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Evaluating the Effects of a Minimalist Deliberative Framework on the Willingness to Participate in a Payment for Ecosystem Services Program

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Abstract: When compared with other stated preference valuation methodologies, deliberative valuation gives participants more time and information, potentially resulting in more valid and reliable estimations and higher participant confidence. However, it also has weaknesses, such as small sample sizes, lower participant diversity, and high costs. This paper proposes a minimalist framework for deliberation that increases sample size and lowers the cost per participant through short, structured deliberative sessions and the use of deliberative sub-groups. A case study was conducted with 192 landholders in south-eastern Mexico, examining how participants' perceptions of benefits from communal forest lands would impact their willingness to accept (WTA) comparatively lower payments to participate in a Payment for Ecosystem Services (PES) program. The results suggest that a majority of landholders would accept a lower payment level to participate in a PES program over a degradative alternative, with 45.5% of participants surveyed willing to accept a 45% reduction in payments to participate in the PES program. The minimalist framework had an impact on participants' rate of acceptance, with a 13.8% increase in the percentage of participants willing to accept the PES offer post-deliberation. The impact on participant confidence was stronger, with a 31.2% increase in the percentage of participants expressing confidence in their choice after deliberations.

Keywords: deliberative valuation; payment for ecosystem services; non-market valuation; tropical forests; watershed management; ecosystem services

1. Introduction

Stated preference valuation techniques, such as contingent valuation or choice experiments, have emerged as some of the most popular methodological approaches for the valuation of non/quasi-marketed good and services, particularly environmental good and services, due to their ability to estimate hypothetical changes and non-use values. However, stated preference techniques have also been subject to extensive criticism over issues of validity and bias, especially related to the process of preference formation for unfamiliar or complex goods and services, as well as more philosophical critiques related to incommensurability of values and the role of the respondent as consumer or citizen [1–3].

One proposed solution is the incorporation of a deliberative component to valuation exercises, bringing respondents together to discuss issues and concerns, to arrive at a valuation superior in both process and outcome. However, substantial disagreement exists over the form and purpose of such a deliberation, with the most fundamental division existing between a conception of deliberation answering, first and foremost, the philosophical criticisms of stated preference methodologies, and a deliberation designed to primarily solve issues of validity and accuracy [4]. These two theoretical conceptualizations of deliberation, which might be termed political deliberation and informative

deliberation, respectively, differ in their approach to consensus, aggregation of results, the role of the moderator/facilitator, and the importance of sample representativeness [5–8].

Evaluating the informative model of deliberative valuation, a number of strengths relative to other stated preference techniques stand out. Deliberative valuation gives participants more time and information than survey-only methodologies, reflecting a more realistic model of preference formation when confronted with the valuation of complex or unfamiliar goods or services, and leading to more valid and/or reliable value estimates [9–11]. The addition of a deliberative component also allows participants to be introduced to new viewpoints from other participants and contributes to a higher degree of participant confidence in their valuation estimation, thereby conferring greater legitimacy to the results of the valuation exercise [12–14].

Unfortunately, informative deliberative valuation has also suffered from a number of systematic weaknesses that have limited its effectiveness. Most notably, past deliberative valuation studies have had restricted sample sizes when compared to other stated preference methodologies, due to the high cost per participant and limited effectiveness of large deliberative groups. This has led to concerns about representation and the ability of deliberative valuation to reflect the preferences of the broader community [15–19]. The time investment required of participants in deliberation has also led to problematic sample compositions, with the systematic underrepresentation of a number of social and economic groups [19–22]. Additional concerns have been noted such as the replication of external hierarchies within the deliberation and problems of group think and group polarization marginalizing minority voices [8,13,15,17,23].

While it may be unrealistic to outline a “one size fits all” deliberative methodology that overcomes all of the weaknesses of deliberative valuation while also preserving deliberation’s strengths, it might instead be productive to develop a variety of deliberative formats to fit different contexts and research goals. This paper proposes such a framework, a minimalist variant of deliberative valuation aiming to reduce costs to organizers and participants and thus increase sample size and diversity. These goals are to be achieved through shorter, more structured deliberative sessions and the use of a larger deliberative group with discursive sub-groups.

In order to examine the impact of this minimalist deliberative framework, a valuation case study is examined. South-East Mexican smallholders were asked to complete a survey questionnaire with demographic and attitudinal questions, and then given a hypothetical valuation scenario. This scenario asked them put themselves in the position of helping to make a decision about how to manage communal forest lands through either leasing the land for grazing or enrolling it into a Payment for Ecosystem Services (PES) program. The study focuses on how landholders’ perception of benefits deriving from communal forest lands would impact their willingness to accept (WTA) lower payments to participate in the PES as opposed to the more destructive, but potentially more lucrative, option. Before and/or after the participants took the survey, some also took part in a deliberation along the lines of the minimalist framework proposed in the paper, allowing for the impacts of the deliberation on participant value estimates and confidence to be evaluated.

