors plays in belief formation (Wynne, 1989; Priest et al., 2003).

Brown and Michael (2001) identified the transmission of knowledge through the popular media and the portrayal of certainty by scientific experts as sources for the limited confidence placed in government experts by members of the public. A different dynamic exists between feed-lot veterinarians and the other social actors they encounter as they engage in antibiotic decision-making. The relative ranking of actors in the confidence in recommendations, guidelines and regulations question provides some clues to this dynamic. The two groups in which they place the greatest degree of confidence are other veterinarians and their professional organizations, followed by the FDA. Nutritionists and technical-service veterinarians are also evaluated with some degree of confidence. All of these groups are professionally credentialed experts who deal regularly with antibiotic use in a feed-lot context, either as practitioners or as advisors and regulators. Thus, all these groups possess a shared framework for interpreting the certainties inherent in antibiotic use (Dean and Scott, 2005), even if they may disagree on the degree of certainty necessary to take precautionary measures on regulation. Furthermore, they are groups that communicate through a set of shared professional journals, with the exception of nutritionists who nevertheless do overlap in their readership of specialist material on feed-lot medicine, rather than the popular media. It is the presence of such shared conceptual frames and value systems that form a basis for social trust (Earle and Cvetkovich, 1995). Such a basis is lacking between many feed-lot veterinarians and

the groups that fared least well in their ranking of trusted advisors on antibiotic decision-making. Consumer and advocacy groups are not in immediate contact with feed-lot veterinarians, and their interactions are most often mediated, either through the news media or their circulars. These circumstances mirror the conditions described by Brown and Michael (2001) that exist between the media-viewing public and professional and governmental experts.

We would be remiss if we do not address certain weaknesses to our study. The focus of our model of contingent adoption on individual behaviour does not address a host of socio-economic and political factors that would likely impact the antibiotic behaviour of feed-lot veterinarians. For example, veterinarians are expected to follow FDA-CVM antibiotic regulations. The impact of socio-political dynamics and economic agents on the regulatory environment that permits this behaviour, and of the socio-economic impact of agribusiness or the pharmaceutical industry on regulation and behaviour within the cattle feeding industry are not addressed by this study. A complete account would address the moral reasoning of feed-lot veterinarians within these larger economic, political and social contexts.

Nevertheless, we designed the concept of contingent adoption as a heuristic tool to reveal the moral reasoning of feed-lot veterinarians in relationship to their larger social environment. These professionals negotiate an acceptable choice within a socio-economic context defined by a range of other moral actors. By understanding trust not only as a matter of apparent competency, but as an attitude towards the moral propensities of salient others, we can understand the calculation of acceptable behaviour by feed-lot veterinarians not only as a product of their own moral duties, but also their understanding of other actors' competencies and moral character.

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Likelihood of Succession and Farmers' Attitudes towards their Future Behaviour: Evidence from a Survey in Germany, the United Kingdom and Portugal

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Abstract. Most authors have referred to the likelihood of having an identified successor in the family as an influential factor affecting several family farm management decisions. Here, we investigate this relationship for a selection of such decisions: the timing of farmers' retirement; the willingness of farmers to change their current mix of activities; their readiness to adopt new farm activities; and their attitude towards intensifying production. The categorical data analysed, mostly Likert scales, came from a postal survey carried out in 2001–2002 of a sample of 13 516 German, British and Portuguese farmers, with just over 4,600 valid responses. Statistical association between the variables was examined by computing the χ^2 statistic and testing for the null hypothesis of no association between the various pairs of variables.

The main conclusions are that the likelihood of having a successor was positively related to the planned length of active farmers' lives, to farmers' adoption of new activities, and to farmers' willingness to intensify production in the future. The likelihood of having a successor was also found to be negatively related to the intention of leaving farm land idle. However, no empirical evidence was found of a statistically significant relationship between the likelihood of succession and farmers' readiness to change the mix of their future farm activities.

Introduction

Many farms in Europe are run as family businesses and, for these farms, succession from within the farm family is traditionally the first choice (Blanc and Perrier-Cornet, 1993; Errington and Lobley, 2002; Glauben et al., 2002). This is likely to be connected to the very nature of family farming where the time-span for production or investment decision-making, for example, is often inter-generational, rather than intra-generational. In this connection, some authors argue that for many family

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farms the main objective of farming is less profit maximization than assuring farm succession and economic survival, and a livelihood for the extended farm family across several generations (for example, see Gasson and Errington, 1993; Kimhi and Nachlieli, 2001).

In contrast, however, some also argue that not all family farm managers look for a successor amongst their children, as some farmers in more depressed and isolated agricultural regions would rather a different and less hard livelihood for their descendents out of the agricultural sector. For example, Fennell (1981) writing about the European Community, said: 'the literature suggests that there is clear evidence that many farmers do not want any of the family to succeed them'. Barkley (1990) found that this was one of the main reasons behind the outmigration of rural labour in the USA between 1940–1985. Also, according to Gasson and Errington (1993), this is so 'often because they do not want their children to have the same struggle as themselves on small marginal farms where the standard of living is falling behind that of the rest of society'. It seems, therefore, that the harder the conditions under which farmers operate, the less likely they are to wish one of their heirs to eventually replace them.

Nevertheless, whenever a willing successor is identified it implies that there is a longer time-span for making farm decisions, and it seems realistic to assume that the perceived likelihood of having a successor influences a number of attitudes and decisions concerning the future of the farm business and the future of the farmer himself. However, the literature does not provide much evidence supporting this contention. To our knowledge, most of the literature addressing the issue of farm succession, rather than studying the effects of it, aims to identify causes for the likelihood of farm succession. However, the issue of the effects is also addressed, sometimes normatively only, but in other cases in evidence-supported terms. To give a few salient examples for the latter, authors argue that the more likely the farmer is to have a successor, the more land is acquired (Hine and Houston, 1973; Harrison, 1981; Hutson, 1987), the more borrowings to finance on-farm investment is demanded (Marsden et al., 1989; Stiglbauer and Weiss, 2000), and the more milk quota is purchased (Burrell, 1989). In the same line, Potter and Lobley (1992, 1996) argue, based on survey evidence from Great Britain, that the less likely succession is to happen, the more willing is the farmer to take up extensification schemes and to farm in more environmentally friendly ways. Quoting Gasson and Errington (1993), 'without their [children's] interest and involvement, there may be little to drive an ageing couple into expansion'.

Furthermore, some authors contend that the less likely a successor is, the more risk averse is the farmer, because, as the farmer grows older and has no or little prospect of a successor, the farmer has no incentive to expand or adopt risky investments or production decisions that might endanger his financial stability and (or) add to the farmer's work-load (Viaggi et al., 2011). To quote Gasson and Errington (1993) in support of this line of reasoning,

> 'the presence or absence of a successor may have more influence upon business objectives and farm performance than the farmer's age. A farmer with a successor has a "generational stake" in that successor which provides a constant incentive for forward planning and expansion. A farmer without a successor has none, and in old age may begin to run down the business and consume capital, if only to reduce workload.'

More recently, Calus et al. (2008) point out, and give evidence in the same direction, that once farmers identify a successor they become more likely to invest in the farm.

On the other hand, there is also evidence that such influence of the likelihood of there being a successor on farmers' attitudes and behaviour varies (increases) with farm size and scale and with the degree of farm specialization (e.g. Errington, 1998; Glauben et al., 2002; Hennessy and Rehman, 2007).

To summarize, the literature suggests, despite the lack of much evidence based on extensive surveys, and comparisons across countries, that the likelihood of there being a successor changes the attitude and behaviour of the farmer decision-maker, making them 1. more prone to intensify the farm activities, 2. more inclined to invest in the farm business, and 3. less risk adverse – for example, being more willing to adopt new activities. Furthermore, the degree of such influence increases with farm size and scale and the level of the business's specialization.

In what follows, we first present our research question followed by detailing our data source and methodology. We then detail our research findings before making some conclusions.

Research Question

Despite the unquestionable influence of the likelihood of a successor on European farmers' behaviour, published evidence in this connection is relatively scarce as mentioned in the section above and, generally, has not been based on large surveys or on cross-cultural or international comparisons. Yet, it is important to know what is at stake when a farmer has no prospect of a successor, in order to correctly assess policies directed, for example, at the promotion of early retirement of older farmers, and their replacement by younger, perhaps better-educated, people.

The authors were involved in a large survey of farmers in three European countries (Germany, Portugal and the UK) – known as the Bond Scheme Survey (Daubjerg et al., 2005; Tranter et al., 2007) – which addressed such matters of farm succession and farmers' behavioural intentions, as well as their attitudes to CAP reform. We realized that, despite them not being the matters of the central goal of the research, interesting evidence was also available from this study on the issue of the likelihood of a successor and farmers' likely behaviour. As such, we decided more recently that this survey data would also help to answer the general question of whether farmers who thought that it was likely that they had identified a successor would have significantly different attitudes towards a number of farm management issues, and different behavioural intentions concerning the future of their farm business. In particular, the Bond Scheme project survey questioning structure made possible the study of whether the likelihood of there being a successor (the explanatory variable) affects a number of attitude measurements concerning farm management (the dependent variables). These latter variables were: 1. the timing of retirement or date of leaving active farming; 2. willingness to change; 3. willingness to innovate the activities mix; 4. willingness to intensify production; and 5. the intention to leave farm land idle in the future. It is this latter aspect that makes the analysis discussed here unique amongst the published literature on farmers' succession and inheritance issues. It should also be emphasized that not only was the survey large, but it occurred at exactly the same point of time in each study country.

Data Source and Methodology

The data used as the basis for the analysis in this article comes from the above-mentioned research project on the Bond Scheme. A survey of farmers in Germany, the United Kingdom (UK) and Portugal was carried out in late 2001 to early 2002; in each country, some 4,500 farmers were sampled making a total of 13 516. In Germany, they were drawn from the official Pension Records database, in the UK from the Yellow Pages telephone directory and, in Portugal, from the list of the Government's Office of National Statistics (Tranter et al., 2004, 2007).

The response rates were, for Germany, the UK and Portugal, 36.8%, 40.2%, and 33.4%, respectively. Responses were checked out for bias, comparing the sample of respondents with known overall national patterns, and it was found that smaller farm businesses were slightly under-represented in the responses from both the UK and Portugal. However, when comparing early to late respondents for non-response bias for a range of farm and farmer features, very few statistically significant differences were found.

A question should be raised here about the likely accuracy or validity of asking people questions about how they might behave in the future. Few studies have been carried out to test this point, but Tranter et al. (2004, 2007) review such intentions surveys in farming and conclude that, providing the surveys are large and well designed following pilot testing, their results tend to be reliable.

First on the four page questionnaire, and following more general contextual questions on the farm structure and on the farmer's profile, a question on the likelihood of having a successor was set, to be answered using a five-point Likert scale:

> '1. "Have you identified a successor?" (1. Definitely – 2. Very likely – 3. Possibly – 4. Unlikely – 5. Definitely not).'

Second, questions on farmers' intentions on the future of their own farms and occupation, the dependent variables, were asked twice, under initially a conservative and then a changing future policy scenario.

The first was a hypothetical 'business as usual' scenario – that is, no changes to the Agenda 2000 direct payments regime, the current agricultural policy situation at the time of survey. Under this first scenario, the questions dealt with in this article were the ones concerning farmers' plans for their farm and for their own professional situation over the next 10 years.

The second proposed scenario was one of a policy change to fixed[1] and decoupled direct payments without any conditionality apart from keeping the agricultural lands' titularity. (This corresponds closely to the current CAP framework today, which was not known at the time of survey). The questions posed to farmers under the assumption of this second scenario were: 1.whether they would change their current mix of farming activities; 2. whether they would adopt new farming activities; and 3. whether they would intensify their current level of production. The actual specific questions posed to farmers under the two different policy scenarios are given next.

Questions on intentions under the first scenario (the Agenda 2000 direct payments regime):

> '2. "Do you think you will be farming in ten years time? Yes or no?"

