Enabling Positive Tipping Points in Public Support for Food System Transformation: The Case of Meat Consumption

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Enabling Positive Tipping Points in Public Support for Food System Transformation

The Case of Meat Consumption

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11.1 Introduction

Today's food production and consumption has large consequences for the environment and human health. With respect to climate change, our food system is now responsible for at least a third of the global anthropogenic greenhouse gas (GHG) emissions (Crippa et al. 2021). In particular, the production of red meat has become the largest source of methane, which is a powerful short-lived GHG (Fesenfeld et al. 2018). Livestock production is also the single largest driver of habitat loss, and a leading cause of soil erosion, water, and nutrient pollution across the world, which increasingly compound pressures on ecosystems and biodiversity (Machovina et al. 2015). In addition, scientific evidence suggests strong associations between meat consumption and health risks including total mortality, cardiovascular diseases, colorectal cancer, and type 2 diabetes (Battaglia Richi et al. 2015; Zheng et al. 2019). This issue of overconsumption is particularly salient for developed countries and large emerging economies where meat consumption is high (i.e., >20–30kg per person per year). Recent systematic reviews suggest that domestic demand in countries with tropical rainforests cause a significant proportion of agriculturally driven tropical deforestation (Pendrill et al. 2022). Hence, rapid dietary changes toward more plant-based diets are a critical component of global food system transformation as they hold the promise to make important contributions to solving health, climate, and ecological crises (Springmann et al. 2018). Without such changes, achieving the Paris Agreement targets and many Sustainable Development Goals (SDGs) is unlikely, even if all other sectors were to achieve rapid transition toward sustainability (Clark et al. 2020).

However, political economy dynamics often delay or derail policy interventions on this issue. In fact, many governments remain unwilling to take strong actions to reduce meat consumption as related policies may cause public backlash by intervening in people's everyday life (Fesenfeld 2020). How can policymakers overcome barriers in promoting ambitious policies to minimize the climate and

environmental impacts of the food system? Drawing upon the literature on public opinion, transition, and policy studies, we develop a theoretical framework, which identifies three factors to shift public opinion on transformative policy change—policy framing, policy design, and policy feedback (Fesenfeld 2020, 2023; Fesenfeld, Rudolph and Bernauer, 2022). We argue that ambitious transformative food policies, such as measures to transition toward more plant-based diets, are likely to gain public support when government interventions are carefully framed to appeal to popular narratives, different types of policies are strategically combined, and positive feedback of policies are created over time. We use evidence gathered from survey experiments with 4,874 respondents in China, Germany, and the United States (US) to illustrate this argument. While focusing on public opinion, we recognize that citizens' support for policies is only one dimension in the political economy of food system transformation. Hence, to understand the dynamics in the whole sectoral transformation, the insights drawn from public opinion research should be combined with the analysis of the broader political economy context (as outlined in other chapters of this book).

The rest of this chapter is structured as follows. Section 11.2 provides a brief review of the existing literature on public opinion on sustainable food transition and identifies research gaps. Section 11.3 introduces our theoretical framework, which takes into account the roles of policy framing, design, and feedback in promoting food system transformation. After briefly explaining our methodological approach, we present results from several survey experiments conducted since 2017 and show how they lend support to our argument. To conclude, we discuss policy implications of our findings and important directions for future research.

11.2 Existing Literature on Public Opinion on Sustainable Food Policy

To understand how the public in different countries perceives and reacts to policies aimed at transforming the food system toward greater sustainability, especially reducing meat consumption or promoting more plant-based diets, we first conducted a scoping review of the academic literature on public opinion regarding sustainable food policy. Through keyword searches and screening, we identified 86 peer-reviewed publications related to public opinion of food policy (see our methodology in Appendix). Over 90 percent of these studies were conducted in developed countries and only 12 reviewed studies focus on meat-related policies. Using cross-sectional survey data, most studies provide a snapshot of public support at one point in time without considering potential feedback of policies over time. Our review identified several patterns. First, public opinion varies across different types of government policies. More importantly, support for policies that add costs to consumers such as food taxes tend to be low. Abundant evidence supports this. For instance, a study on taxes of sugar-sweetened beverages in the

US found that the majority of study participants opposed this policy because they believed that taxes are a quick way for politicians to fill budget holes, an unacceptable intrusion of government into people's lives, and harmful to the poor (Barry et al. 2013b). Likewise, a study on obesity prevention policy in Australia demonstrated that 90 percent of the respondents supported mandatory nutrition labelling, 83 percent supported zoning restrictions of unhealthy food shops, but only 40 percent supported taxes on unhealthy food because people are generally concerned about government overreach through taxation and the effectiveness of taxes in changing behaviors remains questionable (Farrell et al. 2019). A similar pattern also exists in the United Kingdom (UK) as a recent study showed that food place and promotion policies (e.g., supermarkets positioning healthier products at the end of aisles and checkouts and retailers restricting promoting on high-calorie food and drinks) were much more supported by the public than tax policies (e.g., taxes on sugary drinks or high-fat content foods) (Fatemi et al. 2021).

Moreover, policies that impose restrictions on consumers receive lower support as many citizens are concerned about their freedom of choice and therefore unwilling to accept more government interventions in their daily lives. For instance, Kwon et al.'s (2019) online survey measuring support for 13 food policies to promote healthy diets by 19,857 adults in Australia, Canada, Mexico, the UK, and the US found that across all countries, the highest level of support was for policies that provided incentives (e.g., price subsidies) or information (e.g., calorie labeling on menus), and the lowest level of support was for those that imposed restrictions (e.g., restrictions on food company sponsorship of sport events). Likewise, when studying consumer support for supermarkets' initiatives to promote healthy foods in these five countries, Gómez-Donoso et al. (2021) found that "more shelf space for fresh and healthier foods" received the highest support (from 72 percent of the respondents), whereas "checkouts with only healthy products" received the lowest support (from only 48.6 percent of the respondents). Research on different types of "nudges"—behaviorally motivated interventions that steer people in certain directions but maintain freedom of consumer choice—by national governments showed that the policy of having a meat-free day per week has been perceived highly intrusive in people's lives and accordingly received low approval rates in countries like Denmark (Loibl et al. 2018). Pechey et al. (2022) showed that in the UK, policies targeting meat consumption were less supported than policies targeting unhealthy food. They also found that labels and information campaigns were the most accepted policies to reduce meat consumption, followed by measures to reduce availability and provide incentives for plant-based diets. Increasing prices and banning advertising for meat, however, were the least supported measures. Yet, similar to Fesenfeld et al. (2020), Pechey et al. (2022) found that there is substantial scope to increase support for meat reduction policies. All in all, the existing literature sheds light on the importance of policy design when promoting sustainable food as public support for different types of policies varies significantly.

Second and related, the messages provided when introducing a policy can affect public support for that policy. In other words, policy framing matters as campaigners can use messages to alter individuals' preferences through changes in the presentation of the issue in question (Chong and Druckman 2007). For instance, research on the debate about meat taxes in UK media found that the arguments on meat taxes were categorized into five major topics (i.e., climate change and environment, human health, effects on animals, fairness, and acceptability of government intervention), which are associated with different values (Simmonds and Vallgårda 2021; see also Chapter 2 of this volume). The implication is that policy advocates can strategically use certain frames to highlight specific arguments and thus appeal to targeted segments of the population. For instance, research on policies targeting child obesity showed that, regardless of how the cause of childhood obesity was framed, when a news report frames the problem using individualized depictions of a specific child, survey respondents were less likely to support prevention policies than when the report described the problem in more general terms (Barry et al. 2013a). Meanwhile, research found that highlighting policies' effectiveness to protect human health could increase public demand for the relevant policies aiming to reduce unhealthy food (Reynolds et al. 2019). On reduction of meat consumption, Graça et al.'s (2020) study in Portugal showed that individuals who read a news piece about a law approving meat curtailment policies were more likely to support such policies, irrespective of individual differences in ideology and consumption. Also, Perino and Schwickert (2023) showed that framing meat taxes as an animal welfare tax can significantly increase public support for adopting meat taxes in Germany. Hence, we expect that public support for policies to transform the food system can be significantly affected by policy framing.