This paper consists first of an introduction to the theoretical and philosophical roots of deliberation, as well as their implications for deliberative valuation, specifically. The strengths and weaknesses of informative deliberation, are discussed in depth, along with a possible minimalist deliberative framework designed to help alleviate some of these systematic concerns. This is followed by an introduction to Payment for Ecosystem Services (PES) programs, with a specific focus on their implementation in Mexico and issues related to the estimation of opportunity cost for participants. Once this theoretical and contextual background has been explored, the paper outlines the methodology and results of the case study and is concluded by a discussion of their implications for some aspects of PES and deliberative designs.

2. Deliberation and Valuation

2.1. Background

Deliberation has been incorporated into non-market valuation to address perceived limitations of traditional stated preference valuation techniques [5–8,24–26]. However, from the beginning, important epistemological disagreement existed between works approaching deliberation as a means to improve upon existing valuation methodologies and works approaching deliberation as a fundamentally different form of valuation, as a response to the individualist and utilitarian perspective of traditional valuation methodologies, such as contingent valuation [6–8].

The latter works, which might be termed political deliberations, aim to build a consensus value estimate, while explicitly seeking a variety of different value perspectives. Within this deliberative framework, transcendental, non-utilitarian, and incommensurate values are considered explicitly and equally with utilitarian or individualistic values [5–8]. This form of deliberation particularly rejects the role of the participant as a consumer of goods or services; rather, they are to take on the role of citizens and members of a broader community. In this paradigm, the aggregation of individually generated preferences cannot bestow adequate legitimacy on the resulting estimations. Instead, deliberation should involve participants reconciling their differences by arriving at a mutually acceptable consensus [5–8].

Other deliberative valuation work presents a model of deliberation that comes closer to the ideals of post-modernist discourse, even if they are seldom ideologically or theoretically rooted in this *Weltanschauung* [7,8]. These informative deliberations are generally aimed at enhancing traditional valuation techniques, such as contingent valuation, through giving participants the opportunity to become better informed and considering the issues at play more deeply [12]. Participants do not have to restrict themselves to individual utilitarian preferences, but can incorporate other sources of value; however, they are still primed to approach the valuation exercise from the perspective of their own utility maximization, and transcendental and non-utilitarian values are considered implicitly rather than directly. The actual valuation exercise is almost always accomplished through the aggregation of individual preferences and explicitly produces a monetary value [8]. Within this informative context, deliberation serves to tailor information specifically to the participants, give participants time to think and ask questions of the researcher/organizer and other participants, and improve participants' understanding of the issue at hand, while allowing the participants to hear and offer multiple perspectives [12].

This paper follows Niemayer and Dryzek (2007) in accepting that authentic deliberation need not involve consensus of outcome, but rather meta-consensus—agreement on the nature of the problem being deliberated upon, the possible choices present, and the arguments in favor or against those choices. Deliberation should also produce inter-subjective rationality—individuals with similar preferences should favor similar decisions [27].

These two goals highlight the informative/efficient argument in favor of deliberation—deliberation should enable the participant to understand the issue at hand, the possible solutions, the arguments for and against different positions, and, ultimately, the choices made by individuals should therefore accurately reflect their genuine preferences. Thus, deliberation can lead to an individual changing his or her mind on two grounds: (a) his or her preferences change, leading to a choice commensurate with these new preferences, or (b) his or her preferences remain the same, but he or she realizes that a different choice actually better reflects those same preferences, both reflecting a more rational outcome than would have resulted before the deliberation.

2.2. Strengths of (Informative) Deliberation

2.2.1. A More Realistic Model for Preference Formation

Preferences are not always pre-formed. For many environmental goods and services, for example, respondents are unlikely to have strong, existing preferences [2,10,28]. Instead, they may have

amorphous conceptions, based on their beliefs and values, which they attempt to fit into the valuation system required by the survey. Thus, the valuation experience itself helps to refine and solidify the respondents' preferences rather than reflecting pre-existing strong preferences [26,28,29]. Unfortunately, most traditional stated preference valuation interviews prompt respondents to express a value on the spot, with very little opportunity for consideration, reflection, or chance to obtain additional information. Respondents also generally lack the sort of contextual prompts, such as the positions of public figures, political parties, or other opinion shapers that help to mold preferences in real-world decision scenarios [26,30]. This is not necessarily problematic for goods or services the respondent is comfortable placing a value on, such as goods they might actually have purchased or would purchase, but is much more challenging for goods they are not familiar with, particularly ones with substantial non-use value [9–11].