3. (If 'no' to question 2) "What will be your likely situation in ten years? (a) Having retired at the normal age, (b) having taken early retirement, or (c) having taken up other employment?".
4. (If 'no' to question 2) "What will happen to the land you currently farm?" (1) Sold, (2) Give up the tenancy, (3) Passed to successor, (4) Rented out, or (5) Abandoned the land?".'

Finally, for the second scenario posed (direct payment decoupled from land use), the following questions were asked:

'5. "Would you change your mix of activities? (Yes or no?)".
6. "Would you adopt new activities? (Yes or no?)".[2]
7. "Would you leave any of your land idle? (Yes or no?)".[3]
8. "Would you intensify production? (Yes or no?)".'[4]

The respondents and their respective farms are next briefly described on their age and educational level attained, on farmed area and also on their farms' main productive orientation. Full details are provided in Appendix 2. These characteristics were highlighted for examination as it has been shown above that they affect farmers' behaviour and attitudes to the future if they have a successor as shown by Errington and Gasson (1994), Errington (1998), Glauben et al. (2002) and Hennessy and Rehman (2007).

Concerning farmers' age, farmers 50 years old or older predominate, accounting for around 60% of the sample in the UK, and 75% of the samples in Germany and Portugal.

The educational level attained was highest amongst German respondents, as some 25% left full-time education at 20 or more years old followed by the UK with around 19% with this educational level, and with the Portuguese respondents with the lowest educational level, with less than 10% of respondents leaving full-time education at 20 or more years old.

Looking at the farmed area of respondents, the structure of the sample varies considerably across the three countries, with most of the Portuguese respondents, nearly 88%, being smallholders of less than 25 ha. This group is also important amongst German respondents, representing slightly more than 50% of their total. However, for the UK, 50% farmed 100 or more ha of land each.

Finally, concerning the respondents' main type of farming, the profile is similar in Germany and the UK, with most farmers mainly oriented to livestock or to mixed livestock and crop farming. Few had cropping as their main orientation, as only 18% of respondents in the UK and as few as 8% in Germany had this type of farming. On the other hand, more than half the respondents in Portugal had cropping as their main productive orientation.

Research findings

Next, we present and discuss findings concerning, first, the farmers' overall perception on the likelihood of having identified a successor, the explanatory variable for this study and, then, the association of this variable to the attitudinal variables included in the study and referred to above. A null hypothesis of 'no association' was set and tested by means of the χ^2 statistic, appropriate for such categorical data, and

a probability threshold for rejecting the null hypothesis of 'no association' was set at the 5% level of statistical significance.

Comparing all possible pairs of the three countries on answers to the likelihood of succession for the full Likert scale (upper part of Table 1), and using the χ^2 statistic for testing the null hypothesis of no differences, the null hypothesis is rejected for all the country comparisons (at the 1% level). However, the χ^2 statistic is the highest when comparing Germany to Portugal (χ^2=203.5), and the lowest when comparing the UK to Portugal (χ^2=42.8). This is also consistent with the result after amalgamating the original Likert scale into two single categories (lower part of Table 1), namely 'having a successor is, at least, possible' and 'unlikely or definitely no successor', where the differences are not only statistically significant for all country comparisons, but also the Portuguese and UK respondents are closer than any of these countries to Germany concerning respondents' likelihood of having a successor. When looking at the proportions for the three countries, slightly more than half the respondents in Germany said they did not have a successor or the successor was unlikely, while in Portugal, this figure was lower (44%) and, in the UK (39%), lower still.

Coming now to the influence of the likelihood of succession from the attitudinal variables, and starting with farmers' expectations of being an active farmer in 10 years time (Table 2), the results show that respondents in Germany and Portugal expecting a successor are less likely to be active in farming in 10 years time than

Table 1. Farmers' overall perception on the likelihood of having a successor for their own farm business.

Likelihood of a successor:	Germany (n=1209)	UK (n=1705)	Portugal (n=1373)
'Definitely' (1)	16.2%	22.5%	14.7%
'Very likely' (2)	13.3%	13.4%	17.8%
'Possibly' (3)	20.3%	24.9%	23.8%
'Unlikely' (4)	10.3%	20.6%	25.6%
'Definitely not' (5)	39.9%	18.6%	18.0%
	100.0%	100.0%	100.0%
Having a successor at least possibly (1+2+3 from above)	49.8%	60.8%	56.3%
Unlikely or definitely no successor (4+5 from above)	50.2%	39.2%	43.6%

Table 2. Farmers stating that they would not be in farming in 10 years time according to the likelihood of having a successor (%).

Likelihood of a successor	Germany	UK	Portugal
Sucessor possible or certain	41.0	69.0	52.1
Unlikely or definitely no successor	46.6	69.3	62.2
n	1190	1679	1350
χ^2	30.24	0.01	27.17
df		1	
Significance	0.00	0.91	0.00

respondents without or with an unlikely successor. For these two countries, the association was highly statistically significant at the 1% level (χ^2 for one degree of freedom, respectively 30.2 and 27.2). In Germany, the percentage of respondents without a successor and expecting to end active farming before 10 years time ahead was 47%, but the equivalent figure was only 41% for respondents with a possible or certain successor. In Portugal, the difference was even higher, with some 62% of respondents without a successor expecting to end up active farming in 10 years time, and only 52% expecting to be doing this amongst the ones with an identified successor. On the other hand, the same statistical relationship was not found at all in the UK, where the proportion of respondents expecting to end up farming in 10 years was some 69%, irrespective of their likelihood of having a successor.

As detailed earlier in the data source and methodology section, for respondents stating that they would not be in farming in 10 years time, two further questions were posed. First, what would they be doing after leaving farming (Table 3) and, second, what they would do to their current farmed land (Table 4).

Concerning future 'occupation', again, a statistically significant association with the likelihood of having a successor was found for German and Portuguese respondents, but not for those in the UK. In Germany and Portugal, compared with respondents without a successor, respondents with a successor would retire earlier (at the normal age) and would also be less likely to have taken up other employment. Also, the German respondents with an identified successor would be more likely to anticipate retirement (at earlier than the normal age).

Concerning the destination of their current farmed land for those who stated they would not be in farming in 10 years time (Table 4), the differences between farmers with and without successors are very important in statistically significant terms,[5] primarily because passing the land to a successor was a simple or a very unlikely option for the second group. Accordingly, the proportion of farmers with a successor passing the farm to the successor would be 69%, 79%, and 76%, in Germany, the UK, and in Portugal; for farmers without (or with an unlikely) successor, these figures were only 5%, 3%, and 14%, respectively.

Table 3. Future occupation of farmers expecting to leave farming within 10 years by the likelihood of having a successor (%).

Stated ways out of farming (farmers' status)	Germany		UK		Portugal	
	Successor possible or certain	Unlikely or definitely no successor	Successor possible or certain	Unlikely or definitely no successor	Successor possible or certain	Unlikely or definitely no successor
Retirement at the normal age	60.0	37.9	77.3	78.2	57.5	48.0
Early retirement	12.1	9.1	14.7	11.7	5.2	5.9
Taking up other employment	27.9	53.0	8.0	10.1	37.3	46.1
n	397		564		648	
χ^2	25.16		2.28		5.94	
df			2			
Significance	0.00		0.32		0.05	

Table 4. Disposal of farmland, for farmers expecting to leave farming within 10 years by the likelihood of having a successor (%).

	Germany		UK		Portugal	
Stated ways out of farming - destination of the farm	Successor possible or certain	Unlikely or definitely no successor	Successor possible or certain	Unlikely or definitely no successor	Successor possible or certain	Unlikely or definitely no successor
Farm sold	1.3	6.8	3.7	40.1	1.9	7.2
Giving up the tenancy	22.6	56.8	3.5	23.4	4.6	19.1
Passing farm to a sucessor	69.2	5.4	79.1	2.6	76.4	14.4
Renting out the farm	4.4	20.3	13.2	30.3	4.2	8.1
Abandoning the farm land	2.5	10.8	0.5	3.6	12.7	51.3
n	381		705		495	
χ^2	175.09		427.00		193.35	
df	4		4		4	
Significance	0.00		0.00		0.00	

Naturally, for those without a successor, the eventual destination of the farm land would have to be 'sold' or 'rented out' or, for tenant farmers, simply by giving up the tenancy. As expected, all these categories increased in their importance for farmers without a successor. For the last option, the decision to abandon the farm land, in the case of owned land, the proportion of farmers without a successor choosing it was considerable in Portugal, where more than half the respondents indicated that as their option; it was also relatively high in Germany, with 11% of farmers without a successor saying so, and was also visible in the UK, with some 4% of the farmers without a successor stating the same. In addition, compared to farmers with a successor, the proportion of farmers without a successor stating that they would abandon their farmed land was around four times higher for those in Germany and Portugal and about seven times higher for those in the UK.

Finally, association between the likelihood of succession and farmers' attitudes concerning: 1. openness to changes in the mix of activities; 2. openness to the adoption of new farm activities; or 3. openness to the intensification of farm production are assessed next. In addition, 4. the intention of idling at least some farm land as a result of the 'new' decoupled direct payments was also assessed.

For the willingness to change the mix of farm activities, none of the differences between farmers with and without a successor identified (Table 5) were found to be statistically significant (at the 5% level). For the Portuguese sample, however, the differences were nearly significant as the probability for the χ^2 statistic was 7%, with percentages of farmers in that country willing to change their mix of activities of 35% and 30% respectively, for respondents with and without a successor. For the other two countries, there were also differences between the two groups in the same direction, but these were very small differences and were far from being statistically significant.

Table 5. The likelihood of having a successor in relation to changes to the mix of farm activities.

Future Decision Intentions under the Decoupling Scenario	"Would alter mix of farm activities" (%)		Statistics		
Country	Successor possible or certain	Unlikely or definitely no successor	n	df	χ^2 (significance)
Germany	33.8	32.1	1174		0.55
UK	31.0	30.7	1679	2	0.91
Portugal	34.5	29.6	1227		0.07

Table 6. The likelihood of having a successor in relation to adopting new farm activities.

Future Decision Intentions under the Decoupling Scenario	"Would adopt new farm activities" (%)		Statistics		
Country	Successor possible or certain	Unlikely or definitely no successor	n	df	χ^2 (significance)
Germany	9.3	7.6	1174		0.31
UK	6.2	8.1	1679	2	0.14
Portugal	13.9	10.2	1227		0.05

Table 7. The likelihood of having a successor in relation to changes in farm production intensification.

Future Decision Intentions under the Decoupling Scenario	"Would intensify production" (%)		Statistics		
Country	Successor possible or certain	Unlikely or definitely no successor	n	df	χ^2 (significance)
Germany	3.7	3.7	1083		0.99
UK	22.6	15.5	1608	2	0.00
Portugal	23.7	18.2	986		0.04

Table 8. The likelihood of having a successor in relation to leaving farmland idle.

Future Decision Intentions under the Decoupling Scenario	"Would leave idle at least some land" (%)		Statistics		
Country	Successor possible or certain	Unlikely or definitely no successor	n	df	χ^2 (significance)
Germany	38.2	79.7	846		0.00
UK	17.3	24.8	1613	2	0.00
Portugal	44.4	53.4	1030		0.01

For the adoption of new farm activities, the differences between farmers with and without a successor identified (Table 6) were found to be statistically significant (at the extreme of the 5% level) only for the Portuguese sample, with the proportions of farmers in that country intending to adopt new farm activities of around 14% and 10% for respectively, respondents with and without a successor identified. No statistically significant differences were found for the intentions of respondents in the other two countries for this particular variable.

When examining the intensification of farm production, the differences in intentions between farmers with and without successors identified (Table 7) were found to be statistically significant only for the UK and for the Portuguese samples, with proportions of farmers willing to intensify production of some 23% and 16% in the UK, and of 24% and 18% in Portugal respectively, for respondents with and without a successor. No statistically significant differences were found for respondents from Germany, where the proportion willing to intensify production under the new agricultural policy regime were exactly the same, at 3.7%, for both groups of respondents.