Third, individuals' awareness of, and concerns about, the sustainability impacts of food are likely to influence their support for relevant policies. For example, research on the food-energy-water nexus in the US consistently showed that individuals' knowledge about such nexus issues as well as their concern for the environment increases their support of policies for managing food, energy, and water resources (Bullock and Bowman 2018; Portney et al. 2018). Likewise, a study in Australia found that support for environmental food policies is positively associated with people's concerns over environmental impacts of food, and their pro-environment purchasing intentions are positively linked to concerns over nutritional, environmental, food safety, and animal welfare impacts of food (Worsley et al. 2015). Hence, building awareness on the sustainability impacts of food consumption and production can be an important pathway to increasing public support for policy interventions.

Fourth, some studies have also paid attention to the dynamic process of dietary transition and potential feedback of peoples' changing opinion and behavior on policy. For instance, research has identified the links between projections about the future of a plant-based society and current support for policies to

promote plant-based diets. By investigating support of university students in New Zealand for social changes toward plant-based societies, Judge and Wilson (2015) found that for a vegetarian future, the strongest predictor of current support for social change was the expectation that widespread vegetarianism would reduce societal dysfunction, whereas for a vegan future, the strongest predictor of support for social change was an expectation of increased interpersonal warmth in a vegan society.[1] Sparkman and Walton (2017) showed that dynamic social norms, i.e. information about how people's behavior changes over time, can lead to strong meat consumption shifts. These findings suggest possible feedback effects across society as dietary changes accelerate. This reinforces Carlsson et al. (2022) research in Sweden, which found that people's growing experiences with meat alternatives can increase their willingness to pay for such substitutes. Therefore, changes in behaviors and respective social norms may have positive feedback effects on public support for food system transformation.

In summary, although empirical research on public support for policy promoting more plant-based diets remains limited, the evidence provided by recent studies has shown promising signs of the possibility to trigger such changes. For example, Perino and Schwickert (2023) showed in a recent referendum choice experiment that a majority of German citizens clearly supported an animal welfare meat tax rate of €0.39/kg (or €50/t CO_2). This finding suggests that citizens in some developed countries have become more conscious of their meat consumption and are willing to accept higher taxes on meat compared to other countries. Likewise, in the US, partisanship does not necessarily seem to be a barrier to food system transformation as the differences between Democrats and Republicans converge on issues of organic and local food as well as affordable food (Biedny et al. 2020). Therefore, as pointed out by Happer and Wellesley (2019), there is significant potential to develop and reinforce a positive narrative around the benefits of dietary change, and the most effective levers for action are likely to be those that resonate with everyday concerns and that stress the co-benefits of dietary change such as improved health and wellbeing.

11.3 Theoretical Argument

Our scoping review shows that the scientific community has paid increasing attention to the question of public support for the sustainability transition in the food sector. However, the up-to-date knowledge on pathways to food system

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[1] "Warmth" is a concept in psychology, which refers to "a constellation of traits related to perceived favourability of the other person's intentions toward us, including friendliness, helpfulness, and trustworthiness" (Williams and Bargh, 2008: 606).

transformation remains fragmented. Here we propose a theoretical framework that combines three key factors—policy framing, design, and feedback—to understand dynamics in public support for food policies aimed at rapid transformation aligned with the goal of the Paris Agreement and the 2030 Agenda for Sustainable Development.

The first factor in our framework is policy framing, which is often seen as a popular communication strategy with identity-protective reasoning (Druckman and McGrath 2019). By "framing," we refer to the instances where actors use messages to alter people's preferences by changing the presentation of an issue or an event (Chong and Druckman 2007). In other words, when promoting a new regulation or government intervention, policymakers and their supporters can tailor messages emphasizing specific subsets of arguments to certain population subgroups in order to gain their support. In the past decade, a large number of studies were produced to examine framing effects in the area of environmental and climate policy. Most of these studies have found significant effects of different types of framing on public opinion. Notwithstanding some caveats to framing research (Bernauer and McGrath 2016; Fesenfeld et al. 2021, Fesenfeld et al, 2022), the importance of framing in the policy cycle is key since providing additional and tailored information can change citizens' understanding on the issue, and consequently their policy support and behaviors.

Beyond framing, the second, and probably more important, factor for changing public support is policy design. The premise of this factor is that food system transformation is likely to require mixing various types of policies including those at the supply- and demand-sides that induce both behavioral and technological innovations (Geels et al. 2017; Fischer, 2018; Poore and Nemecek 2018; Springmann et al. 2018). Past research has shown that many citizens perceive supply-side regulations and pull measures (e.g., discounts for environmentally friendly food products) as less intrusive and costly and thus support them more; in contrast, demand-side market-based push measures and regulations, like meat taxes or restrictions in public cafeterias, receive lower support (Fesenfeld 2020; Fesenfeld et al. 2020; Fesenfeld 2022; Pechey et al. 2022; Perino and Schwickert 2023). For many citizens, the material and immaterial costs (compared to the benefits) of such demand-side push measures are more salient and visible. Besides higher financial costs and restrictions in their personal lives, citizens also often perceive such demand-side push measures as unfair and not effective. Earmarking revenues from taxes to compensate for low-income groups in society as well as for green investments could partially address these concerns and enhance public support. Moreover, the level of policy stringency, i.e., the increase in the policy ambition vis-à-vis the status quo, can affect public support. More stringent policies often also imply higher perceived costs, especially for more visible demand-side policies, and thus can lead to lower support levels. As outlined in previous studies (Fesenfeld et al. 2020; Fesenfeld 2022), we expect that the strategic packaging of different types of policies

with different levels of stringency can increase public support for food policies. This expectation rests on the assumption that positively valued policy design features can compensate for the negative support effects of policy design features with high cost visibility for citizens (Häusermann et al. 2018; Fesenfeld 2020).

The third factor in our proposed framework is policy feedback, which has not yet been a focus of empirical studies on public opinion about food policy. "Policy feedback" broadly refers to the variety of ways in which existing policies can shape key aspects of politics and policymaking (Béland and Schlager 2019). More specifically, feedback effects occur through two mechanisms: first, policies provide resources and incentives that encourage political actors as well as individuals to act in ways that lock in a particular path of policy development since policies cannot be easily reversed and generate increased returns; second, policies also have cognitive consequences by providing actors with information and cues that encourage particular interpretations of the political world (Pierson 1993, 2000). In other words, by changing material incentives, perceptions, and social norms, certain policies or interventions may, over time, trigger transformative changes. Over the past three decades, policy feedback has become an important research topic in the field of public policy and transition studies, as well as with respect to environmental and climate policy (Rosenbloom et al. 2019). However, it has so far received scant attention from food policy researchers.

Research on feedback requires attention to sequencing and ratcheting-up dynamics in the policy lifecycle (Levin et al. 2012; Pahle et al. 2018; Farmer et al. 2019). Harnessing positive policy feedback via a strategic sequence of policies over time is likely to be a critical enabler for transformative food policy change in the face of scarce political and economic resources. In the case of meat system transformation, one can expect that the current political-economic equilibrium and the respective public discourse around meat consumption and production can shift if change-oriented actors identify sensitive intervention points to gradually booster public support for ambitious sustainable food policies, and ultimately trigger non-linear, often abrupt changes toward a more sustainable food system (so-called positive tipping points [Sharpe and Lenton 2021; Fesenfeld et al. 2022]). For instance, actors can destabilize the existing meat system through adopting first politically less controversial supply-sided pull policies that foster innovations and offer new income sources to potential losers of more stringent policies (e.g., governmental support for the diffusion of sustainable meat substitutes and consumer discounts for plant-based alternatives, etc.). These policies may gradually shift public opinion on meat and its regulations by changing social norms and consumer behaviors. Moreover, such policy sequencing may also create changes in interest group coalitions (e.g., new meat substitute industries), which seek to change the framing and public narratives around meat and respective policies. This, in turn, may generate feedback in public support for more stringent policy actions to transform food systems.