If preferences for particular goods and services are not fixed and invariant, stated preference surveys will return inaccurate estimations. When confronted with the valuation of unfamiliar or complex goods or services, respondents may rely on heuristics or exhibit lexicographic preferences, where they are unwilling to trade any quantity of a good or service for any quantity of money, or vice versa [2,10,14,22,26]. This is particularly evident for environmental goods, where respondents/participants may be unfamiliar with the terminology behind concepts such as “biodiversity”; it seems a fair assumption that when a respondent is not clear what is being valued, they are unable to accurately estimate its value [14,22,28,29]. Deliberation thus provides a means for participants to engage in preference formation and accrue the knowledge necessary to offer informed estimations, and thus can function as a mechanism to solidify preferences [11,14,22,29].

2.2.2. Time and Information

Deliberation offers the chance to provide large amounts of information to participants; additionally, participants can discuss the information provided, and then request additional information or sources of information. This information can consist of different perspectives, or of scientific or policy information about the underlying issue or policy solution [16,31,32]. When this information is received, in part, through discussion with other participants, participants also show a greater interest in cooperative and collective responses to environmental issues [16,33]. Within an environmental context, deliberation can offer participants the opportunity to learn about complex and interconnected processes of ecosystem services, and about the way these processes are impactful on other participants. Deliberation can also explicitly highlight the moral and ethical concerns inherent in environmental decision-making [8,16,31].

2.2.3. More Valid and Reliable Value Estimations

Deliberation can lead to the expression of more valid and reliable value estimations by ameliorating some of the biases and flaws in traditional stated preference valuation methodologies. Deliberation can reduce the effects of embedding, that is, assigning a different value to a good depending on the context in which it is presented [12,22]. For instance, a respondent's willingness to pay for one good might fall when presented with competing goods; or, a respondent might offer the same willingness to pay for vastly varying quantities of the same good. There is evidence that respondents are particularly challenged with scope, having difficulty distinguishing large magnitudes. Embedding is reduced in deliberation by providing sufficient time and multiple perspectives by which to consider questions of scope and tradeoff [12]. Deliberative groups can be especially useful when dealing with challenging welfare measures such as willingness to accept compensation, where discussion and deliberation can reduce strategic over-bidding and protest bidding [14,18,32–35].

There is evidence that improved knowledge and information about the good or service in question meaningfully changes aggregate preferences—not just individual positions, but the aggregate distribution of preferences would be different on many issues if all respondents were better informed [5,9,11,12,14,18,22,29,35,36]. Traditional stated preference surveys give an overview of preferences as is; deliberation also offers the chance to examine preferences after a minimum threshold

of knowledge is obtained. If done correctly, a deliberation can outline the preferences of a public that has had the chance to learn, reflect, and discuss the relevant topics in depth [14,35].

2.2.4. New Viewpoints

Deliberation has the potential to bring together participants who would otherwise not interact and expose different voices and perspectives within a mediated setting [1,37,38]. Deliberation should optimally function as a surrogate for a public discussion of the issue at hand. Through the sharing of knowledge and perspectives between group members, deliberation can lead to the development of ideas and perspectives that no one in the group would have developed individually [10,29,35,37]. When preferences are shaped during deliberation, as seems to be the case with unfamiliar goods and services, the deliberation may lead participants to respond differently than if they were considering the valuation individually, considering new perspectives and sharing their own perspectives [35,37,38].

2.2.5. Increased Confidence and Legitimacy

When evaluating the success of a valuation exercise, it is important not merely to look at normatively-oriented process measures, but also respondent-focused criteria; that is, do the respondents in a valuation exercise believe the valuation has adequately allowed them to form and express their preferences [6,13,14]. There is evidence that deliberation leads to a higher number of participants estimating values through cognition versus intuition, and to have increased participants' confidence, both in the value they estimated and in their own ability to accurately estimate that value [12–14].

For instance, when comparing a familiar and unfamiliar environmental good, participants in MacMillan et al. (2005) were much more likely to change willingness to pay (WTP) estimates between contingent valuation and deliberative valuation exercises for unfamiliar goods; participants also expressed much more confidence in their estimation after deliberation [22].

Deliberation can lend a great legitimacy to valuation estimates from non-participants. Policy-makers generally want to enact policies based on accurate and up-to-date information on the issue at hand, including the preferences of the affected public. When the value estimates generated by valuation exercises are considered to be valid, reliable, and legitimate, they are more likely to be acted upon by policy-makers, further increasing the legitimacy of the valuation exercise [13,39].

2.3. Weaknesses of (Informative) Deliberation

2.3.1. Sample Size Limitations, Representation, and Cost

The greatest problem facing deliberative valuation is that of sample size and scale, and corresponding issues of representativeness, exacerbated by cost. Deliberations are time-consuming and expensive to conduct with the number and socio-economics of participants needed to be representative of larger populations. Deliberation thus suffers from a problem of scale: functionality requires small-groups, but legitimacy requires the widest possible participation [15–19]. However, if participants in deliberations are not representative of the affected population or of the full range of perspectives, the results will be less valid and less legitimate; this is even more the case if this inequality in participation reinforces existing external hierarchies of status and power [4,15,16,18,20,37].