Finally, concerning the study farmers' intention of idling at least some land under the decoupled policy payments scenario presented to them, the differences between respondents with and without successors (Table 8) were statistically significant and in the same direction for all study countries. That is, respondents without successors were, in all study countries, more likely to idle at least some of their farm land after the proposed policy changes were implemented.

For the two groups (with and without successors), the proportion of respondents intending to idle at least some farm land under the proposed policy changes were 38% and 80% for Germany, a very considerable difference, 17% and 25% for the UK, and 44% and 53% for Portugal.

Conclusions

Returning to the initial research question on the likelihood of how having an identified successor might influence attitudes and behaviour of farmers towards their future situation, the data analysed in the study discussed here gives evidence favouring this relationship for some of the expected consequences, but not for others.

For example, we would expect that farmers with an identified or likely successor would be less likely to be retired or out of farming in 10 years time after the survey. This was found to be the case for respondents in both Germany and Portugal, but was not confirmed by analysis of the data from the UK. For farmers expecting to leave farming in 10 years time, we would also expect that a larger proportion of them would be taking retirement at the normal age (not postponing retirement) or to have taken up other employment away from their farm. Again, this position was confirmed for Germany and Portugal, but there was no evidence confirming this for the UK.

We also predicted that, drawing especially from the work in the EU of Blanc and Perrier-Cornet (1993) and Viaggi et al. (2011), under lessened agricultural policy restrictions, farmers with a certain or likely successor, when compared to those without a successor, would be more flexible about changing their mix of farm activities, more prone to adopt new farm activities and more willing to intensify farm production. Concerning the flexibility of mix of farm activities, the data did not confirm the prediction. For the readiness to adopt new activities issue, only data from Portugal

confirmed this prediction. For the intensification of production issue, the prediction was confirmed for the UK and Portugal only, but not for Germany.

Finally, we also expected that the absence, or the unlikelihood, of having a successor, would make it more likely for farmers to decide to abandon or leave some of their farm land idle in the future. This was confirmed completely by data for all the three countries surveyed in our study, thus echoing the findings of, for example, Harrison (1981), Barkley (1990) and Hennessy and Rehman (2007).

Notes

1. Equivalent to average payments in the last three years (see Appendix 1 for the full transcript of the relevant questionnaire section detailing this scenario).
2. For this question the respondents were actually asked to choose out of 12 varied activity categories as the ones that they would start from scratch; for the purposes of this article, any respondent indicating at least one activity as 'new' was assigned a 'yes' to question 6.
3. This question was posed as a five-point Likert scale (none – less than half – around half – more than half – all); for the purposes of this article, all the answers except 'none' were considered a 'yes' to question 7.
4. This question was posed as a five-point Likert scale (greatly decrease – decrease – remain unchanged – increase – greatly increase); for the purposes of this article, the answers 'increase' or 'greatly increase' were considered a 'yes' to question 8.
5. χ^2 statistic associated with a probability of less than 0.1% for the three countries.

Appendix 1: Policy Reform Scenario 2 Statement

'The next questions relate to the first step of our proposed policy change for the future of arable area aids and headage payments received by farmers under the IACS system. Please imagine that crop payments will be detached from current land use. Thus, future payments will no longer depend on which crop you plant, the area planted or even whether land is planted at all. Instead, payments will be made at a flat rate, on the basis of your average arable area claims during the previous three years.

Our proposal will also affect the livestock sector similarly, with future payments being based on the average number of livestock units (cattle and sheep) for which the farm claimed payments in the previous three years. As for crops, the entitlement would be held the same, irrespective of the actual number of livestock units kept in the future. This farm-specific payment entitlement would also be attached to the land used by the farm so that, if the farm was subsequently broken up, future payments would continue to be made to the component parts.

Please reflect your likely practical response to this proposed policy change when answering the following questions' (Tranter et al., 2007).

Appendix 2: Some Details of the Study Respondents and their Farm Businesses by Study Country (% of Respondents)

		Germany	UK	Portugal
Age of farmer in years:	Sample size:	1201	1685	1283
< 50		23.6	40.4	24.9
50 and over		76.4	59.6	75.1
Age at leaving full-time education (years):	Sample size:	1157	1674	1184
< 20		74.8	81.5	90.3
20 and over		25.2	18.5	9.7
Farmed area (hectares)	Sample size:	1209	1674	1076
< 25		50.7	7.0	87.2
25 - 50		17.3	14.4	5.8
50 - 75		10.6	15.4	2.3
75 - 100		5.7	13.1	0.9
100 and over		15.7	50.0	3.8
Type of farming	Sample size:	1124	1643	1176
Mainly livestock		51.4	51.9	22.2
Mainly cropping		8.3	18.0	58.3
Mixed		40.3	30.1	19.5

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Changes in Food Chains in the Context of Globalization

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Abstract. This article highlighting the political and ideological conditions necessary for globalization and the role of the technologies associated with this process is an attempt to explain the nature and dynamics of change in food chains. In this text, a political-economic perspective is employed, relying on well-known theoretical and empirical examples that abound in the literature about globalization of food, and on the underlying theoretical explanation of the structural changes brought about or intensified by the globalization process.

It seeks to understand the logic and dynamic that explains why the corporate retailers became the main economic motors of deep and rapid changes in food chains and after a short appraisal of the effects of the changes it seeks to identify the winners and losers of the process.

Introduction

Since the beginning of the 1990s, a substantial body of literature has addressed the theme of the globalization of the agri-food system. After the seminal publication edited by Bonanno et al. (1994a) focusing on the role of transnational corporations (TNCs) in the global agri-food system, a broader perspective of TNCs as actors in global governance emerged. More recently, aiming at examining 'the *political* role that corporations play in efforts to *govern* the global *food* system', Clapp and Fuchs (2009, p. 2, emphases in original) edited their book seeking 'cross-referencing between these two literatures'.

This article results from an attempt to build up a pedagogical narrative inspired by the commodity systems methodology,[1] about a perspective that, to my knowledge, did not receive enough attention from the above-mentioned literature. That is, I will try to highlight the political and ideological conditions necessary for globalization. Also, I will stress the role of those pieces of technology associated with this process in order to explain the nature and dynamics of change in food chains.[2] I am aware that a detailed argumentation about all the issues involved could not be satisfactorily provided in a single article with page limitation; however, I feel that the

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main argument and other minor findings should be discussed by a broad audience of agri-food researchers.

This attempt follows a political-economic perspective, meaning that, besides seeking to understand the nature and dynamics of changes, an effort will be made to assess the importance and effects of those changes and to identify the winners and the losers in the process.

The article starts with a very short description of the overall globalization context, stressing the political/ideological conditions that, during the last decades of the twentieth century, paved the way for the emergence of intermediation-driven global capital[3] as the dominant forms of capital, relegating most of producer-driven capital to a secondary place. Then, the main drivers are identified that explain why the great distributors/retailers became the leading economic driving force of the food chains, and it intends to show relevant technological features involved in those changes.[4]

This approach relies on well-known theoretical developments and on empirical examples that abound in the globalization literature and, particularly, in that of the globalization of food.[5] Seeking an explanation for the processes of change it also appeals to the concept of the technological treadmill (Cochrane, 1979). This helps to clarify the dynamics of change and illustrates the structural effects of the adoption of technological innovations.

The text is organized as follows: the second section aims to link the changes in food chains to the context of globalization, highlighting the technological and the politically driven changes. In the third section, the structural impacts resulting from the changes in food chains are addressed, followed by some conclusive remarks that attempt to identify the winners and losers.

The Context of Globalization

It is assumed that the reader is familiar with the literature about globalization in general and particularly that involving food issues.[6] Nevertheless and taking the risk of being too schematic, I think that it is important to focus on the concept (see Box 1, where the most relevant features of the process are displayed). The current globalization phase of the capitalist system emerged in the 1970s as a result of the political will and actions of a new generation of governments, pioneered by Thatcher in the UK. Political action inspired on the neo-liberal ideology that had become hegemonic after a relatively long process of gestation; a process that resulted from the ideological and political project to shape the future of capitalist development. This process, financed by very wealthy people, started before World War II and succeeded in enrolling leading people from the academic orthodoxy, namely economists from the Chicago and Austrian schools, in networks of think-tanks in association with opinion makers, business men and politicians (Busch, 2010).

My understanding of the process is the following: probably the most remarkable feature of this globalization period is the shift of power between the types of capital, highly associated with the revolutions in information technologies (IT), transport and logistics, as well as with state-led decisions that make possible worldwide trade liberalization, and the other features involved in the Washington Consensus.[7] That is, corporations involved in intermediation – either financial or commercial – are the winners of the process due to their ability to better take advantage of the emerging technologies that represent a prerequisite of globalization, as well as from the change of the nature of the state induced by the neo-liberal ideology.

Box 1. Globalization determinants and consequences.

- Technological change as a prerequisite. Revolution in transport, information technologies (IT) and logistics (generalization of containers).
- Neo-liberal policies, starting with Thatcher in UK and Reagan in the US and then followed voluntarily by other countries, while being imposed by the IMF on indebted developing countries. Policies that became known as the Washington Consensus, particularly the following recommendations (impositions):
  - Privatization aimed at expanding the reach of private capital under the ideological claim that this is a more efficient way to assure the provision of public goods.
  - Liberalization of trade: GATT is transformed into WTO, including agricultural trade. Regional agreements such as NAFTA in North America or the expanding Common Market in Europe. Countries such China or India become huge commercial players. Offshoring of services and of productive operations resulting in international outsourcing becoming common practice. Fordism came to an end and new methods of flexible management emerged, such as just-in-time.
  - Deregulation (re-regulation Bonanno et al. (1994b) or neo-regulation (Otero and Pechlaner, 2010). From a state regulator to a state facilitator (McMichael and Myhre, 1991) and a shift from TNCs adapting to the state regulations to imposing conditions on the state, either in developed or in developing countries (Moreira, 1994).
- Empowerment of finance capital: financial tyranny (Fitoussi, 1997) and the capture of the state by the financial system (Johnson, 2009).
- Financial speculation recently aimed at food commodities, as a source of huge price volatility, affecting essentially the developing poor (Ghosh, 2009).
- Change in the balance of power between labour and capital. Capital gained more freedom of movement and in many countries public perception gives a more benevolent look at the inequalities of wealth, while labour lost most of its influence over the state apparatus and unions lost much of their attractiveness. Furthermore, labour had to deal with the fear of unemployment, due to the generalization of outsourcing and offshoring, an efficient way to self-restrain wage and other benefits claims as well as to force labour to accept the flexibility so praised by market fundamentalists.

Concerning food chains, some technologies that will be mentioned below have been instrumental in granting a decisive competitive advantage to the corporations able to take full profit through them, meaning that the well-managed adopters were able to gain competitive advantages that constitute a remarkable leverage for a self-reinforcing process, favoring the constitution of oligopolies. I refer particularly, but not exclusively, to the corporations involved in distribution and retailing in the area of the food chain in which the effective power and control is located (Dixon, 2002).

Even rejecting technological determinism, one must acknowledge that technologically driven innovations have been determinant to allow large corporations to take advantage of their position along the agri-food chains at the global level, to gain market power and capacity to enter a reinforcing process, while small players on the chain are frequently the subject of a squeeze between giants located at the upstream and at the downstream of the chain.

Evidence supporting the argument is illustrated by the growing importance of the finance sector due to liberalization and deregulation to grant free rein to capital, coupled with IT paving the way to the emergence of the virtual economy, based firmly in speculation,[8] and by the sudden entrance of a few distribution or retail agents directly into the top rankings of the most important corporations, such as Wal-Mart, Carrefour, Tesco, Metro, Kroeger and Ahold, all of them involved in food supply (Hughes, 1996).

The Dynamics of Change of Food Chains[9]

In order to understand the logic and dynamics of change, it is worthwhile to regard the changing process as the result of a system of forces entailing dialectic relations

from which I will underline those involving issues related with: (i) capital accumulation; (ii) consumer behaviour; (iii) state regulations; and, particularly, (iv) technology-driven innovation.