Overall, taking a political economy approach that incorporates policy framing, design, and feedback effects on public support is helpful to understanding food policymaking decisions. Yet, this political economy perspective needs to also account for the relative role of public support in shaping food policy design choices compared to other factors, like interest groups power, political institutions, and broader economic developments and external shocks. These factors can moderate the relative effects of public opinion on food policymaking. Swinnen's (2018) review shows that different agents along value chains—from farmer groups and processors to retailers and consumers—influence agricultural and food policymaking. According to Culpepper (2011), the public salience of different policy options moderates the relative influence of different interest groups and public opinion on policymaking. In general, we can expect that public opinion matters more for very salient and visible policy decisions compared to more technical, less salient decisions. Past research has also indicated that political institutions including regime types, electoral rules, and bureaucrats' position can influence governments' choices of agricultural and food policies. For example, farmer or consumer groups have more influence on governments' policy choices (e.g., tax on a commodity) in democratic systems (Olper 2007). Within democracies, Olper and Raimondi (2013) have found that agriculture is more protected (or less taxed) under a proportional electoral rule or a presidential system than under a majoritarian rule or a parliamentary system. Among OECD countries, right-wing governments are on average more protectionist in agriculture than left-wing governments (Olper 2007), but this effect is conditioned by the political power of key interest groups in each country. In the case of autocracies, economic development can also shift communist regimes from taxing to subsidizing agriculture as shown by the case of China (Rozelle and Swinnen 2010). Additionally, dramatic changes in agricultural and food policy in many countries have been triggered by large external shocks (e.g., economic crises or pandemics), which can overcome policy inertia and change dominant actor coalitions (Anderson 2009). Thus, governments' food policy choices result from the dynamic interactions between public opinion and the broader political economy environment.

Figure 11.1 summarizes how the three factors, policy framing, design, and feedback, are likely to influence public support for sustainable food transition. We expect that sustainable food transformation can gain public support when government interventions are carefully framed, strategically designed by combining different types of policies, and positive feedback effects are harnessed. We also assume that variation in the broader political economy environment and institutional setting (e.g., power of different interest group coalitions, ideologies, regime types, electoral systems, etc.) will moderate the relative effects of these three factors in shaping public support for transformative food policies.
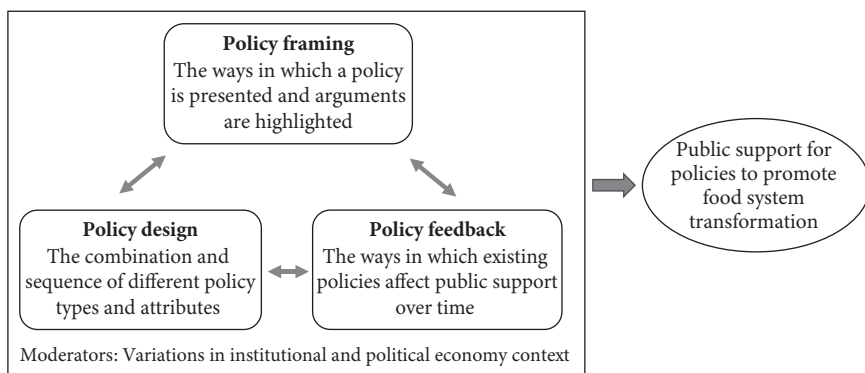
Figure 11.1 A framework of framing, design and feedback for food system transformation.

11.4 Methods Used in Survey-Embedded Experiments

To illustrate our argument, we present here initial evidence from a large survey in China, Germany, and the US that we conducted in 2017–2018. We used quota sampling to ensure representativeness in terms of age, employment status, gender, income, and region (please see details in our related publications Fesenfeld et al. 2020; Fesenfeld et al. 2021). These countries were selected for two reasons. First, they are among the world's largest producers and consumers of meat products, hence exerting a major environmental impact (Global Footprint Network 2018; OECD 2018). Second, the three countries have very different political economy systems: authoritarian state-led economy in China, coordinated market economy in Germany, and liberal market economy in a bipartisan system in the US. The structure and power of the interest groups supporting the meat industry are likely to vary across these cases. Moreover, the salience of the issue of meat consumption in these countries seem to also vary. For instance, with strong support of civil society, reduction of meat consumption has been put on the government's agenda of climate policy in Germany, but the issue was much less considered in the US, and almost not at all in China. Hence, the three country cases provide a good sample to investigate how different political economy contexts shape public support for food system transformation. Finally, the three countries vary in their current rates of meat consumption. While the US has the highest per capita meat consumption of all three countries (128 kg/person in 2019), also Germany (76 kg/person in 2019) has a higher per capita meat consumption than China (64 kg/person in 2019). Nevertheless, in the US and Germany, per capita meat consumption is stagnating or slightly falling while in China it has been rising sharply over the last years.[2]

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[2] The data are from the UN Food and Agricultural Organization, see also respective interactive visualization on OurWorldInData at https://ourworldindata.org/meat-production.

11.4.1 Sampling

The survey was conducted in collaboration with Ipsos. In total, we conducted our survey-embedded experiments with 4,874 respondents in China (n=1626), Germany (n=1624), and the United States (n=1624). All experiments were internet-based, and participants were recruited via the online panels that Ipsos maintains in each country. For our survey, Ipsos pre-selected respondents from their panels according to quotas and constructed samples that were representative of the national voting age population in the three countries. More specifically, we used hard quotas in our sampling in an attempt to match distribution by gender, age, and region according to each country's latest census data. Quotas for gender and age were combined to ensure that each age group was nationally representative in terms of gender distribution. We also employed soft quotas for education, income, rural-urban population, and occupation to ensure that the samples are not too skewed toward certain socio-demographic groups.

The quotas worked well in Germany and the US such that our samples in these two countries closely followed distribution by income, education, rural–urban divide and occupation in the national population. The sample from China was more skewed toward a higher educated, higher income urban population because sampling rural, low-income populations in China is currently not feasible through internet-based surveys. Yet, given the particularly significant uneven economic development in China and the country's political regime, we believe that our sample represents well that subgroup of the Chinese population—namely, the urban middle-class—whose consumption has the most significant impact (Wiedenhofer et al. 2017; Zhang et al. 2016). In our robust check analyses (see further details in Fesenfeld et al. 2020, 2021), we also included various socio-demographic and political control variables and repeated the analyses for the urban middle-class, higher educated segments of respondents in Germany and the US. These analyses indicate that our results are robust and not substantially affected by the sample differences across China and the two other countries. The survey was conducted in the three countries during February 2018.

The outcome variables of interests for this chapter focus on policy support. The first outcome variable concerned willingness to pay more for meat products as part of increasing taxes; we assumed that higher prices would discourage meat consumption. We first showed respondents an indicative average price for meat in their country and asked them to indicate on a scale from 0 to 100 percent how much more they would be willing to pay for meat (compared to current prices) as part of a tax increase. To increase the external validity of our findings and reduce potential social desirability bias, we connected respondents' responses (as percentages) to the respective price increase and showed them how much money they would personally have to pay for meat under the related scenario. The second outcome variable concerned support for public policy that promotes reduction

of meat consumption and the consumption of meat alternatives. We differentiated here between three prominent types of meat alternatives, namely plant-based meat substitutes, insect-based meat substitutes, and lab-based meat substitutes. Here, we asked respondents to indicate their level of support for policies for reducing meat consumption or promoting meat alternatives in their country on a 7–point Likert scale (ranging from "strongly oppose" to "strongly support").