It is unlikely that any group small enough to deliberate could effectively represent the views of a larger population. Additionally, attempting to pick out participants to “represent” some broader groups creates a false and problematic narrative that all members of that group have functionally identical views and preferences [4,8,9,15,20,21,27]. This also puts participants in the dilemma of whether to represent their own preferences or the perceived preferences of the group they are “representing”; it is unreasonable to suggest that any member of any group can adequately represent all members of that group [4,9,15,20,21,37].

A possible solution would be to conduct a number of different small deliberative groups, allowing for statistical representation while preserving the effectiveness of small group size. However,

historically, deliberative groups have had a very high cost per participant in both time and money. Balderas Torres et al. (2013) found deliberative valuation to be much more expensive than a traditional contingent valuation survey, costing between \$8 and \$20 per participant, compared with \$3 per respondent for a contingent valuation survey [18].

2.3.2. Uneven Cost to Participants

A related problem is the uneven cost of participation within a deliberation on different participants, which can have systematic impacts on the representativeness of a deliberative group. The more involved the commitment to take part in deliberations, in time, money, or effort, the more challenging it will be to ensure a representative group, instead favoring participants with available time and resources to participate [40,41].

Levels of participation in deliberations are generally low, and there is an inevitable degree of self-selection in participants that has implications for representativeness [19–22]. Some social groups, such as young people and the elderly, minorities, those in full-time employment, and non-environmentally active people have been historically underrepresented in deliberative settings. When social balance is lacking, as is often the case in deliberations, the validity and legitimacy of any decision suffers [4,6,8,18,41].

Problems with sample composition due to time costs have been found in other quasi-deliberative settings featuring a substantial cost in time, money, or effort. De Santis and Renner (1997) found that citizens in Massachusetts towns with town meeting governments were over four times as likely to vote than to attend a town meeting, with often substantial demographic and political differences from attendees [42]. Similar differences in turnout have been noted in those Swiss cantons maintaining the *Landsgemeinde* public cantonal assemblies, Appenzell Innerrhoden and Glarus, one of the reasons why other cantons replaced them with ballot box voting [43].

2.3.3. Hierarchical Replication

For a deliberation to be successful, it must, as a minimum threshold, be fair; that is, all participants must be treated equally, and have equal ability to participate in discussions and an equal voice in any decision made. Participants must also be free of internal or external manipulation through imbalances in power [13,15,23]. However, deliberations are often impacted by participatory exclusion, where power imbalances outside of the deliberative setting are replicated within it as well [8,17].

Deliberative processes can exacerbate existing inequalities by replicating power imbalances, prizing expert interpretations through facilitation processes, and exerting pressure to correspond to social or group norms. Deliberative settings can also favor strong personalities, those with higher social capital, and those with higher technical expertise [8,13,41].

When participants within a group are part of an extant social hierarchy outside of the groups, marginalized participants who break with social conventions can suffer outside consequences, which could severely deter their participation within the deliberative group [15,19,23,44]. These types of marginalization are less amenable to solutions such as active facilitation, since even if space is made for participation, the negative consequences of this participation would take place outside the “safe space” of the deliberation. [8,23,44].

When marginalized groups are ignored, they are more likely to bear the costs of adopted proposals, and less likely to reap the benefits, and their unique informative contributions are lost [8,15,23]. For instance, Agarwal (2001) found that women collected most of the wood used in rural India and Nepal, but were largely excluded from offering their insights at community forestry meetings [23]. Alternatively, marginalized groups might be shunted away from making “important” decisions towards specific tasks thought to be uniquely suited to them; for instance, “women’s issues” or “elderly issues”.

Some of the best studied deliberative settings are American criminal juries, where 12 participants with no previous judicial experience deliberate on the guilt of an accused criminal. American juries select foremen (to represent the jury to the judge and rest of the court) internally; foremen

are disproportionately likely to be white, male, higher-educated, and of higher socio-economic status [45–47]. Likewise, members of the jury who spoke frequently were much more likely to be seen as persuasive, regardless of the content of their contributions. Jury simulations suggest that the two most talkative of the 12 make up around 25% of the discussion and the two least talkative make up only around 2%. Disparities increase further as groups become larger [45,46]. When conducting a citizen's jury in Belfast, Barnes (1999) found that the most talkative member of the jury spoke 130 times, and the least talkative did not speak at all [47]. These participation rates are related not merely to extroversion, but also gender, age, and socio-economic status [45–47].

2.4. A Possible Framework for a Minimalist Deliberative Valuation

The goal for any new deliberative framework should be to preserve the strengths of deliberative valuation, while addressing some of its problematic weaknesses. This means that any deliberative technique should aim to provide adequate space and structure for valid and reliable preference formation, give sufficient time and information for participants to inform themselves about the object of the valuation and be exposed to a variety of viewpoints, leading to more realistic valuation estimates and participant confidence. At the same time, the deliberative framework should attempt to improve methodological weak points, such as ensuring a sufficiently large sample size to negate problems of representation (while keeping deliberative groups sufficiently small), minimizing the cost to participants in time and effort, and restricting the ability of external and internal hierarchies to unfairly shape deliberation.