Capital Accumulation

The logic of capital accumulation appears not to need any particular explanation if one does not forget that its prime goal is the incessant quest for profits. Therefore, due to the overall pressure to build up a state facilitator of the requisites of capital, the concerns about, or the opposition to, the logic of capital accumulation are left only to the struggles driven by workers, consumers movements, radical alternative movements and/or people involved in grass-roots protests. These movements involve very different actors, focusing usually on particular issues that express the changing and frequently limited concerns of the civil society.[10]

During this process, strong competition among capitalists was intensified and geographically extended, even when collaborations such as strategic alliances are formed. Furthermore, it should be stressed that an articulation between different types of capitalists and between them and non-capitalist forms of production/distribution/retail[11] is perfectly compatible with the logic of capital accumulation.

Since the 1980s, we have seen the emergence of new large transnational corporations gaining disproportionate market power while many old giants lost ground.

At this point a clarification must be made. A particularly well-informed observer, Robert Reich (2007, p. 10), states that large corporations lost much of their importance in the economy compared to the period that ends at the beginning of the 1970s. It seems that the positions are not contradictory and could be easily reconciled.

In fact, old giants dominated most of the US market, when this country absorbed the lion's share of the industrial production of the globe, indeed loses its relative importance due to the expanding reach of competition, as Reich argues. Nevertheless, with globalization new large players emerged: not only oligopolies involved in information technologies such as Microsoft, Google, Intel, Oracle, Cisco, etc., but also large corporations that took advantage of the technologically and politically driven changes to increase their market power. This happened in the financial sector[12] and with the large retailers, of whom many were of a transnational character.

In short, successful oligopolies, while keeping fierce competition amongst them, place themselves in the most profitable segments of global chains leaving the less profitable to smaller actors.[13] These most profitable segments are the result of the use of their own technologies protected by patents,[14] or from a mix of new technologies (logistics and centralized purchasing centres) coupled with successful management, such as TNC retailers. Those corporations get enough competitive advantage to raise barriers to new competitors that might wish to enter the market.[15] And, finally, this growing power is also favoured by mergers and acquisitions that characterize global businesses, taking advantage of the financial leverage made possible by innovations in finance.

The Behaviour of Consumers

Undeniably, consumers benefited from the globalization that made exotic and out-of-season products affordable for mass consumption, opening up new possibilities

to adopt new types of diet, such as ethnic-driven cuisines (Appadurai, 1986). However, the other face of this coin is the emergence of concerns about the globalization of food. Concerns originated essentially through fear about food safety (Allard, BSE, nitrofurans, dioxins, *E. coli*, *Salmonellas*, etc.) that, being amplified by the media, paved the way to the quest for the traceability of the most perishable foods and favoured the establishment of private regulatory standards.

But consumer behaviour also involves a number of movements opposing globalization that need to be taken into account even if not explored here (Lowe et al., 2008). Ranging from the ones that radically contest the system, to others ethically or environmentally concerned that focus their actions on the functioning of the agrifood productive systems (extensive versus intensive, organic production, etc.) or on support to the survival of local producers (fair trade) or local markets or demand guarantees about animal well-being.

State Regulations

When looking at state regulations, one must bear in mind that globalization brought deep changes to regulation (Marsden, 1999; Busch and Bain, 2004). In certain cases, existing regulations were circumvented through processes such as the replacement by others more favorable to capital accumulation or by a less effective enforcement of existing laws.[16] Furthermore, as Busch (2010, p. 334) put it, 'strategies of supply chain management (SCM) and the tripartite standard regime (TSR)[17] have provided large firms with new ways of acting in a neoliberal world'.

This does not mean that state intervention disappeared, but only that it changed the intervention focus from direct economic intervention to other types of regulation, such as TSR or planning regulations (Griffith and Harmgart, 2008), as well as measures aimed at facing sanitary, health and animal well-being concerns, approved by the European Union and more or less enforced by member states.

Technology-driven Innovations

Addressing innovation and new technologies, it is worth mentioning that while they are made available by the technoscience system, the moment and pace of its adoption is determined by the logic of capital accumulation.

As already mentioned, transport and IT were a precondition for globalization since they have an enormous potential to reduce costs, to promote trade, and to improve efficiency in global chains. Higher velocity and more tons of freight per unit of transport, as well as the less known gains obtained from the generalization of the container,[18] substantially increased productivity, diminished costs of long distance trade, and facilitated logistical gains. The recent possibility to transfer all relevant information in real time, using Intranet and/or the public Internet, only costs a small fraction of the past costs. Indeed, the use of IT has been crucial to achieve new levels of efficiency in logistics and in long distance management and control, measured either in terms of gains of time and/or quality of service.

These technologies were instrumental in the emergence of the most important innovation within the supply chain. I refer here to the implementation of highly centralized forms of acquisitions, through giant purchase centres able to supply several sales points of a particular group within a strategically defined geographical area,

which, as often happens in the European Union, frequently have a transnational character.

Other technologies contribute to the success of these purchase centres, adding to gains in efficiency and reduction of functioning cost. Especially among them, the electronically enabled supply chains that radically transformed the velocity, quantity and quality of information between the actors that participate in supply chains.[19]

It is worth noting that these technologies constitute a threat to some intermediate agents in supply chains facilitating direct access between producers and retailers, and therefore constituting an obvious means of permanent pressure to contain prices at the intermediate level. And even if it could serve, in certain market segments, to by-pass the retailer when there is direct access between producer and final consumer (Yao et al., 2007), it has been particularly important to the large distributors/retailers.

Furthermore, IT allows the monitoring of trade and quality parameters, particularly important to food chains, which are no longer a solely internal business requirement necessary to obtain efficient logistics. In fact, in 2004, the monitoring process became subject to EU regulation (Jedermann et al., 2006). These regulations go in parallel with innovations concerning the conditions of transport of live animals and transport and stocking of fresh produce, under rigorous control of temperature and atmospheric conditions.

Complementary to this is the expected generalization of radio frequency identification (RFID),[20] which, besides its further gains of efficiency, can be associated with sophisticated systems based on software improvements to allow the use of autonomous sensors to check the state of maturation of produce. There are already working prototypes to assure this form of traceability (Jedermann et al., 2006).

Concluding, even for arms-length trade, IT is decisive in making trading points more efficient and less dependent on the labour force. Large retailers pioneered these innovations but many of these technologies are spreading even to small retailers. This movement started with the generalization of the bar-code system that not only made possible the profitable use of the electronic points of sale, replacing the old register machine with visible speed gains, but also allowed automatic transmission of data necessary for a better management of the retail unit. The afore-mentioned RFID will increase the advantage of electronic points of sale, respond to concerns about the traceability of products, and contribute to a more efficient connection between retailers and suppliers. Moreover, those innovations not only serve to increase the productivity at the lower end of the supply chain, but also contribute to the establishment of partnerships replacing certain forms of competition.

Fast and cheaper transportation, coupled with more efficient logistics, means that distance and/or long distance trade gained importance, giving a new life to the traditional form of catalogue or TV sale but also the direct purchase via Internet, either directly from retailers or producers, namely the ones exploring niche markets, involving real time payments using debit/credit cards or electronic transfers. However, one must recognize that these forms of distance retail trade only function well for certain types of products, since consumers are reticent to buy without previous inspection of their acquisitions. This situation is particularly felt at the markets for fresh fruit and vegetables, fish and meat.

To complete the description of technology-driven innovation, a brief mention must be made of the emergence of nanotechnologies,[21] which could be seen as a source of future changes, particularly due to the 'growing alliance between the cor-

porate food sector and scientific communities… [that] strategically place the corporate sector to shape the research trajectory and commercial applications of nanotechnology, and the future of agri-food systems', pointing to the emergence of a 'nano-corporate food paradigm' (Scrinis and Lyons, 2007, p. 22). Nanotechnologies not only complete and extend the reach of known productive technologies, from precision farming to nutraceutical production, passing through the improving of quality, durability and shelf life of packaged foods, but can be coupled, at the nano-level, with IT, allowing the generalization of the use of nano-sensors, which will reinforce large-scale production restructuring (Scrinis and Lyons, 2007, p. 22).

Impacts of Globalization on Food Chains

Impacts of globalization on food chains result from a number of factors. Without any pretension of being exhaustive, I will focus on the scale effects of the technology-driven innovations and on the outcomes of an increasing worldwide competition.

Impacts Resulting from Scale Effects

Besides IT, the most visible and important scale effect stems from the centralized acquisitions of purchase centres. These large infrastructures that only are profitable if significant quantities of products are to be exchanged allow these operators to obtain substantial discounts for large quantities, and simultaneously to impose minimum thresholds for the suppliers just to have access to the negotiation process.[22]

Size matters – by definition, strong market power makes these large players able to squeeze the prices paid to the producers or to force them to support marketing strategies supporting the costs of promotional sales. The competitive advantage of these operators is also reinforced by the extraordinary financial advantage of this type of business. In fact, different from small retailers that frequently accept delays in payment from their customers, corporate distributors/retailers do not maintain personal relations with consumers and any sale is immediately paid for: consequently, they do not suffer treasury risks due to unpaid debts. Furthermore, they can obtain substantial financial interest since they can take advantage of the gap between the sale and the 60–90 days during which they can delay payments to suppliers. Thus, it is obvious that this kind of business gives enormous financial leverage to corporate retailers, daily reinforcing the already considerable financial and market power of these actors, opening opportunities to mergers and acquisitions of competitors.

The results are obvious: on the one hand, many suppliers become entirely dependent on a single buyer and, on the other hand, isolated producers and/or small associations or co-operatives could find themselves excluded from the segment of the market formed by the sale points connected with these purchase centres. Knowing that the market share of these purchase centres shows consistently rising levels, the implications are clear: suppliers are forced to enter restructuring processes[23] solely to have access to the negotiation room.[24]

This means that any corporation able to establish these large centralizing acquisition centers can reinforce their market power on a daily basis to a point that, emulating identical procedures, becomes imperative for competitors to stay or to enter the business. This also means that the well-managed first innovators gained formidable

power and could erect entrance barriers against new competitors that have to find new places and new business strategies.[25]

This dynamic of food chains leads to a new market segmentation at the lower end of the food chain with a quite different distribution of power: on the one side, we find a small group of large distributors or retailers that rapidly gained market share and became oligopolies. And on the other side, there is a multitude of small retailers facing a diminishing market share, especially when they are not able to associate themselves in order to have their own large purchasing centres. This picture will be finished if we add to these two groups the isolated actors that voluntarily choose niche markets, which, by definition, are aimed at obtaining higher prices but, given their niche character, cannot expand beyond restricted limits. In spite of keeping fierce competition amongst them, however, it should be stressed that even these large players benefit from a close and complex form of articulation with other smaller actors in traditional or alternative markets, or even with the smaller producers of niche markets.[26]

A somehow different picture can be observed at the other zones of the food chain.

On the one hand, we can find identical scale effects in agriculture and the food raw-material trade, where a few actors reache such high levels of market power that it allowed a World Bank researcher to state: 'In all major consumer markets, decreases in world commodity prices have been systematically much less transmitted than increases to domestic consumer prices. This asymmetric response which has been attributed to trade restrictions and bidding processing costs, appears rather to be largely caused by the behavior of international trading companies' (Morisset, 1997, p. 28).

Different is the case of corporations relying on patent ownership and involved in production. They have to deal with worldwide increasing competition and with the growing costs of research and development.[27] This trend results in new highs of worldwide concentration of power through the formation of clusters of strategic alliances that are particularly important in the trade of grain/animal feed, seeds, agrochemicals and biotechnologies, as happened with Cargill and Monsanto and Novartis and ADM (Hendrickson and Heffernan, 2002).

The alliances can also be found in other segments of corporations directly involved in production,[28] such as the Beverage Partners Worldwide (BPW), a joint venture between Nestlé and Coca-Cola concerning ready-to-drink tea, or the Dairy Partners Americas (DPA) involving the Nestlé and New Zealand's Fonterra Co-operative Group Ltd.

Other Effects

Liberalization of trade (GATT and WTO) set in motion a global competitive dynamic that mirrors the image of the technological treadmill used by Cochrane (1979) to describe the historical evolution of agriculture in the US, with similar structural effects. The difference is that, nowadays, the effects of market competition are no longer restricted to national borders.