11.4.2 Combined Framing and Conjoint Experiments

To overcome the limits of simple surveys in terms of social desirability bias and test policy framing and design effects, the survey also included combined framing and conjoint experiments. In a first framing experimental step, in each of the three country samples we randomly varied four different policy frames to compare their effects on policy support. Based on our prior expert interviews in these countries, we identified four broad types of arguments in favor of shifting meat consumption and respective policy change. They are the protection of (1) animal welfare, (2) the global climate, (3) the local environment, and (4) personal health. We hence designed our treatments for the experiment along the lines of these real-world arguments to create realistic policy implications concerning the effects of policy framing on public support for dietary shifts. To ensure that participants read and looked carefully at the framing text and graphical illustrations, they could not move on from the treatment page for a minimum of ten seconds before continuing the survey. We then employed a manipulation check to ensure that participants had understood the essential information in the related frames and that the treatment worked as expected.

As our primary outcome variable of interest, we here use respondents' policy support for differently designed policy packages as measured in a conjoint experiment that was administered to respondents after the framing experiment. Conjoint experiments ask respondents to evaluate profiles that combine multiple randomly assigned attributes. We used a conjoint design of fully randomized paired profiles in which each respondent was shown profiles of two different hypothetical policy packages displayed side-by-side. Hence, each policy measure constituted an "attribute" in the package to which it belonged, and the attribute values were randomly assigned such that the two policy packages in each pair differed in one or more attribute values (Hainmueller et al. 2014). Each policy-package contained six types of policies (i.e., new tax on meat, rules for public cafeteria, animal welfare standards, information campaigns, discount for vegetarian alternatives, and reducing subsidies for meat products) and an additional attribute related to earmarking for the tax policy. We choose these six policy instruments based on expert interviews and a review of the existing food policy literature (Fesenfeld et al. 2020). Table 11.1 provides an overview of the policy instruments and stringency levels

Table 11.1 Overview of policy design attributes in the conjoint experiment.

Policy Instrument	Policy Stringency (high, medium or no change to status quo)	Policy Type and Primary Target Group	Perceptions of Policy-Induced Costs and Benefits by Majority of Citizens	Expected Policy Design Effects on Support for Policy Packages
"Taxes"—New tax on meat and fish products	• Increase prices by 30% • Increase prices by 15% • No new tax	• Market-based push instrument targeting consumer demand	• Low Benefits & Moderate to High Costs	Moderate to Strong Negative Effects on Support for Packages
"Regulations"—Rules about minimum share of vegetarian meals in public cafeterias	• At least 75% vegetarian meals • At least 50% vegetarian meals • At least 25% vegetarian meals • No such rules	• Command-and-control pull instrument targeting consumer demand	• Low to Moderate Benefits & Moderate to High Costs	
"Campaigns"—Information campaigns	• Frequent campaigns • Occasional campaigns • No campaigns	• Information-based pull instrument targeting consumer demand	• Moderate Benefits & Low Costs	Moderate to Strong Positive Effects on Support for Packages

Continued

Table 11.1 *Continued*

Policy Instrument	Policy Stringency (high, medium or no change to status quo)	Policy Type and Primary Target Group	Perceptions of Policy-Induced Costs and Benefits by Majority of Citizens	Expected Policy Design Effects on Support for Policy Packages
"Discounts"—Discounts for low-emission (vegetarian) alternatives	• Reducing prices by 30% • Reducing prices by 15% • No discounts	• Market-based pull instrument targeting consumer demand	• Moderate to High Benefits & Low Costs	
"Producer subsidies"—Reduction of subsidies for meat and fish producers	• Eliminating subsidies • Halving subsidies • Keeping subsidies at current level	• Market-based push instrument targeting supply side	• Moderate to High Benefits & Low Costs	
"Standards"—Animal farming standards	• Organic standards/free range • Higher animal farming standards • Standards kept at current level	• Command-and-control push instrument targeting producer supply	• Moderate to High Benefits & Low Costs	

Note: Please also compare to Fesenfeld et al. 2020 for more details on the experimental design. In our conjoint experiment, the policy stringency of each policy instrument randomly varied between three levels, i.e., no difference from the status quo, a medium level of stringency, and a high level of stringency. We expect citizens' perceived policy-induced costs and benefits and thus also their support level to vary according to the type of instrument and the level of policy stringency.
Source: Fesenfeld et al. (2020); reproduced with permission.

that we randomly varied in the conjoint experiment as well as the expected support effects among the majority of respondents based on previous research and the arguments outlined in the theory section (Fesenfeld et al. 2020). Respondents then indicated which of the two presented policy packages they would choose and to what extent they supported or opposed each package using an ordinal scale of seven degrees ranging from "strongly oppose" to "strongly support." These ratings resulted in a numerical variable from 1 to 7 for participants' level of support for each package.

In this chapter, we go beyond our previous publications (Fesenfeld et al. 2020, 2021) and combine the framing and conjoint experiments to discuss policy framing and design effects simultaneously. Moreover, this combination of experiments allows us to test for potential interactions between policy framing and design.

11.5 Results

Turning to the empirical findings, Figure 11.2 illustrates the observed variation in consumers' willingness to pay more for meat as part of a tax increase in the three countries. In China and Germany, participants indicated the greatest willingness to pay more for meat products. This is a significantly higher willingness to pay than the willingness of American respondents. Overall, these results show substantial average support for increasing taxes on meat to reduce meat consumption.

This finding is buttressed by our results of the average support for policies to reduce meat consumption and promote meat alternatives in the three countries. Figure 11.3 below shows that in China, a majority of respondents clearly supports public policies to reduce meat consumption and promote certain meat alternatives. However, the support for public policies to promote meat alternatives varies by meat substitute type. In China policies promoting plant-based alternatives receive the highest support, followed by policies promoting lab-based meat and insect-based meat. In Germany, on average respondents accept public policies to reduce meat consumption and promote plant-based meat alternatives. Yet, German respondents clearly oppose public policies promoting lab-based and insect-based meat. In the US, we find the same pattern. Also, here respondents on average accept (but not actively support) public policies to reduce meat consumption and promote plant-based meat alternatives, but not other types of meat alternatives.

Although we do not empirically explore the reasons for these differences here, socio-political and cultural differences between China and the other two countries are likely to account for these differences in public attitudes. Broadly speaking,
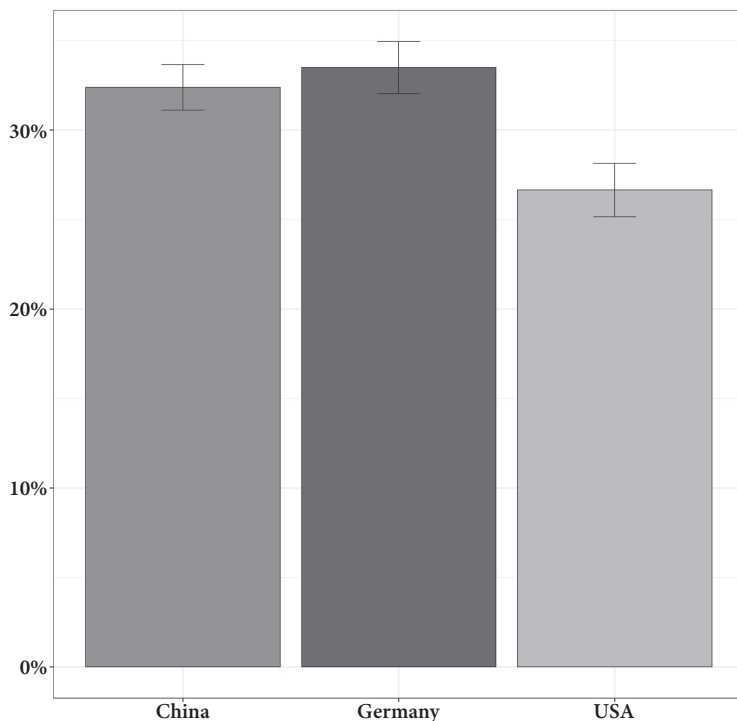
Figure 11.2 Willingness to pay more (in %) by adding a tax to reduce meat consumption.