It is perhaps unrealistic to expect any single deliberative framework to overcome all of these problems, while preserving the strengths of deliberative discourse. Instead, a more fruitful paradigm might be to explore possible variants of deliberative valuation, developing different frameworks to fit different contexts and research goals. One such possible framework might be focused on maximizing the number of participants, while minimizing the (monetary) cost to organizers and (time and effort) cost to participants. This deliberation framework might make use of structured group deliberation with short deliberation sessions, thus maximizing the number of groups that deliberate and allowing for higher sample sizes and greater comparability [12,35].

Drawing on decision analysis, behavioral decision research, and the deliberative valuation work of Gregory and Keeney (2000), McDaniels et al. (2003), and Dietz et al. (2009), this paper proposes a possible framework for such a minimalist form of deliberative valuation, consisting of a short, structured group deliberation, followed by an individual valuation exercise [12,35,48]. The minimization of time would help to alleviate problematic differences in participation that minimize the voices of marginalized groups, while the minimization of cost would allow for a higher number of deliberative groups to be conducted, eliminating the problems of trying to represent an entire population with a few dozen participants. An outline of this proposed framework can be seen in Figure 1.

Deliberative valuation studies typically involve around 30–70 participants. The reasons for the small survey samples, and related issues of representation and participant diversity, are the length of the deliberations, which typically consist of multiple sessions of several hours, generally over consecutive days, but sometimes a week or more apart [8,9,11,12,14,16,22,29,32,34,35,49]. The amount of time participants must dedicate to the deliberation both limits the potential pool of participants, and contributes to the underrepresentation of some demographic and social groups. At the same time, the high cost per participant to organizers of these lengthy deliberations limits the number of deliberative groups that can be conducted within a study.

Instead of multiple sessions of several hours each, a minimalist deliberative framework might instead aim for a single deliberative session of 90–120 minutes. The aim of this session would be to allow participants to become sufficiently informed on the subject of the evaluation to form and express meaningful and valid valuation estimations, while imposing a sufficiently low burden to minimize differences in possible participation.

One of the challenges of deliberation is scaling up; the larger the deliberative group, the harder it is to ensure a functional and genuinely participatory group. One possible solution would be to have a larger deliberative group (20–30 participants), which could be divided into sub-groups for discursive purposes. This would allow a single facilitator to interact with a greater number of participants, lowering cost and increasing the potential sample size.

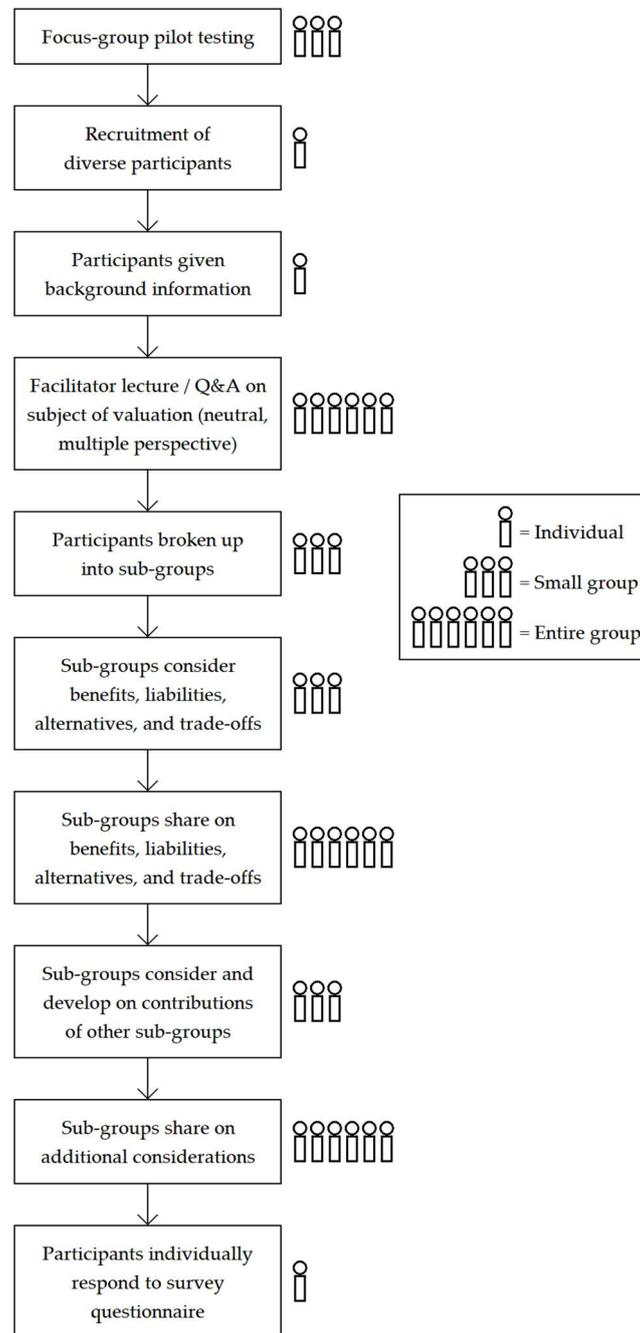


Figure 1. Minimalist Deliberative Framework.