The result of these dynamics are new highs of de-territorialization of production of many food products, illustrated by the geographical concentration of intensive meat production based on globally sourced raw materials used as feedstuffs,[29] thus intensifying and extending the changes in the geography of production previously remarked at the national level. This happens through the concentration of intensive

agricultural production in the most favourable areas, which is the ineluctable outcome of the technological treadmill when actors are only submitted to market price stimuli. In this case, the goal of obtaining competitive advantage, or simply staying in business, forces producers into an incessant quest to increase productivity, concentrating production in better areas, and slowing down agricultural production levels or even abandoning agriculture in the less productive areas[30] and, therefore, contributing to the socio-economic decline of the less favoured areas.

Another dimension of the global food chains is related with an unrestricted international trade of food or raw materials to produce food, just to provide marginal gains to the holders of capital involved in this trade. In fact, international trade is based on a dynamic that depends on heavily subsidized infrastructures and limited and non-renewable energy sources to transport many goods that could be produced perfectly in the proximity of consumers. This apparent irrationality is justified on two grounds. One results from a private logic that does not care about social concerns that justify that even a tiny gain from trade is enough to promote long distance trade. The other is more technically driven, and it is inherent in the negotiation procedures and logistics logic that involve prices, but also volumes and quality standards, that often are difficult to obtain timely in regional and, sometimes, even in national markets.[31]

This overall logic is hardly sustainable,[32] unless transportation could find a new source of clean energy.

Since only few people are aware of the externalities involved in the global food system, it is highly improbable that this could generate an overall concern or constitute the basis for public demonstrations. Therefore it is understandable the lack of political will to design policies able to counter activities that produce negative externalities and, simultaneously, compensate the costs to producers of positive externalities. And when this exists, it is considered as equivalent to protectionist policies contrary to WTO agreements that only care about trade liberalization.[33]

Concluding Remarks: Identifying the Winners and Losers

Considering competition and scale effects, it is enough to identify winners and losers, but it is also necessary to have in mind that this increased worldwide competition is played out among actors that are quite differentiated in terms of economic and financial weight along each supply chain. Broadly speaking, two different types of competition are present in the agri-food sector.

One type involves supply chains with the uncontested command of corporate distributors and or retailers; supply chains where all the other intermediate actors (service providers, transportation and logistics, processing industries and farmers) are relatively small, and thus cannot escape the grip of the corporations. Farmers are the weakest link in these chains, since they are squeezed between two forces: on the one hand, they have to comply with corporate retailers' requirements (price, volume and quality standards); on the other hand, they suffer from the market power of the corporations that supply them with equipment and agro-inputs. This type of competition relates essentially to short supply chains, mainly aimed at fresh products, which tend to be under the control of corporate distributors or retailers, relegating the other intermediate actors to a subordinate role.

The other type of competition, found in longer supply chains that do not have a sole controlling actor, as when one or more of the large corporations such as Nestlé,

Unilever, Coca-Cola, Pepsico, Conagra, ITB are present. In this case, only the small actors present in the chain are subject to price squeeze. The other large players, either producer-driven or intermediate-driven corporations, prefer to try to find forms of supply-chain partnerships rather than entering into power games with players of identical financial and market power (Humphrey, 2006).

At the consumer level, the emergence of global food chains and the surge of corporate retailers brought perceived benefits: consumers benefited from the presence of these large retailers in terms of lower prices, better services and wider choices, even if in a differentiated way. The ones in highly populated areas could benefit from competition among large players, while consumers served only by one large retailer can count on relatively higher prices. Nevertheless, hyper-valuing these benefits lead consumers to a sort of schizophrenic behaviour: as consumers we see people bargaining for these advantages, even when they are aware that they are linked to outcomes that they prefer rationally to refuse, such as economic, social and environmental losses and, particularly, damages to the democratic system that is probably the most troubling outcome of globalization.[34]

Shortly, the absolute losers of the process of globalization of food chains are the smaller actors that have been forced to give up and get out of business. Relative losers are small retailers located at the downstream end of food chains facing unfair competition of corporate retailers, or farmers located at the upstream end of food chains suffering from uneven market power relations, either when dealing with input supplier oligopolies or being obliged to comply with volume, time and quality standard requirements, as well as a price squeeze imposed by the corporate distributors or retailers.

But the small operators located in the less favoured areas are the ones suffering the most, since they share all the burdens and, simultaneously, are the worst placed to participate in the global supply chains, and/or to fully exploit the kind of opportunities that globalization can grant to small producers.

In addition, it must be noticed that consumers located in less favoured areas could be considered as a relative losers of the process, since retail competition is scarce or non-existent in these areas. Therefore, they pay more for identical goods than consumers in places where competition really exists, as successive consumer surveys demonstrate.

Large distributors or retailers are the obvious winners, the ones that were able to capture the many benefits derived from trade liberalization and from the dynamic associated with the above-mentioned technology-driven innovations.

That is, those actors were instrumental in exacerbating the competitive weakness of many producers who previously suffered only from competition restricted to national or protected European Common Market boundaries.

Increasing downstream market power in the food chains put pressure even on large corporations involved in agricultural input production (seed and agrochemicals) or involved in food and beverage production. It pressured them to focus only on the most profitable segments of the supply chain, leaving to small actors the most risky and less profitable productive operations, and, furthermore, it pressured them to look for strategic alliances or supply-chain partnership with other giants.[35]

The emergence of the oligopolization of the large retailers stimulates the formation of larger ventures of their smaller suppliers through collective action, associating farmers, other intermediates or small retailers. It also urged other large corpo-

rations to countervail the market power of the corporate distributors or retailers, therefore contributing to alliances between the large players.

To conclude it seems appropriate to call attention to the Achilles' heel of this politically driven globalization of food.

The first challenge comes from collective action of a number of movements, ranging from more or less radical alternative movements to other grass-root and loosely organized rejection movements expressing the vitality of civil society that wants to have a word on the modes of production, marketing and consumption of food.

Recently, since the onset of the current financial crisis the usual political arguments that point to a globalization backlash have been reinforced greatly. World finance is far from being stabilized and fears of higher levels of protectionism are common.[36] Expected higher commodity prices, i.e. oil, will increase transportation costs,[37] therefore implying a severe adjustment of the global food chains (Moreira, 2004). Hence, part of the global trade in food and raw materials is condemned to fade away, at least concerning the products with relatively higher weight and volume by ton.

In short, political dissatisfaction with globalization, financial and food crises, grass-root and alternative movements' concerns about food production and consumption, and higher transportation costs constitute elements that point to a deep change in the current food paradigm.

Notes

1. I will use chain to abbreviate commodity chain or supply chain, knowing that as Friedland (2001) recognizes 'the nomenclature in this field is not yet settled down'. The terms interchangeably used in sociology are commodity systems, commodity chains, and the French filières, while economists also refer to value chains and supply chains even if usually their analysis 'is devoid of human beings'.
2. Busch (2010) approach goes in the same direction.
3. By intermediation-driven global capital, I mean the types of global capital essentially based on intermediation processes, either financial or commercial.
4. The article focuses on the major change drivers, which could lead the reader to think that changes followed a linear path, predetermined and inevitable. The length of the article does not permit reference to the nuances and specificities of the processes, as can be observed in de Raymond (2007).
5. Among them, let me highlight the following: Friedland (1984, 2001), Bonanno et al. (1994a, 1994b) and Morgan et al. (2008).
6. Well-known literature allows me to skip explanations of the main globalization drivers. Among those that the reader might find useful are: Bonanno et al. (1994a, 1994b), Clapp and Fuchs (2009) and Busch (2010) concerning agrifood; Gereffi et al. (1994) concerning the distinction between producer-driven and buyer-driven commodity chains; the edited books of Lechner and Boli (2000) and Held and McGrew (2000) where other dimensions of globalization are also treated; and, finally, Rodrik (2002, 2007) and Stiglitz (2002, 2006) for an economic perspective critical of the orthodoxy.
7. 'By the late 1980s a remarkable convergence of views had developed around a set of policy principle that John Williamson, infelicitously termed 'Washington Consensus"… Toward the end of the 1990s, this list was augmented in the thinking of multilateral agencies and policy economists with a series of so-called second-generation reforms that were more institutional in nature and targeted at problems of "good governance"' (in Rodrik, 2007). The first guideline extensively imposed by the International Monetary Fund's structural adjustment policies involve 10 principles: fiscal discipline; reorientation of public expenditures; tax reform; interest rate liberalization; unified and competitive exchanges rates; trade liberalization; openness to direct foreign investment; privatization; deregulation; and secure property rights (Rodrik, 2007, pp. 16–17). However, the way it was applied by the IMF was strongly criticized by authors such as Stiglitz (2002), turn the expression a label of market fundamentalism.
8. Johnson (2009) underlines that 'From 1973 to 1985 the financial sector never earned more than 16 percent of domestic corporate profits. In 1986, that figure reached 19 percent… This decade, it reached 41 percent'. See also Stiglitz (2010), for a deep analysis of the crisis, the issues of financial regulation

of those too big to fail, and the responsibility of the economics orthodoxy. Allais (1993) calls attention to the role of automatic software on finance volatility and crisis, and Sethi (2010) quotes a Financial Times article stating that 'After a detailed four-month review of the flash crash, looking at market data streams tick-by-tick and down to the millisecond, the SEC concluded that a single order in the e-mini S&P 500 futures market ignited an inferno of panic selling. It was over in about seven minutes, and $1,000bn was up in smoke'.

9. An interesting perspective comes from Flora and Bendini (2007), who consider changes as corresponding to a fundamental shift in the value chains, with farms forced to pass from market convention to industrial convention demands. I think that this perspective is based on conventions theory rather than in parallel with the approach developed here.
10. About the rising political importance of the civil society, see Friedland (2008).
11. That is, small family farmers, traditional local markets and artisanal production or small retailers, mainly family based.
12. See the discussion about the needed regulation of the institutions too big to fail (among others, Johnson, 2009; Stiglitz, 2010).
13. Several cases of vertical integration along the commodity chain illustrate this claim, such as in the automotive sector, information technologies and clothing industries where the leader corporation concentrate on design and marketing, while production is left to independent or quasi-independent producers. The same happens in many examples of food production, namely meat and broiler production, where the riskier part of the chain is usually reserved for autonomous producers (Bonanno et al., 1994, pp. 7–8; Gouveia, 1994, pp. 130–131; Heffernan and Constance, 1994).
14. As happens at the upstream of the agri-food supply chains with giants such as Bayer (Aventis), Syngenta (Novartis and Astra Zeneca), and Monsanto.
15. Reich (2007, pp. 53–55) refers that '[s]ize was no longer an entry barrier', but he also acknowledges, exemplifying with Wal-Mart, that '[l]arger size can still be useful to a firm – but not because of production scale, and not to keep competition at bay so prices can be raised'.
16. As illustrated by what happened to financial and environmental regulations during the George W. Bush Administration, or TNCs delocalization to countries where environmental regulations are not enforced.
17. Consisting of standards, certifications and accreditations with the involvement of state and private institutions. Particularly relevant for globalization of food is GLOBALGAP, which substituted EurepGAP as created by several European market chains.
18. With savings of 0.3–0.5% of the shipping value (Crafts and Venables, 2001, p. 26).
19. Electronic Data Interchange is the usual way of doing business by corporations such as Procter & Gamble, Colgate, Sony, Johnson Wax and Royal Brands when negotiating with Continente, the larger Portuguese retailer (Rousseau, 1997, p. 105). Also worth mentioning is factory gate pricing, a cost-saving procedure where products are collected by the retailer at the factory gates of the suppliers (le Blanc et al., 2006).
20. See Busch (2010) explaining the slow pace of RFID adoption.
21. About the significance of the nanotechnologies see Busch (2010).
22. Identical scale effects are observed in the relations between African exporters and producers of fresh vegetables and UK supermarkets (Dolan and Humphrey, 2001).
23. A good example of this restructuring is given by Harvey et al. (2002, pp. 86–95) when referring to the emergence of the Greenery International or the AENOR label.
24. Busch (2010, p. 336) quoting Grievink relays that '70 buying desks for supermarket chains now control most of Europe's food supply', and Fuchs et al. (2009, p. 32) quoting MacMillan point to '110 buying desks, which act as intermediaries between 3.2 million farmers and the consumer'.
25. This does not mean that all early innovators were able to achieve an oligopolistic level, some failed due to bad management or poor strategies, while others have been incorporated into larger operations through the merger and acquisition movement that characterizes the financially led business world.
26. de Raymond (2007) provides illustration of this kind of articulation. Conroy et al. (1996) show that in Central America larger exporters and importers frequently use traditional markets to obtain the volumes they need while giving preference to contracts with large players.
27. Increasingly substituting state-led R&D.
28. Even when the bulk of their profits come from non-productive activities.
29. Heffernan et al. (1999) note that 97% of US broiler production is concentrated in 40 firms, using 250 processing facilities.
30. Productivity calculated not in terms of agricultural production potential but measured by current market-driven prices regardless of the positive and negative externalities incurred by the fact that production is intensified in some places, and because the other face of the coin is the extensification

or abandonment of areas perfectly suitable to produce foodstuffs or raw materials. Externality is an economic concept that refers to the effects, positive or negative, provoked by economic activities that are not valued through market prices.