Note: The graph shows the mean willingness to pay more for meat as part of a tax increase in China, Germany, and the US. The lines indicate 95 percent confidence intervals. Willingness to pay more for meat as part of a tax increase was measured on a scale from 0 percent to 100 percent meat price increases (compared to current prices), where higher values imply greater willingness to pay more for meat. In China, respondents are, on average, willing to pay 32.5 percent higher prices for meat than today due to a respective tax increase, while in Germany the average accepted price increase due to higher taxes was 34 percent. In the US, the average accepted price increase for meat due to higher meat taxes is 27 percent (compared to current prices) and thus significantly lower than in the two other countries.

China has a more collectivist culture valuing a strong role of the state, while Germany and the US have a rather individualistic and more liberal culture (Hofstede 2001). Moreover, food traditions in China differ strongly from the other two countries (Happer and Wellesley 2019; Fesenfeld 2020). For instance, plant-based meat sources, such as soy protein, have a long tradition in China, while such alternatives traditionally have been less prominent in Germany and the US. The explanatory factors of these cross-country differences warrant further investigation.
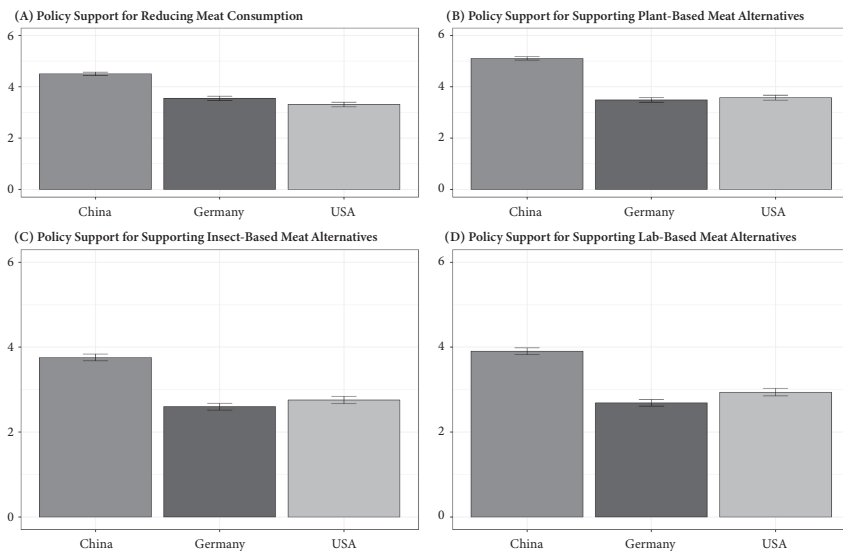
Figure 11.3 Average policy support to reduce meat consumption and promote different types of meat alternatives in China, Germany, and the United States.

Note: The lines indicate 95 percent confidence intervals. Support for policy reducing meat consumption and promote meat alternatives was measured on a scale from 1 to 7, where higher values imply stronger policy support.

11.6 Combined Framing and Policy Design Effects

Nevertheless, simple stated preference measures for general policy support might overestimate true support due to social desirability biases. Also, as outlined in our literature review citizens are likely to hold varying preferences for different types of policy instruments and the specific policy design is thus an important factor to consider. Moreover, as highlighted in our theoretical argument, policy design and framing might interact and jointly affect public support for policies to transform the food system.

Our framing and conjoint experiments can reduce such social desirability risks and yield more externally valid results (Hainmueller et al. 2015). In the following, we present the results of combining two conjoint and framing experimental studies.[3] As outlined in the Method section above, respondents had the choice between different pairs of food policy packages consisting of six different types of food policies. In addition, prior to rating the support for these policy packages, respondents were randomly confronted with four different types of policy frames. This design

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[3] As outlined in the Method section, we here combine two experiments that we discuss in more detail in Fesenfeld et al. (2020, 2021).
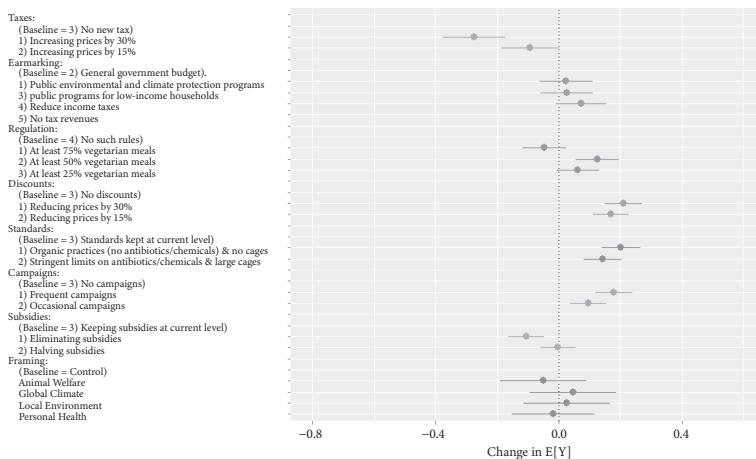
Figure 11.4 Effects of policy design and framing attributes on respondents' support rating (China).

Note: Scale is from 1 to 7, where higher values imply stronger policy support on policy packages to reduce meat consumption. Data points with horizontal lines indicate average marginal component effects for medium and high policy design stringency and different framing treatments with cluster-robust 95 percent confidence intervals from linear least squares regression. The dashed vertical line at 0 on the y-axis denotes the baseline category (that is, no design change to the status quo and no framing). The figure is based on data collected for Fesenfeld et al. (2020, 2021).

thus allows us to estimate the average marginal component effects on policy support of both different policy design attributes and policy frames as well as their potential interactions.

In contrast to the more generic policy support items outlined in Figures 11.2 and 11.3 above, here we test the support for specific types of policy instruments. In addition to the advantages of conjoint experiments to reduce social desirability risks (Hainmueller et al. 2015), the measurement of specific policy instruments arguably increases the external validity of results because individuals are less likely to overstate their support for specific instruments compared to general policy goals (Fesenfeld 2020).

Figure 11.4 shows the average marginal component effects of the different policy design and framing attributes on respondents' support rating on policy packages to reduce meat consumption in China. As expected, including a tax in a policy package that increases the prices of meat by 30 percentage points on average reduces support for a proposed policy package by about 0.28 points (on a 7–point Likert scale) in China, while a tax that would increase prices by 15 percentage points reduces support by around 0.1 points (on a 7–point Likert scale). However, against our expectations, earmarking the tax revenues for social or environmental purposes does not significantly affect support levels in China. Interestingly, demand-side regulations that define a minimum share of vegetarian meals in

public cafeterias also do not negatively affect support levels in China. A minimum share of 50 percent vegetarian meals would even significantly increase support levels in China. This finding contradicts our expectation about the negative support effects of demand-side restrictions outlined in the theory section and Table 11.1 above.

In line with our expectations, we find that adding discounts for plant-based meat alternatives and stricter animal welfare standards can significantly increase support levels for a proposed policy package in China. For example, adding discounts for plant-based meat alternatives to a policy package would increase support by about 0.22 points (on a 7–point Likert scale) in China. While adding information campaigns also increase the average support levels for a proposed policy package, eliminating subsidies for meat producers significantly reduces support. Surprisingly, the policy framing attribute, compared to the policy design attributes, does not significantly affect support levels in China.

As illustrated in Figure 11.5, similar to China, we also find in Germany that the combination of different positively and negatively valued policy design attributes can increase support for ambitious food policy packages. In Germany, we find that strong tax increases reduce support levels by 0.49 points (on a 7–point Likert scale) and thus more than in China. However, in contrast to the Chinese case, we can observe small but statistically significant positive effects of earmarking
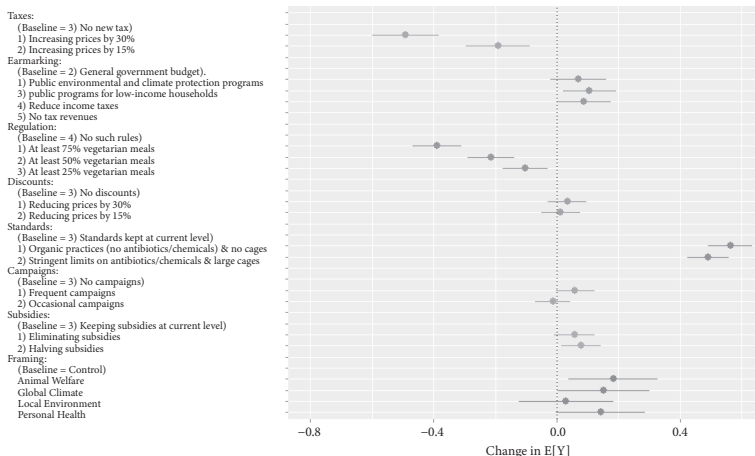

Figure 11.5 Effects of policy design and framing attributes on respondents' support rating (Germany).