A plausible framework could involve participants receiving information before the deliberation, allowing them to form a basic understanding of the issue, particularly if it is complex or unfamiliar. The deliberation could begin with a lecture format, reviewing the information through an oral/audiovisual presentation from the facilitator, followed by time for participants to ask any questions they might have about the valuation topic. If possible, for instance if the particular good or service

being valued is the subject of local or national political debate, it may be particularly helpful to present the positions of political or interest groups on both sides of the debate. This approach provides not only information to respondents, but increases the credibility of the information offered, and offers the sort of contextual prompt that would occur in an actual public debate [2,26,30].

Following this, participants could be divided into groups of 4–6 participants, and tasked with discussing the core of the particular valuation question: Is this good or service valuable? If so, why is this good or service valuable, and what benefits would this bring/what benefits would be lost to myself/my family/my community if this was increased/decreased? Conversely, what liabilities would be engendered/what benefits would be lost if this were increased/not decreased? Each smaller group would come up with their own answers to these questions, and then, one by one, could state their answers to the other groups, where they could be listed by facilitator.

At this stage, it would be important to delve deeper, to move past concepts like “jobs” or “sustainability” to clarify what these objectives mean in practices, as this can vary conceptually between different participants and between participants and organizers [12,48]. Each group can then explore the answers further, focusing on those answers produced by other groups. In this way, the conceptual answers provided at the first stage can be explored and clarified. By the time this is finished, the deliberative group would have considered many different aspects of the valuation issue, including benefits, liabilities, alternatives, and trade-offs. By hearing the ideas of other groups and participants, and helping to further explore them, participants are able to support each other’s thinking, with multiplicative results [12,35,48].

While the structured and focused nature of the deliberative process outlined above does limit participants’ ability to shape its direction, that same structure would also help to keep participants from being overwhelmed and allows the group to identify priorities and prevent minority perspectives from being drowned out. A clear structure also prevents the domination of a deliberation by an aggressive few without the need for extensive facilitation, which places the burden for the success on the deliberation largely on the facilitator [48].

This deliberative framework is particularly focused on clarifying preferences by clearly identifying benefits, liabilities, alternatives, and trade-offs. The limited focus and structured organization are aimed at keeping the deliberation as short as possible, to maximize the ability of a diverse set of participants to take part. The larger group size, made functional by the sub-groups, would also help to keep the cost per participant down, allowing for larger, more representative samples of participants. This deliberative framework is also structured to work effectively via video chat, allowing for remote participation.

In order to examine the effects of this proposed minimalist framework on participants’ willingness to pay/willingness to accept estimations and confidence in their choices, a case study was conducted on landholder willingness to accept an offer to participate in a Payment for Ecosystem Services (PES) program in South-East Mexico.

3. Payment for Ecosystem Services (PES)

3.1. Introduction to Payment for Ecosystem Service (PES)

Ecosystem services, as defined by the Millennium Ecosystem Assessment, include (a) provisioning services like food and fuel sources, (b) regulating services like climate control and flood prevention, (c) cultural services like recreation and (d) supporting services like soil formation [50]. Ecosystem services are crucial for human development and survival. However, it is estimated that over 2/3 of global ecosystem services are in decline, with market failure leading to a suboptimal degradation of natural/environmental capital. These market failures include unclear property rights, the fact that ecosystem services are generally public goods, poor information about ecosystem services, and a lack of enforcement or interest in internalizing the externalities caused by ecosystem services degradation [50–56].

Payment for Ecosystem Services (PES) programs are designed to ensure the continued provision of ecosystem services and to address the lack of market and price information for many of these services, which has led them to be consistently undervalued [51,55,57]. PES is a voluntary, but conditional, exchange of money from a buyer for an environmental service to a seller [51,52,54,55,57,58]. PES incentivizes individuals or communities to provide ecosystem services through direct financial payments, better reflecting the non-marketed, but real, values of ecosystem services. Rather than purchasing a particular ecosystem services however, most PES programs instead compensate landholders/land users for land/resource usage restrictions. PES aim to provide benefits for taking (or not taking) actions that would have social benefit, such as preserving forest cover, that might have limited private benefit to the landholder, thereby internalizing the externalities inherent in their behavior [33,51,53,54,58–60].