31. An example of this 'irrationality' happens when a small flower retailer in Portugal orders Mediterranean flowers from their usual supplier and the order is satisfied and delivered by a Dutch lorry that transport the flowers from the Netherlands after being produced and shipped from a production facility located some kilometers away from the final sale point.
32. This is due to the negative externalities involved in trade, namely long distance trade. Also worth mentioning are the perverse effects of subsidizing bio-fuel production on climate and food consumption.
33. As happens with much of the defense of the European model of agricultural production where externalities justify 'protectionist' policies.
34. See Reich (2007). Showing identical concerns, see also the trilema of globalization defined by Rodrik (2002).
35. See note 13 as well as Hendrickson and Heffernan (2002), Maloni and Benton (2000) and Mulrony and Chaddad (2005).
36. Currency disputes at the recent G20 summit in Seoul are an example.
37. Rubin and Tal (2008) in a recent newsletter note that 'in tariff-equivalent terms, the explosion in global transport costs has effectively offset all the trade liberalization efforts of the last three decades. Not only does this suggest a major slowdown in the growth of world trade, but also a fundamental realignment in trade patterns', and '[o]ver the last three years, every one dollar rise in world oil prices has fed directly into a 1% rise in transport costs'.

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Japanese Fish Markets, Chinese Seafood Palaces and Global Sushi: Meeting Theodore C. Bestor

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Theodore C. Bestor received his Ph.D. in Anthropology from Stanford University in 1983. He has worked at the Social Science Research Council as Director for the Japanese and Korean Studies Programs, and taught at Columbia University and Cornell University. Currently, he is the Reischauer Institute Professor od Social Anthropology and Chair of the Department of Anthropology, as well as the Curator for East Asian Ethnology at the Peabody Museum of Archaeology and Ethnology. His major publications include *Neighborhood Tokyo* (1989), *Doing Fieldwork in Japan* (co-editor, 2003), *Tsukiji: The Fish Market at the Center of the World* (2004), and *Routledge Handbook of Japanese Culture and Society* (co-editor, 2011).

In October 2009, I had the chance to conduct several interviews with Theodore C. Bestor, one of the most prominent researchers in the field of the Japanese fishing industry, market organization and food culture. Besides fruitful impulses for my own work on maritime territoriality, fisheries regulation and property rights in fisheries resources, these meetings provided me with valuable insights into his work and his views on a number of issues, ranging from recent transformations at Tsukiji[1] and in Japanese seafood trade in general to the role of food in cultural diplomacy and tourism.

Tsukiji

Sonja Ganseforth: Your first major publication, *Neighborhood Tokyo*, dealt with an old middle-class neighbourhood in Tōkyō where you looked at social relations and informal institutions.

Theodore C. Bestor: Right, and there were institutions that were part of the life-style of the old middle classes, but they were not really their business relationships. Well, they were to some extent, as it was about the way they interacted with customers and neighbours and so forth. I was really much more interested in the neighbourhood, not the businesses, but that led me to become interested in the kinds of social

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networks, other than neighbourhood ones, small business people are embedded in. That led me to an interest in the Japanese distribution system, which, of course, was infamous at the time – and still is – for being highly fragmented and highly personalistic. So I figured if one looks at the business families as personalized units, then it makes perfect sense that they have personal, personalistic relationships. So then I went back to Tōkyō to look at that and quickly realized that I needed to focus on something, that it was just too many businesses, too many fields. So I narrowed it down to food, but that was still too broad. And then eventually, people said, 'Well, why don't you go to Tsukiji?'. So I went to Tsukiji, thinking this was going to be a little bit of background for something else, and suddenly I realized that the market was, in itself, a fascinating place. And that is how this project came about.

SG: What fascinated you so much about it?

TCB: It is hard to say. Of course, the scale and the busyness and the enormous numbers of kinds of fish are just overwhelming, particularly for somebody who does not come from a particular fishing background. But I think what fascinated me intellectually, standing in the middle of a marketplace, watching all these people running around wildly, yelling and shouting and bidding with their hands, fish going this way and fish going that way, was the realization that this was real economic life, that it was tangible. It was not just something that you read about in the newspaper and it says, 'Prices are up 5%, and savings rates are down', or 'Trading was high on the Frankfurt Stock Exchange, inflation is rising'. Those are all very abstract things, and we all encounter them in our daily lives and interpret them a little bit and think, 'Oh, things are getting better!'. But these are people; Tsukiji is full of people who are actually making a market every single day. It suddenly made me appreciate economics not as an academic discipline, but as an aspect of daily life, that this is about as tangible as you can get, in terms of looking at an economic system at work.

SG: You spent a considerable amount of time doing research on Tsukiji, visiting the market again and again and unearthing fascinating mechanisms.

TCB: I first started doing research at Tsukiji in 1989, and the last bit of research that actually went into the book was in 2002. So that is 13 years. But of course, most of that were very short-term trips. I think the single longest period of time that I spent doing research at Tsukiji uninterrupted was about six months. Most of the rest was lots of little trips, lots of snapshots of things. In some ways, it would have been nice if I could have arranged to do all of my research in one year or in a year and a half. But in fact, I think the fact that my research was spread out over such a long period of time enabled me to get a much better sense of the way the market changes because that 13-year period was pretty dramatic in terms of economic change. So if I had just done two years of research in 1989 through 1991, I would have come away with a very simplistic or rather a much less deep sort of appreciation of how markets change. So I guess I am lucky.

SG: Is it safe to assume you are still visiting Tsukiji once in a while?

TCB: Yes, I am still going there. Partly, I go there because I have got friends there, people I have known for a very long time. But I am also still very much interested in the market and in looking at how the market will change or may change if the Tōkyō Metropolitan Government goes ahead with its plans to move the location of the market by 2016.

SG: Do you think that is going to happen?

TCB: I am really not certain at this point, and that is one of the reasons why I want to get back to Tōkyō, back to Tsukiji, as soon as possible, to get a sense of that. One of the nominal reasons for moving Tsukiji and having it open by 2016 was the Tōkyō 2016 Olympics. They wanted to use the space at Tsukiji for Olympic facilities. Well, as we know now, Tōkyō is not going to get the 2016 Olympics. So that may take some of the power behind the move away. At least last time I checked, there was a fair amount of opposition among the people at Tsukiji about moving. There is a possibility that they may be able to mobilize enough public support, since the idea of the 2016 Olympics itself was never really popular in Japan. So it is hard to say whether or not the market will really be moved.

SG: There appear to be quite a lot of problems with the new site for the market.

TCB: Oh, there certainly are problems! The site that the government selected in an area called Toyosu was formerly owned by Tōkyō Gas. They used it for some kind of storage and processing facilities for petrochemicals. The ground underneath is apparently highly toxic, and a year or so ago, a panel of government scientists – not skeptics, but scientists working for or appointed by the government – determined that the level of benzene toxicity in the ground was something like a thousand times the permissible levels. The government said, 'Oh, this will not be a problem, we will scrape off the top four metres of soil, then we will put in a huge clay barrier and then fill the top with clean soil from somewhere else'. But then people pointed out that this is on landfill, which is inherently unstable, and in the middle of an earthquake zone. So you scrape off four metres of ground, you put in a clay seal, and an earthquake comes, cracks the seal, tsunami rush in from the bay, everything gets screwed up, and benzene is back. So there certainly was a fair amount of opposition from people, just ordinary people, against the idea of building a food market on a contaminated petrochemical dump. There are lots of perfectly good reasons why this might be canceled. But the problem is, if the move is canceled, there is still the problem of what to do with Tsukiji, which is falling apart. And it is falling apart not the least because the government has been saying for so long that they were going to move it, so they were not going to spend any money on it.

SG: The relocation of a market place is bound to bring about certain transformations. In Tsukiji you assumed that the social relations will not be completely broken apart by a move. But what effects do you think a move would have on the social fabric of the market?

TCB: Actually, if I were to rewrite the conclusion of my book, I think I would change that part of it; certainly, the macro level of human relations will change. I think that the micro level of human relations will remain more or less similar. But I think the changes that are inevitable, whether it moves or does not, are that in another half generation, the numbers of companies will have shrunk. Those that remain will be larger, so there will be a consolidation. As companies get larger, that is certainly going to change the overall balance of human relations. If you have a small stall with four employees, and you deal primarily with *sushi* chefs and retail fishmongers, that is one kind of social world. But if you are a large wholesaler that has 20 stalls and 50 employees and you are basically selling products to chain restaurants, then it is a very different kind of a milieu. It is not that one is new and the other is old, it is just that the spectrum of actors 20 years from now will be smaller than today. The small

stalls are going to disappear or become much extenuated and the large-scale, more bureaucratic form is going to be more common.

SG: Are you already observing a lot of buy-ups and business consolidations or do you think this will rather be a future development?

TCB: I think it is an accelerating trend. The last time I checked, the absolute numbers of firms had decreased over the last 10 years or so by something like 10–15%. But I think the economy has been so bad that people have not really had the cash to buy each other up. So what I am told is that there are lots of firms that are sort of waiting, hanging on, until hopefully the economy improves so that somebody will come and buy them. They are keeping in business at a very low level, just because they have to stay in business to protect their one asset. And their one asset is this license [to operate a stall at Tsukiji]. If the market for licenses is very depressed and you are counting on that license to launch you into a new business, then perhaps you are going to wait. But there are also bankruptcies from time to time; people do go out of business.

The Role of Supermarkets

SG: Supermarkets and other large retailers are increasingly entering the markets as direct buyers of seafood now. Would you say that they constitute a threat to the *nakagainin* [intermediate wholesale traders] at Tsukiji?

TCB: Well, they intervene in a couple of different ways. One is that they by-pass the market altogether. It constitutes a threat to the whole system. One of the reasons why Tsukiji will be shrinking is that the percentage of its control over the total amount of seafood consumed has been dropping, because supermarkets can arrange their own deals with, for example, a Hokkaido salmon co-operative, or a tuna co-operative in Kyūshū, or with a general trading company like Mitsubishi to get tuna from the Mediterranean. So the market share for Tsukiji as a whole is shrinking, and that puts everybody at risk. But there are lots of things that supermarkets do not want because they are too expensive, or they are too esoteric, or they just do not fit a supermarket's model. And then there are also things that supermarkets want to get, but it is not feasible for them to set up their own supply lines. Supermarkets need to have weekly specials, right? Those weekly specials can either be things that are commonplace and they could offer at a really low price. So if a package of salmon would normally cost ¥250, they might say, 'This week's special! It's only ¥120! Limit: five per customer!'. This kind of thing they can handle through their own supply lines. They just arrange a deal to get a really cheap shipment of salmon. But the other kind of special could be a particular delicacy that is associated with a special holiday coming up. Supermarkets will want to have a little bit of this expensive delicacy around to attract customers who want to buy their special food for *oshōgatsu*, or *makimono* for *setsubun*.[2] For these kinds of specialties, and particularly seasonal specialties, it is probably in most cases not worth the effort by an individual supermarket chain to set up a distribution network for something that they are only going to sell for two weeks. So for those things they go to the market. When they go to the market, however, they are looking to do business with the large-scale dealers because their volume is large, not the small-scale dealers. So the supermarkets pose a threat to small-scale *nakagainin* on two levels. One is that the entire market share is shrinking,

but then when supermarkets do enter the market, they are avoiding the small dealers and going to the large dealers.