Note: Scale is from 1–7, where higher values imply stronger policy support on policy packages to reduce meat consumption. Data points with horizontal lines indicate average marginal component effects for medium and high policy design stringency and different framing treatments with cluster-robust 95 percent confidence intervals from linear least squares regression. The dashed vertical line at 0 on the y-axis denotes the baseline category (that is, no design change to the status quo and no framing). The figure is based on data collected for Fesenfeld et al. (2020, 2021).

tax revenues for public programs for low-income households. Also, in contrast to the Chinese case, stringent rules about the minimum share of vegetarian meals offered in public cafeterias reduce support for a proposed policy package by about 0.39 points (on a 7–point Likert scale). This is in line with our expectation on the negative support effects of stringent demand-side push measures. While unexpectedly discounts for plant-based meat alternatives do not significantly affect support levels in Germany, adding stricter animal welfare standards would increase support by about 0.56 points in Germany. Also, reduced subsidies for meat producers would slightly increase support levels while information campaigns do not have any significant effects on the support for a proposed policy package. Finally, in contrast to China, in Germany the policy framing attribute has a significant positive effect on policy support but not for all policy frames. The animal welfare, personal health, and global climate change frame increases support by almost 0.2 points (on a 7–point Likert scale), while the local environment does not have a significant support effect.

We also investigated potential interactions between the policy frames and policy design attributes (see Figure 11.6). In contrast to China, for the German case, we find that higher taxes on meat are supported significantly more if framed via the animal welfare argument (i.e., the marginal mean of respondents' support is
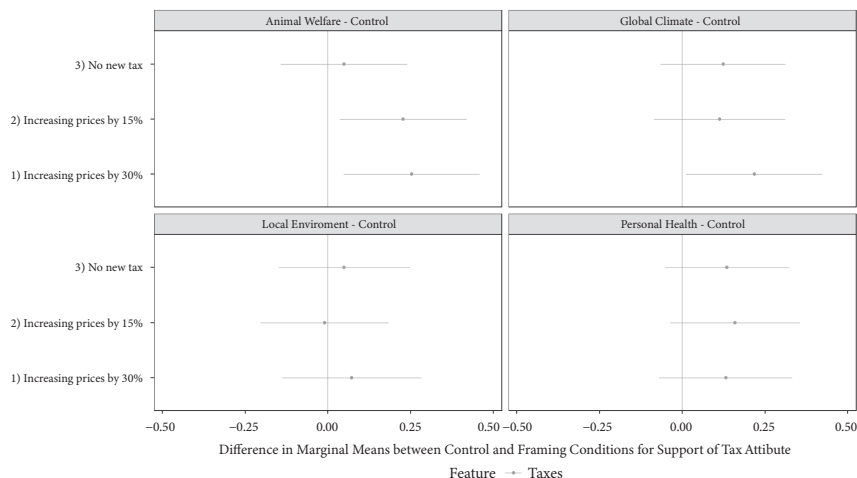
Figure 11.6 Difference in marginal means between the control and framing conditions for different tax levels on meat (Germany).

Note: We estimated the difference in marginal means for the different framing attributes and tax levels with cluster-robust 95 percent confidence intervals using the R cregg package developed by Leeper et al. (2020). If the error bars do not overlap with the dashed vertical line at 0 on the y-axis, we find a significant difference in the marginal means between the control and respective framing conditions for the support rating of the respective tax level. The figure is based on data collected for Fesenfeld et al. (2020, 2021).
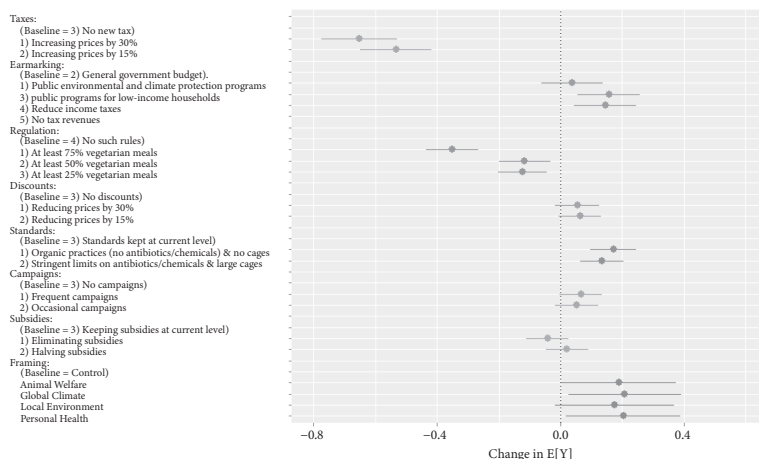
Figure 11.7 Effects of policy design and framing attributes on respondents' support rating (United States).

Note: Scale is from 1 to 7, where higher values imply stronger policy support on policy packages to reduce meat consumption. Data points with horizontal lines indicate average marginal component effects for medium and high policy design stringency and different framing treatments with cluster-robust 95 percent confidence intervals from linear least squares regression. The dashed vertical line at 0 on the y-axis denotes the baseline category (that is, no design change to the status quo and no framing). The figure is based on data collected for Fesenfeld et al. (2020, 2021).

around 0.25 points higher on the 7-point rating scale for the animal welfare condition compared to the control condition without a frame). This result is in line with recent evidence from a referendum choice experiment in Germany conducted by Perino and Schwickert (2023). In addition, the global climate change frame also has a significant positive effect on respondents' support for taxes that increase meat prices by 30 percent, while the other framing conditions do not significantly increase support for higher taxes compared to the control condition.

Finally, for the US sample (Figure 11.7), we uncover very similar findings to the German case and in many regards also to the Chinese case. In the US, strong tax increases reduce support levels even significantly more (by 0.65 points on a 7-point Likert scale) compared to the German and Chinese cases. Similar to Germany, earmarking tax revenues for programs for low-income households significantly increases support in the US.