PES is more flexible than a command-and-control system of environmental regulation, as landholders can make an informed decision on the relative marginal opportunity cost of conserving different areas of land. Command-and-control can also have negative distributional impacts on poor, rural populations who rely on the land for a high percentage of their income [33,53,55,57,58,61]. Unlike in Market for Ecosystem Services (MES) programs like buying carbon credits, PES programs seldom resemble an actual market; rather, a governmental or non-governmental entity pays the stewards of the ecosystem services a predetermined amount of money for ensuring the continued production of that ecosystem services [51,53,61].

3.2. *Payment for Ecosystem Services (PES) in South-East Mexico*

With a deforestation rate in its tropical forests of more than 2% each year (a loss of an average of 263,570 ha/year) between 1976 and 2000, Mexico has lost more than 95% of its original tropical forest cover in that period [53,57,62–66]. Unlike in the Amazon basin, the majority of deforestation in Mexico is not attributable to commercial logging, mining, or ranching interests, but primarily to pioneering smallholders moving from overpopulated highland areas to low-density tropical lowlands and clearing land, and, to a lesser extent, to the expansion of existing lowland ejidal communities into surrounding state or communally-managed forest areas for additional farming land and grazing pasture [53,62,67–70]. A map of South-East Mexico can be seen below, in Figure 2.

Ejididos are a system of ownership where land is owned communally by a collective comprised of families, where individual plots of land are operated via heritable usufruct [62,64,67,71]. Generally, ejidatarios were given a parcel of agricultural land, which they have lifetime usufruct over, and which could be inherited by a spouse or single descendent, and access to a section of communal grazing or forest lands [62,64,67,70,71]. The communal management of these common areas has been one of the most important real-world test cases for self-organized common pool resource management, for example, Ostrom (1990) [72–74].

When edjios clear new plots for slash-and-burn milpa (mixed crop of beans, tomatoes, and peppers along with the staple crop, maize) agriculture, the tropical forest soils, poor in nutrients and prone to erosion, rarely last more than a few years, and are subsequently converted to pasture for cattle, with new forest land cleared for agriculture [57,62,64,67,75]. While there are some, mostly coastal, areas of South-East Mexico where deforestation is attributable to larger-scale commercial interests, most deforestation in the region is attributable to this smallholder colonization without major outside capital investment [62,64,67,71].

The nature of deforestation in SE Mexico, combined with the structure of property ownership and management, necessitates the direct involvement of individuals and communities with a conservation agenda; this makes SE Mexico a potentially optimal site for PES programs [18,62,64,67,69–71]. Mexico began to develop PES programs with the Payments for Hydrological Services (PSAH) program in 2003 and the broader Payments for Carbon, Biodiversity and Agro-Forestry Services (PSA-CABSA) program in 2004, merging in 2006 into the Program of Payments for Environmental Services (ProÁrbol). This program is managed by the National Forestry Commission (CONAFOR). Subsequently, Mexico

has emerged as one of the world leaders in PES, with over three million ha of forest land brought into a PES program, involving members of over 6000 ejidos [53,65,75,76].



Figure 2. South-East Mexico.

PES in Mexico is explicitly not a market for ecosystem services. The Mexican government is a monopsonist, which sets a price for which it will buy forest conservation. PSAH and subsequent programs were designed to combat the primary cause of deforestation, forest destruction by smallholders for agriculture and pasture creation, through direct payments to preserve forest cover [53,57,63,65,68,69]. This policy was aimed both to efficiently advance conservation objectives and to alleviate the economic distress that would have been caused with direct command-and-control measures aimed to regulating smallholder behavior [53,65,68,69]. Most PES contracts were created with ejidos rather than individual landholders, enrolling over 127,000 participants in the first year [68].

Starting with hydrological services and carbon forestry, ProÁrbol now addresses biodiversity and other aspects of forest conservation [69,75,76]. Through 2011, 5.2 million ha had been entered into Mexico's PES program(s), totaling over 5% of the national forest cover [75]. From the beginning, Mexico's PES program was designed to be both pro-environment and pro-poor, with a specific focus on reaching marginalized and indigenous communities; as of 2007; 91.2% of PES participants are classified as somewhat or highly marginalized [65,66,75,76].

Alix-Garcia et al. (2015) estimated that the land enrolled in the PSAH component of ProÁrbol experienced 40%–51% less degradation than it would have if not enrolled. Additionally, they found that PSAH reduced poverty by a small, but statistically significant amount among participants [76]. Ramirez-Reyes et al. (2018) found that, while deforestation unfortunately has continued through the period between 2000 and 2012, overall deforestation has slowed [66]. PES programs have been shown to effectively limit deforestation, reducing it by 40% to 50% compared to land not enrolled. Lands enrolled within ProÁrbol experienced deforestation rates comparable to Mexican protected areas, and only somewhat higher than the very strictly managed core biosphere reserves. This evidence

suggests that an expansion of ProÁrbol to enroll more lands would substantially reduce Mexico's deforestation rate, with a particular impact on the tropical forests of SE Mexico [66].