SG: Wasn't the whole market auctioning system set up in order to regulate and centralize the country's food supply? Now what the supermarkets are doing is by-passing this whole system. Is this point criticized by anyone?

TCB: Well, first of all, historically, it is true, the wholesale market system was set up to stabilize and regulate national food supply. But this was in the 1920s, when the national food supply was a lot simpler than it is now. It is probably not until the 1960s, maybe the 1950s, that processed foods of the sort that you can buy in a supermarket really became very common. So changes in the technology of food production have vastly changed the nature of the distribution system for food supplies as a whole. There certainly are, I am sure, people in Japan today who are concerned about the ways in which supermarket chains dominate the food industry, but I do not know if anybody is systematically critiquing it, in part because it would be so difficult to do anything about it. I would guess that the only principal opposition to supermarkets that would ever catch any attraction would be on environmental grounds. And then of course, there are critiques of the food as being overly processed, containing too much sugar and too much fat and being bad for the diet. So from those two angles, the green angle and the organic angle, you could imagine a critique of supermarkets that would have some weight. But neither of those is going to be widespread. In Japan, I do not think the notions of green and organic have become nearly as widespread as in Europe and North America.

Global Seafood Commodity Chains

SG: How about other new actors coming into the seafood trade, for example with the introduction of national Exclusive Economic Zones[3] and the expulsion of Japanese fishing fleets from many non-domestic fishing grounds?

TCB: The only significant set of new actors that I can think of would be foreign producers and foreign distributors, who have become much more visible at Tsukiji and in the whole process, promoting their own products in ways that, a generation ago, I do not think happened. If you think about information about Tsukiji or about Japanese markets in some kind of a lever function, a generation or so ago, all of the power, all of the movement was on the Japanese side, and there was just a tiny little bit of movement on the foreign side because they did not really know or care that much. But as Tsukiji became much more important as a destination for their products, obviously people's incentive was to learn more and more. And so, gradually, the power shifts not to an equal, but to a more equal kind of balance. So we are at a point where there are now more foreign companies that are trying to influence Tsukiji than before. They are trying much harder to make the market move by actively promoting, by creating brand names, by visiting the market, and by inviting Japanese buyers to visit their facilities. For example, a couple of years ago, I interviewed a Mexican businessman, who has a large tuna ranching operation on the Pacific Coast of Mexico. He has produced DVDs about his operation, which he attaches to every tuna. When the tuna arrives at Tsukiji, there is a little plastic pouch stapled onto the side of the fish. So the person who buys it can take the DVD home and look at it. It talks all about the purity of the water, the careful quality control, the veteri-

nary medicine and medical facilities that they use to monitor the health of the tuna and so forth. It is all about promoting his particular brand of tuna. In other parts of the world, producers similarly try to make themselves more visible. Sometimes it is visibility for a particular company, sometimes it is visibility for a particular region. A producer group in New Zealand might band together and create a local name for their product and promote that together. They might try to get MSC[4] certification and promote that. So I guess what I would say is that the major actor, who really was not on the scene when I started my research, is this kind of foreign involvement.

But other than that, the big trading companies have been around for a very long time, the food and the fishing companies have been around since the 1920s. There are six or seven major companies, but what is interesting about them is that if you talk to their executives today and say, 'Oh well, you're a fisheries company', they will say, 'Oh, no, no, no, no, we are a seafood trading organization'. Because they all have gotten rid of their fishing vessels; they no longer have fishing fleets. They are simply involved in buying products from foreign countries, in some cases processing them into canned goods or frozen products that can be sold in supermarkets, and in some cases continuing to sell products to markets like Tsukiji or putting them up for auction at Tsukiji. In some cases, they may have a small division that still handles some actual direct fishing activities, but it is an increasingly small level of involvement. I remember visiting the offices of the chief executive officer of one of the big so-called fishing companies. His office suite is decorated with these wonderful ship models, these very nice, very detailed models that are assembled when a company launches a ship. So there are half a dozen of these scattered around his office, and as I am standing there and being introduced to people, trying to make conversation, I started asking questions about these different vessels. At some point, the president himself said, 'None of us know anything about that! None of us have ever been on a boat. In fact, there is nobody in the company anymore who has been on any of these boats'. So he considers himself to be the boss of a company that trades food products, which happen to be seafood in many cases, but not exclusively. That is a big change, in the sense not of a big actor coming in, but of a big actor going out.

SG: Would you say that, with the expulsion of Japanese fishing fleets from many foreign waters, there has not really been a power shift from fishing corporations to trading houses, but rather a transformation of the activities of fishing corporations into trading?

TCB: Yes. Well, I suppose there is probably some fairly intense rivalry and competition between the trading houses and the former fishing companies. But I do not know enough about that, I can just imagine that there must be significant territorial issues. So to sum it up, the trading houses, big fishing companies and the auction houses are more or less unchanged. The small-scale, mid-level wholesalers, the *nakagainin*, have changed as we have discussed, but it is a gradual attrition rather than anything sharp. Then of course, there is the rise of supermarkets, which is also related to the power of the general trading companies, because many of the general trading companies have invested heavily, or their parent companies have invested heavily, in setting up supermarket chains. So the supermarket chains and the general trading houses are working in conjunction with each other to create not only domestic supply, but also global supply lines, not just for seafood, but for all kinds of things that will enable the system to work.

SG: How important are joint ventures with foreign companies?

TCB: I do not have enough information about joint ventures to really comment on that. I think that one of the ways in which the former fisheries companies have partially left the business is that they do not run ships anymore, but they may have joint ventures with a company in Thailand, Indonesia, or the Philippines that is actually catching the fish. So it is a little bit disingenuous. They are kidding themselves, or they are kidding me when they say they are not involved in fishing anymore. They are, but it is through joint ventures. Similarly, the trading companies have set up joint ventures with tuna farmers or shrimp producers or with Chilean salmon producers. I think a lot of that is a direct response to the Exclusive Economic Zones being set up and the Japanese fleets being kicked out.

SG: Would you say the introduction of the Exclusive Economic Zones was one of the main reasons for the generation of new commodity chains?

TCB: I do not think you can put it to a single cause because the introduction of the EEZs came at just about the same time when jet transportation became a worldwide possibility, so at least for high-priced items, global supply became possible. Nobody is going to ship anchovies by air cargo, but a tuna that might sell for $20 000 – why not? And that became possible in the early 1970s, just as the EEZs were coming in. Also, the rapid development, particularly by Japanese companies, of freezer technology played an important role. I think all of these things make for a transformation of what would be possible for distribution chains. Of course, this also all happened at a time when suddenly the Japanese economy was roaring. The Japanese still had an enormous exchange rate advantage over most other international currencies, and so it was a time when Japan could go out and buy what it wanted. I think it would be very hard to put it down to one factor. But obviously, those four or five factors I just mentioned are going to have different sets of impacts on different kinds of actors in the whole system. Some profit and some lose. The actual fishing divisions of the seafood companies lose. They have to get rid of their ships, basically. And what do they do? They sell them to the Taiwanese or the Indonesians. But they probably sell them to joint ventures. So are they losing or are they winning? Who can say? The fact that all the big fishing companies are still around says they must have won. Obviously, the globalization of supply chains works to the advantage of general trading companies, which have had the expertise in this area, maybe not for seafood, but for iron, electronics, and chemicals – well, why not food? I do not know the specific histories of any of these, but I would suspect that the food trading operations of big companies like Marubeni or Sumitomo or Mitsubishi probably got started on a large scale during the 1970s and 1980s. The actors are changing, of course, in response to the other changes, and they are also contributing to those other changes, so it is a completely interactive system.

SG: How about more recent changes? Would you say there have been some significant transformations in global commodity chains as of recent years? For example, I am thinking of industrialized processing in countries like China for the Japanese market.

TCB: I think the technological changes in food processing have had an impact in a global sense in that there are so many things that can be done off-shore. This fishing company I was talking about before has a plant in Bangkok, where they process *sushi*. Apparently it is an assembly line operation, they have machines that make rice blocks and then people are putting, one by one, slices of tuna, slices of shrimp, slices

of this, slices of that. Afterwards, it is put into plastic shrink-wrap, frozen, and sent by airplane to Japan, where it is sold to *kaiten-zushi*[5] restaurants. If you have a *kaiten-zushi* restaurant, you can order 1,000 pieces of *maguro* [tuna], 1,000 *ebi* [shrimp], 500 *uni* [sea urchin], whatever you want. It comes in a big crate, and there you have it. That is off-shore production, and the technologies that make this possible are airplanes, freezers, shrink-wrapping, being able to create a sanitary environment. I gather that at this factory in Bangkok, everybody is in white suits and everything because obviously they are very concerned about sanitation, particularly given Japanese attitudes towards the Thai.

SG: I was just going to ask about this point. How acceptable is it to Japanese customers to have *sushi* processed in Thailand or China, especially considering the public uproar over incidents like the *gyōza* incident?[6]

TCB: I am sure it is not advertised as such. I am sure if you were the proprietor of a *kaiten-zushi* restaurant, you would not put little stickers on your *sushi* saying 'Thai'. I am just trying to imagine a *kaiten-zushi* restaurant with everybody sitting there in shock at the sight of these stickers. Especially China has gotten such a bad reputation for its food sanitation issues that I would imagine any Chinese processed food product would have a really tough time in Japan right now. China has a pretty dismal record of various kinds of contamination, pollution, poisoning and so on. Of course, there are all kinds of ways to hide these things. The *sushi* for a particular chain may be packaged in a particular way that indicates that it comes from a certain facility in Kobe. There may be a warehouse in Kobe, where the things are kept. There are probably ways slightly illegal in which you can avoid labeling the country of origin, even though that is required under Japanese food packaging laws, which interestingly give consumers more information than consumers get in the United States about places of origin. The set of attitudes towards foreign production of food is a little bit of a wild card. Companies that have invested in that kind of production, probably through joint ventures, are probably taking a pretty substantial risk that if something goes wrong, they might be crucified in the press.

Food Security and Global Competition

SG: Tuna is a fish that is very high-priced, especially on Japanese markets, and at the same time threatened by overfishing and extinction. There is talk of a 'national tuna reserve' in freezers inside Japan as well as abroad; would you say this description is accurate?

TCB: Well, I have heard people say that, but I do not think anybody has concrete figures on this. There certainly are a lot of freezer warehouses, not only in Tōkyō, but also in places like Yaizu, Shimizu and a couple of other big tuna ports in Japan. I have also toured some in Australia that were pretty big. But the question is, if an Australian company has a big freezer warehouse full of tons and tons of tuna, is that a Japanese tuna reserve or is that an Australian tuna reserve? So I think it is a misnomer to think of a Japanese reserve. I think you have to think about it company by company. Mitsubishi may have a stock pile, and Mitsui may, but maybe Maruha does not. But even with freezer technology on very high standards, these are still perishable products. It is not like putting gold bars in a cave in Switzerland where they will not deteriorate. The best-case scenario is that a well-treated piece of frozen

tuna has a two-year shelf live. You can keep it frozen for longer than two years, but I am told that the quality deteriorates. So if it is a reserve, it is a reserve that has to constantly be replenished. You have to be bringing fresh tuna in and freezing them, in order to take some out. So I think it is more a journalist's fantasy than a reality. You would have to get into the inner workings of the Fisheries Agency to find out. It could very well be that there is some official strategy, though not in the sense of creating a tuna reserve. But in order to ensure stability of supplies, different companies and different food sectors need to think about how to make sure the supplies will not be disrupted. So there may be recommendations for the companies to think about keeping a certain back-log. I am not saying that it could not be a national strategy, but no one has ever mentioned it to me. And I think in the years that I have been poking around, I would have come across some evidence of it in some fashion. But there is absolutely no denying that the whole point of having frozen tuna is to bring it into market when conditions are right to sell. And so when there is relatively little fresh tuna available, there will be relatively more frozen. And when prices are particularly high, there will be more frozen available, but it will be carefully controlled because they do not want to depress the market either. So I am sure that there are people in these companies who are probably using very sophisticated software to track supplies and determine all the bases of yesterday's prices in order to determine how many tons should be released the following day. Like a bank and their foreign exchange desk, I suppose.