In contrast to China, but similar to Germany, stringent rules about the minimum share of vegetarian meals offered in public cafeterias would reduce support for a proposed policy package by about 0.35 points (on a 7-point Likert scale). Like in Germany, against our expectation, discounts for plant-based meat alternatives do not significantly increase support. Yet, as in China and Germany, stricter animal welfare standards can significantly increase support levels for a proposed policy package.
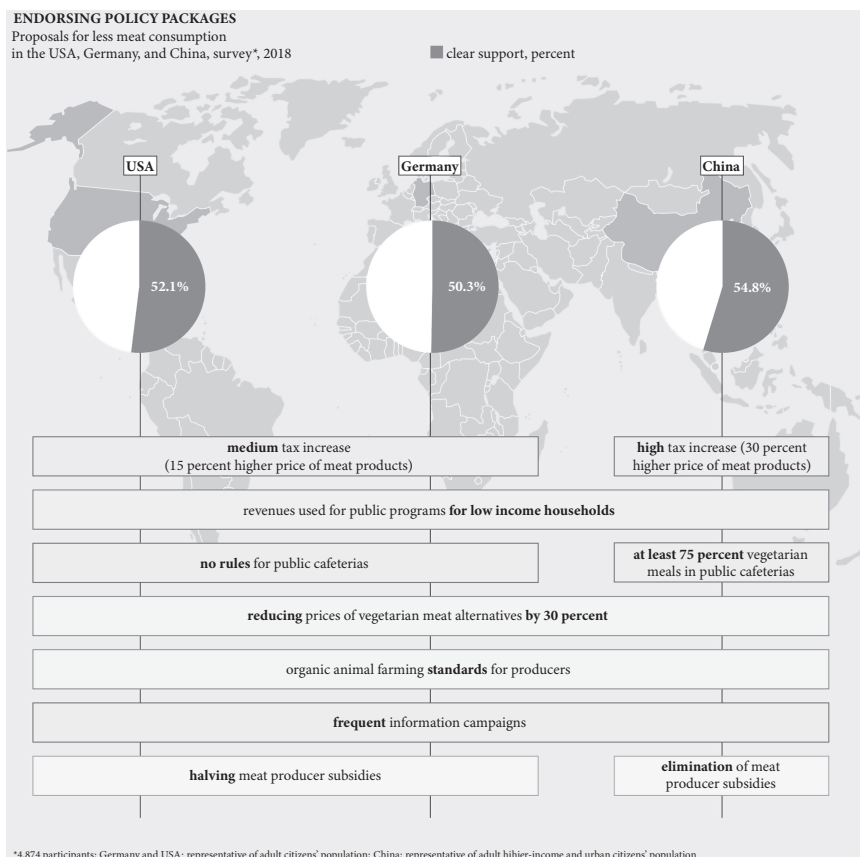
While adding information campaigns or subsidy reductions to a policy package does not significantly affect support in the US, policy framing can have positive support effects. In the US, all frames (except the local environment frame) significantly increase support by a magnitude of 0.2 points. Like in Germany, also in the US the animal welfare and global climate change frames significantly increase respondents' support for policy packages, including higher taxes (see Figure 11.8). In fact, the marginal mean of respondents' support is around 0.30 points higher on the 7-point rating scale for the animal welfare and climate condition compared to the control condition without a frame. However, in contrast to Germany and China, the personal health frame also significantly increases support for higher meat taxes in the US. In sum, justifying meat taxes via the animal welfare and climate change argument seems a promising way of increasing support levels for meat taxes in the two democracies, while in the US the health frame also has positive support effects. In China, none of the frames increase support for taxes any further. Yet, for the Chinese case, it is noteworthy that support for packages including higher meat taxes is already significantly higher than in Germany and the US (see Figure 11.9 below).

All three country cases clearly support our expectation that the combination of different types of policies within policy packages is key for explaining majority support for policies to reduce meat consumption. To illustrate the importance of
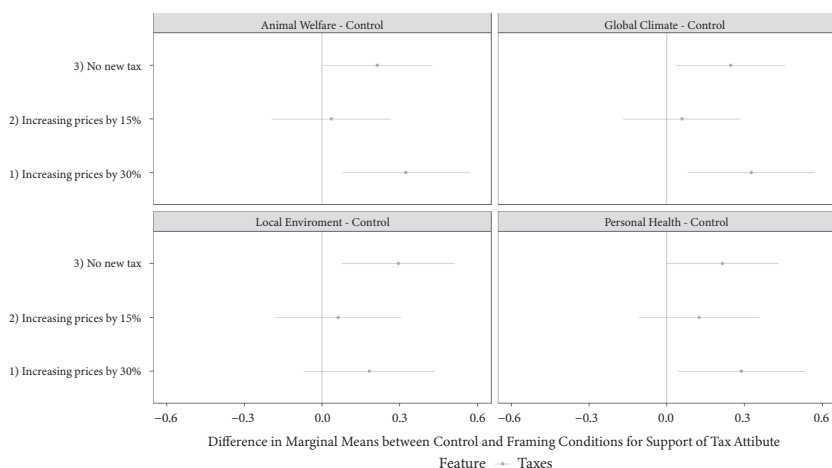
Figure 11.8 Difference in marginal means between the control and framing conditions for different tax levels on meat (US).

Note: We estimated the difference in marginal means for the different framing attributes and tax levels with cluster-robust 95 percent confidence intervals using the R cregg package developed by Leeper et al. (2021). If the error bars do not overlap with the dashed vertical line at 0 on the y-axis, we find a significant difference in the marginal means between the control and respective framing conditions for the support rating of the respective tax level. The figure is based on data collected for Fesenfeld et al. (2020, 2021).

ENDORSING POLICY PACKAGES
Proposals for less meat consumption
in the USA, Germany, and China, survey*, 2018   ■ clear support, percent

USA — 52.1%   Germany — 50.3%   China — 54.8%

medium tax increase (15 percent higher price of meat products)   **high** tax increase (30 percent higher price of meat products)

revenues used for public programs **for low income households**

no rules for public cafeterias   **at least 75 percent** vegetarian meals in public cafeterias

reducing prices of vegetarian meat alternatives **by 30 percent**

organic animal farming **standards** for producers

frequent information campaigns

halving meat producer subsidies   **elimination** of meat producer subsidies

*4,874 participants; Germany and USA: representative of adult citizens' population; China; representative of adult hihjer-income and urban citizens' population

Figure 11.9 Most stringent policy package proposals in China, Germany, and US receiving clear public support (i.e., a rating of 5 or higher on a 7-point scale).

Note: Figure is based on predicted support for differently designed policy packages as published in Fesenfeld et al. (2020). To estimate the share of support we recoded the seven-point Likert scale into a binary oppose/support variable. In essence, the values 1–4 indicate opposition to the proposed policy-package, while the values 5–7 indicate support for the policy-package. This coding scheme provides conservative estimates of feasible policy packages given that we only consider packages respondents clearly support (i.e., awarded a rating of 5 or higher) rather than packages respondents would also accept (i.e., awarded a rating of 4 or higher).
Source: Bartz/Stockmar, CC BY 4.0 https://creativecommons.org/licenses/by/4.0/

policy packaging, we also predicted respondents' share of clear support for policy packages (i.e., a rating of 5 or higher on a 7-point scale) that include specific policy attributes. For example, Figure 11.9 outlines the most stringent but still clearly supported policy packages in the three countries. Here we can see that in Germany and the US packages including moderate taxes are only clearly supported by more than 50 percent of respondents if combined with discounts for plant-based meat alternatives, stricter animal farming standards and public programs.

In China, however, we find broader public support—even for packages including larger tax increases.

Overall, policy design seems to be the substantially more important factor in shaping public support compared to policy framing. Nevertheless, our results also indicate that policy framing can affect support levels to some degree and that the interactions between specific policy frames and design attributes (e.g., animal welfare frame and meat taxes) can be essential for garnering majority support. Overall, as we discuss in more detail below, we conclude that more research is needed to investigate the effects and interactions of different policy frames and policy designs in shaping public opinion about food system transformation.

Finally, given the cross-sectional nature of our survey, we cannot directly assess policy feedback, which should be a focus of future research. Nevertheless, in several recent studies, we gathered preliminary evidence about potential feedback effects on public support for food system transformation. First, in a recent survey experimental study in China and the US (Fesenfeld et al. 2023), we find that more tasting experiences per week with plant-based meat substitutes, such as vegetarian burger patties, is an important predictor for public support of costly demand-side policies to reduce meat consumption, such as higher taxes on meat. Using different machine learning-based methods,[4] we find that the strong predictive effects of meat substitute experience have an independent effect on policy support and are unlikely to be an artifact of third variables (e.g., ideology, environmental awareness, knowledge, gender, etc.) that correlate with meat substitute experience. These findings also resonate with evidence from another study that shows that being familiar with meat substitutes is an important predictor of the willingness to pay for substitutes and thus potentially also for support of tax-based policies to incentivize a switch from meat-to-meat substitutes (Carlsson et al. 2022). Second, in a recent study in Switzerland, we employed a novel combination of vignette and conjoint experiments to test for the joint effect of policy framing, design, and feedbacks on public opinion (Fesenfeld, Maier et al. 2022). Here we find that private industry initiatives can have positive feedback effects on public support for governmental regulations to improve the sustainability of the food sector.

In sum, these studies indicate that pull policies that seek to increase the availability and consumer experience with plant-based meat alternatives (e.g., targeted discounts, innovation programs, and less intrusive nudges in public cafeterias) are more publicly acceptable at an earlier point of time than push policies at the demand-side, like higher meat taxes. That said, over time, positive feedback effects of such supply-side policies—both public policy and private initiatives— are likely to increase public support for the subsequent introduction of more

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[4] Please refer to the original study for further details on the methodological approach (Fesenfeld, Maier, et al., 2023).

stringent demand-side food policies. Hence, more empirical research is needed to investigate such policy feedback and sequencing strategies in the political economy of food system transformation.

11.7 Discussion and Research Outlook

Reflecting upon the results presented above, we identify some limitations of the existing literature and provide an outlook for further research on food system transformation. Overall, policy framing, design, and feedback effects have, so far, been studied mainly in isolation and hence also in different survey and/or country populations. However, in reality these three factors are likely to interact with each other (Fesenfeld 2020, 2023; Fesenfeld, Rudolph and Bernauer, 2022). For example, policy framing can make specific policy design factors more salient in the public discourse and thus alter the public support effects of different policy package attributes. In addition, the specific labeling of policies (e.g., tax versus levy or animal welfare tax versus meat tax) can create interacted policy framing and design effects (Fesenfeld 2023; Perino and Schwickert 2023). Moreover, the complexity of policy designs can also make public support more prone to framing effects (Fesenfeld 2022). Finally, the specific combination of different policies is likely to alter potential feedback effects and thus change public support for transformation over time. In fact, recent research has started to look at all three factors simultaneously and provides evidence on their synergetic relationships in moving public support for sustainability policies in the food sector (Fesenfeld, Rudolph and Bernauer, 2022).

Considering the dynamism of food policies, future research can move beyond cross-sectional survey experiments and instead combine field- and survey-experiments in a panel design to gather preference and behavioral data over time. For example, in a combined longitudinal survey- and field experiment in supermarkets or public cafeterias, one could randomly vary the availability of sustainable meat substitutes and provide different policy design and framing treatments to compare combined effects on individuals' shopping behaviors, perceived social norms, and policy attitudes over time. Moreover, such settings would also allow to estimate social norm diffusion and social contagion effects by testing for potential spillover effects from treated to non-treated individuals in the same social context (e.g., in work-place cafeterias or families).

Such research designs would be helpful to examine positive tipping dynamics, which could play a crucial role in accelerating food system transformation. A tipping point occurs when change in part of a system becomes self-perpetuating beyond some threshold, leading to substantial, widespread, often abrupt and irreversible impacts. At a positive tipping point in a socio-technical-natural

system, such as a food system, a relatively small intervention can shift the system toward a qualitatively new state that is predominantly beneficial to humans and the natural systems on which we rely (Sharpe and Lenton 2021; Fesenfeld et al. 2022). For instance, a critical mass of consumers that start to shift to a more plant-based diet could make investments into the development of new meat alternatives profitable and thus decrease substitute prices over time. At a certain price and quality level, meat alternatives thus also become more attractive to other (less conscious) consumer segments and their increasing experience with and information about the sustainability benefits of substitutes helps to shift social norms and public discourses. This, in turn, increases investments into new markets and shifts interest group positions about food policies, such as meat taxes and producer subsidies. Potentially, this then enables policy change that can further accelerate meat consumption shifts. Eventually, this could reduce demand for natural resources linked to meat production and lower the risks of crossing dangerous tipping points in natural systems, such as the dieback of the Amazon rainforest. Thus far, however, we lack knowledge about whether and how such tipping dynamics exactly take place in the food sector and which types of policies can trigger them (Fesenfeld et al. 2022).

In terms of geographic coverage, as outlined by our scoping literature review in Section 11.2, the majority of public opinion research on food policymaking still focuses on Western industrialized countries, particularly the US and the European Union (EU). However, given the rising meat consumption and dietary changes in many developing countries and emerging economies, more cross-cultural and comparative research on public opinion about food system transformation is needed (Resnick 2020). We thus encourage more public opinion research in the developing world, especially large emerging economies where the impacts of food consumption and productions continue to grow.

Finally, we would like to highlight the need for research on the interactions between opinions of citizens and political elites on food system transformation. So-called second-order beliefs (i.e., beliefs of actors about the beliefs of other actors and the public) could yield misperceptions among citizens and key political stakeholders about each other's opinions (Fesenfeld 2020). Also, the relationship between the opinions of the public and those of elite actors is likely to be dynamic and endogenous. While policymakers, businesses, non-governmental organizations (NGOs), and scientists seek to strategically communicate to and influence public opinion, public opinion in turn also affects stakeholder positions. For example, parties in democratic countries are likely to shift their positions as result of major public opinion changes, and companies may alter their product offerings and lobbying positions as result of shifts in public discourses.

11.8 Conclusion

Our chapter provides an overview of the existing public opinion research on food system transformation, which shows that most of the existing studies have focused on health-related issues (e.g., sugar taxes) rather than a holistic food system transformation perspective in line with different SDGs (e.g., environment-related goals such as biodiversity protection and climate mitigation or social outcomes such as ending hunger and improving livelihoods and wellbeing). Based on our scoping review and the broader transition literature, we propose a theoretical framework for structuring future research on the subject. Specifically, we highlight that policy framing, design, and feedback effects should be studied as important factors for shaping public opinion about food system transformation and policy change.

We present survey-experimental evidence, which support the importance of these factors, especially policy design and feedback, for shifting public opinion. More specifically, our surveys in China, Germany, and the US show that public support for ambitious policies to reduce meat consumption—arguably one of the most important goals to transform the food system in line with the SDGs—is already high in large meat consuming and producing countries. However, the results also show that support for stringent policy measures such as higher meat taxes strongly depend on policy design and specific packaging—e.g. moderate tax increases can be accepted if combined with stringent producer standards and discounts for plant-based meat substitutes. Thus, careful policy packaging can be a useful strategy to garner majority support. At the same time, we also find that simple policy framing (e.g., emphasizing health, animal welfare, or climate mitigation and local environmental protection arguments) does only slightly alter public support for ambitious policies to reduce meat consumption. Lastly, policy sequencing—e.g., first introducing pull policies to increase consumer experience with meat alternatives and then demand-side push policies like meat taxes—has the potential to increase public support for ambitious food policies and alter social norms, which may ultimately enable positive tipping points in public support for food system transformation.

Linking our chapter to other chapters in this book (e.g., Chapter 3, 7, and 9), we also believe that such sequencing strategies might be effective at shifting both public opinion and elite actor coalitions. As outlined in the introduction, increased public support for food system transformation is only one of the factors that determine political feasibility of transformative policy initiatives. Here, we suggest that our framework on policy framing, design, and feedback can also be useful to understand combined public opinion and actor coalition shifts and thus estimate the political feasibility space for food system transformation.

For example, the rise of new meat substitutes might offer an opportunity for creating an integrative policy frame around green growth jointly supported by a coalition of change-oriented food industry and civil society actors. Such a novel narrative could combine traditional civil society frames around food system sustainability (e.g., climate protection, animal welfare, and health) with new innovation and technology arguments pushed by meat substitute producing companies. This actor coalition could use the positive and integrative policy frame to shift public opinion in favor of transformative policy initiatives and jointly lobby policymakers in favor of the adoption of (currently less opposed by citizens) pull policies. Such strategic policy framing and design efforts could then help shifting resources to the new actor coalition and trigger feedback for altering public discourse and opinion in favor of stringent demand-side food policies (currently more opposed by citizens).

Overall, while the chapter focuses on the role of public opinion in the political economy of food system transformation, our framework and preliminary evidence shed light on the interactions between policy framing, design, and feedback in the broader processes of sustainability transition. Looking ahead, researchers of food policy need to conduct more time-series analysis to compare countries with different socioeconomic and political systems. For addressing the limitations of existing research, future research should also employ more field-experimental and panel designs that increase external validity and allow to better study the interactions between policy framing, design, and feedback over time. We also need more research on the interactions between public opinion and the broader political economy environment. Integrating novel computational social science methods with experimental and case studies thus offers new opportunities for moving beyond existing limitations in analyzing the political economy of food system transformation.

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