SG: It is always argued that Japan does not have a lot of agricultural land, so fish is very important and Japanese autarky in supplies should be increased. How important do you think fish really is for national food security?

TCB: Within the Ministry of Agriculture, Forestry and Fisheries of Japan [MAFF], there are bureaus concerned with food security, distribution, ensuring the stability of prices and supply and so forth. So obviously, on some bureaucratic level, there is consciousness of food security. But it is probably more a discursive strategy for politicians than it is a daily concern for bureaucrats or people in the food industry itself, whether fishing or anything else. There have been, at different times, different aspects of what to worry about. In the 1970s, one of the great worries was when Nixon cut off soybean exports to Japan. They were shocked beyond belief that their trusted ally would suddenly, without warning, cut off a major source of food to Japan. When you raise the question of food security to any Japanese over the age of 40, this is the example they will give. Food security issues come up all the time in fishing disputes. 'We need this, we need that, because we are a poor island nation with few natural resources and little arable land!' The most recent iteration of this would be the fear of China. Chinese economic growth seemingly is on a massively upwards street. There is a very genuine concern amongst people, in the seafood business at least, that China will be the competitor for seafood in the foreseeable future and simply dwarf Japan in its ability to purchase things. So it becomes a question whether that is a discursive worry or a genuine reading of the global political economy. I guess I would have to say that it is less of a discursive worry than some of the others. But on a day-to-day, or month-to-month, or year-to-year basis, I do not think that very many people in the food business are particularly concerned. Well, they are concerned about supply and demand, rising prices, inflation, and foreign exchange, but I do not think that they wake up in the morning with issues of food security on their mind.

But if you go to Hong Kong or Guangzhou, there are huge pavilions; to call them 'restaurants' would be too modest a term. About a year and a half ago, I was at a conference in Guangzhou and we were taken to different restaurants for several nights. One night, we were taken to one of these gigantic fish restaurants, where I was told they could seat 2,500 people! It was a two-story complex; the dining rooms were on the second floor. The first floor was like walking through a big wholesale fish market in that there were counters for every kind of seafood imaginable for you to pick out: 'Oh, I'd like that snapper, I'd like that tuna, I'd like that alligator!'. So you would pick the fish and then there were different places where you could pick the technique, whether you ordered it prepared as *sushi*, or if you wanted it prepared fried, or if you wanted it prepared in something steamed. I think most people were there as parts of a large party, so I am sure the host would make the arrangements. But you could still walk around and look at all of these things, watch it being prepared and say: 'Oh, well, I know you've already ordered the main dishes, but couldn't we have some of this as an appetizer?'. Then you go upstairs and sit down, and the waiters bring what you have ordered. It was one of the most astounding spots I have ever been. It felt like walking through Tsukiji with a vast dining room attached. This place we were taken was one of maybe a dozen such places in the immediate area in Guangzhou. It was a huge business. Looking at that, I thought to myself that Japanese concerns about future seafood competitions, particularly with South China, are valid things to be concerned about, that, indeed, as China becomes wealthier and wealthier, as there is more of an urban middle class with a disposable income, and as appetites for seafood become more common, the buying power of China is going to far outstrip the buying power of Japan. Just from casual research on this, the extent to which China is competing in the global market with Japan for bluefin tuna, for Pacific lobster, for all kinds of products that come from Australia, New Zealand, Micronesia, Indonesia, and South-east Asia means that the Japanese, from their own standpoint, are very concerned. I have a half-finished book that is tentatively titled *Global Sushi*. I think my subsequent research in completion of this book is probably going to return to Japan to look more at questions of how Japanese companies, producers and markets are reacting to the tightening of supplies and competition with China.

SG: What do you think are the main reactions or strategies that are being taken?

TCB: I do not have enough information yet to come to any conclusions. Part of the answer certainly lies in ODA [overseas development assistance]. The Japanese government is strategically spending money on development projects that specifically relate to food production in various parts of the world. So, for example, in cases that I know of in the Caribbean, Japanese advisors from MAFF have designed new fishing ports and arranged for them to be built by Japanese construction companies or joint ventures of various sorts. So there is clearly an attempt to cement relationships with potential producing countries and companies with a presumably long-term eye towards being able to call in the debt by saying, 'No, no, we're buying that, not the Chinese!'. Well, the Chinese are probably doing the same thing. From my perspective at this point, I would say the Japanese are competing, or laying the groundwork for competition with China, through ODA, and obviously through strengthening joint ventures with Australia, Indonesia, Korea, etc. But I would bet that some of the big players are probably also busily strengthening their ties with China, that is to say putting together joint ventures with Chinese organizations, providing technol-

ogy in exchange for catches. If I were a businessman, this is probably what I would do. I would realize that I am never going to be able to beat the Chinese, so I might as well be a partner and see where we can get. But I would imagine that this is a fairly low-profile kind of a strategy. For all kinds of reasons, including the food and contamination scandals, no Japanese corporation wants to find itself partnered with some Chinese corporation that is going to get bad publicity for contaminated fish.

Culture, Authenticity, and the Global Spread of *Sushi*

SG: In *Global Sushi*, you are dealing with the generation of global commodity chains in seafood and especially tuna used in *sushi*. Are you also putting a focus on production sites?

TCB: Not in any terribly specific way. But another angle of *Global Sushi* is that I am interested in how *sushi* became popular outside of Japan. How something that, a generation or two ago, no Western person would go crazy over, is incredibly popular in the United States now, and I am sure the same is true in Germany. You could go to any big supermarket in America, and they will have a counter where somebody is making *sushi* and putting it in a plastic box for you to take home. It has become global fast food. So my project will ultimately look at both production and commodity chains, but also at the diffusion of popular demand across cultural boundaries.

SG: Do you think that the global spread of a taste for *sushi* really did give rise to a lot of competition over bluefin tuna for Japan?

TCB: I think it did lead to competition in a couple of different ways. Of course, the case that I know best is the New England fishing industry here, where initially the demand for tuna was entirely focused on Japan. In that sense, Japanese demand created a fishing industry where none had existed before because, traditionally, Americans did not eat tuna except in cans. And so commercial fishermen in New England might catch an occasional tuna, but there was no market for it, so nobody went out of their way to catch it. Sports fishermen caught it as a trophy fish, but commercial fishermen were not interested. That changed in the 1970s, as Japanese buyers began to arrive and create a market. So then there was a small, but fairly active fleet in New England that now focused on tuna. But as the Japanese economy went poorly from about the late 1980s onwards, my sense from interviews with people is that a lot of people who were fishing for tuna continued to fish for tuna, but also needed secondary markets in the United States because they were not confident of being able to get a high enough price from Japanese buyers. So they began to sell more and more to American restaurants and companies. The New England tuna industry today sells the majority of what it catches in North America. There was more demand for Japanese-style cuisine, so there were American restaurants that wanted tuna in order to be able to serve it as *sashimi* or *sushi* or whatever, but as part of a sort of overall global gourmet boom. Tuna came to be seen as something that could be in a very expensive, very elegant dish quite apart from Japanese cuisine. I cannot really date this, but I would say from maybe the very late 1980s or early 1990s, American menus held entries like 'sashimi-grade tuna steak, seared with wasabi and a touch of ginger' or something like that. So it still has some oriental or Asian signifiers, but it is not being served as a Japanese dish. Here you have a plate with a steak and broccoli and mashed potatoes and something else, all with raspberries spread around

the side. So it becomes part of *nouvelle cuisine* in a way. I do not know enough about the European side of things, but my sense is that a similar trend developed. And of course, since the Mediterranean is a major source of tuna, and the Mediterranean is surrounded by a very large number of nations with active fishing fleets, then it is not directly Japanese demand, but it is this kind of diffusion of demand that leads to more and more competition in the Mediterranean, as I understand it. There are now French, Spanish, Italian, American, Chinese, Taiwanese, and Indonesian fleets that recognize tuna as a valuable commodity.

SG: What do you think about the initiative by the MAFF to issue licenses for authentic *sushi* or Japanese restaurants abroad?

TCB: I have looked into that a little bit. I do not think it is ever going to happen. And I have talked to people in the *gaimushō* [Ministry of Foreign Affairs of Japan] who think it is the stupidest idea they have ever heard of, because it would ultimately have to be people in the *gaimushō* around the world who would have to administer this programme, and it is not going to buy them any friends to go out to *sushi* restaurants in Boston and to say, 'Oh, you're not authentic!'. So I think that was a proposal that was generated by some domestic constituency in Japan and the MAFF people just agreed to it, but I cannot really imagine that it would ever happen.

SG: How important do you think *sushi* in particular, or food in general, is for Japan's cultural diplomacy?

TCB: Oh, it is absolutely important. I do not know if they are doing the same kind of campaign in Europe, but at least for the past couple of years, Japanese consulates here in the United States have been promoting a 'Cool Japan' concept. If you look at the 'Cool Japan' materials, food is always one of the components. The consulate here in Boston, at least a couple of times a year, sponsors some kind of food event where they have a famous chef or a famous product of some sort. I assume that they are doing similar things at other consulates, not only in the U.S., but around the world. At these events, they usually have expensive looking publicity packages, DVDs about Japanese food and so forth. So there clearly is an organized effort to promote Japanese cuisine as part of cultural diplomacy. And I suspect that tourism to Japan is at least to some degree motivated by food interest. Well, obviously, you are not going to fly to Tōkyō just because you want good *sushi*, but I am sure for people who can afford to travel anywhere food makes a difference.

SG: Food is very important in inner-Japanese tourism as well, isn't it, with every place having its own *meibutsu* [local specialty]?

TCB: Yes, exactly. That is part of what I want to look at in my next research project, *meibutsu* and *omiyage* [souvenir], travel and eating culture. So I am now more interested in other aspects of Japanese food, including regional specialties and the ways in which locality matters for marketing purposes and travel, the intersection of travel and environmentalism, tourism and food culture. Another thing that I want to look at in this project is how people think about the environment and organic, local, and slow food. How and to what extent have these become part of the discourse in Japan about food, not only the popular/elite discourse about environment, food, nutrition, locality, organicness and so forth, but the extent to which this really matters when people are sitting down to eat or going to the shop and saying, 'Hmm, I'll go for the organic tomatoes, even though they're twice as expensive as the non-organic

ones'. Also, the question of authenticity, identity and locality would not be restricted to seafood, so these are things that are less Tsukiji oriented, but fish markets will still continue to play an important part in my work.

Notes

1. Tsukiji is the central wholesale marketplace in Tōkyō and the largest wholesale marketplace for seafood in the world.
2. *Oshōgatsu* is the Japanese New Year; *setsubun* is a holiday for the beginning of spring in February, where beans are thrown to drive demons away.
3. National Exclusive Economic Zones extending 200 nautical miles from a nation's coastline were established in the United Nations Convention on the Law of the Sea (UNCLOS III), which was signed in 1982 and came into force in 1994.
4. The Marine Stewardship Council is a non-profit organization that issues ecolabels and fishery certifications for sustainable fishing practices.
5. These are *sushi* restaurants where plates with the food are delivered to every table around the restaurant on rotating conveyor belts, so the customers can either serve themselves from the conveyor belt or place orders.
6. The food poisoning of numerous Japanese in 2007–2008 because of Chinese-produced *gyōza* (pork dumplings), which were found to be pesticide-contaminated, caused an anti-Chinese uproar and widespread suspicions of Chinese-produced foods in Japan.