3.3. Difference in Opportunity Cost vs PES Payments

Payment for Ecosystem Services (PES) programs are, theoretically, designed to: (a) compensate landholders at least equal to the opportunity cost of alternative uses of the land, and (b) not compensate more than the value of the ecosystem service being provided. However, one of the intriguing features of most Latin American PES programs is that they typically pay substantially less than the estimated alternative economic uses of the relevant land [52,55,57,64,77–81].

Looking at some examples, Corbera et al. (2007) estimated the potential farm income of a hectare in Nicaragua at around US\$126/ha/year, compared to the PES payment of US\$26/ha/year, representing a substantial opportunity cost to participants [57]. Examining PES payment provision in three Central American PES programs, Kosoy et al. (2007) found that participants experienced a considerable loss through participation when measured against the opportunity cost of lost income from agriculture or grazing, around US\$100–150/ha/year [78]. Grieg-Gran et al. (2005) and Wunder and Alban (2008) found similar results when looking at Latin American PES programs more generally [77,79].

Why do landholders participate in voluntary PES programs, with their lower payments when compared to alternative income streams? One explanation is that potential income from agricultural, grazing, or other destructive activity is overstated due to the unsuitability of the land enrolled in PES programs relative to the other land owned by the participants, due to topography or soil quality [52,57,78,81]. Another possibility is that income from PES offers a guarantee of payment for little or no work on the part of the landholder, even if it is lower than other income sources [58,59,64,78,79]. In both these cases, the PES program may be said to lack additionality, enrolling mainly those landholders who were unlikely to engage in the environmentally destructive behavior anyways, due to lack of labor, resources, or accessibility. However, these explanations are contradicted, to some extent, by the findings of Alix-Garcia et al. (2015), Caro-Borrero et al. (2015), Sims and Alix-Garcia (2017), and Ramirez-Reyes et al. (2018), from Mexico alone, which suggest that at least some of the land being enrolled into PES programs has high potential for agricultural, forestry, or grazing profitability [60,65,66,76].

A third, interesting, explanation is that many landholders understand and appreciate the substantial environmental benefits/ecosystem services provided by their land enrolled in the PES program, such as provisioning and regulating services, both directly, in the form of water, firewood, or shade, and indirectly, in the improvement in the output of their other land [57,64,78,80,82]. In this case, the provision of these services to the landholder, privately, are worth enough to them to explain the divergence between the PES payment and alternative income sources. However, to evaluate the validity of this explanation, it would be necessary to have an understanding and estimation of the value that PES participants place on these additional benefits [64,82].

Why is it important to understand the motivation of PES participants? As much as possible, PES programs should aim to improve additionality, that is, to ensure that payments are directed at participants and land that would otherwise not be conserved, rather than paying for conservation that would take place without any payments [55,82]. While some level of additionality may be sacrificed for the sake of lowering administrative costs or as a form of subsidy, lack of additionality diminishes the amount of ecosystem services provided within a limited budget [82,83]. Thus, if potential participants overestimate the relative opportunity cost of participation, it lessens the efficiency, and therefore efficacy, of PES programs [60,82,83]. While most PES programs err in the direction of under-paying participants, activity-reducing ecosystem service activities, like conservation easements, do have the possibility to set payments too high, given the lower opportunity cost involved, as can most notably be seen in Costa Rica's PSA PES program [57,84].

4. Case Study

In order to examine how a possible minimalist deliberative framework might impact both valuation estimates and participant confidence in those estimates, a valuation exercise was conducted. South-East Mexican smallholders were asked to complete a survey questionnaire with demographic and attitudinal questions and then given a hypothetical valuation scenario. This scenario asked them to put themselves in the position of helping to make a decision about how to manage ejidal forest lands with two potential options: lease the land for grazing or enroll the land into a Payment for Ecosystem Services (PES) program. The payment for leasing for grazing was kept fixed, while the payment from the PES program was varied by survey, to see how participants would respond. Participants were also asked to rate their confidence in the decision they made. Some participants were just given the survey, some were given the survey, then participated in a deliberative group discussing PES and ecosystem services before taking the survey again, while a third group went straight into the deliberative group before taking the survey. This allowed for an evaluation of the impact of the minimalist deliberation on the valuation estimates and participant confidence.

While the scenario given to the participants was entirely hypothetical, it was designed to be plausible to participants, given that all were smallholders belonging to ejidos with communal forest lands. PES was chosen as a topic of the valuation exercise both because of the importance of estimating the value landholders place on generated ecosystem services and because it is a topic most participants were expected to be largely unfamiliar with. This allows for a better evaluation of the impacts of the minimalist deliberative framework. The hypothetical non-PES income option rules out the common explanation of land being enrolled into a PES program because it is uneconomic to exploit.

Following focus group pilot testing in November and December 2016, the valuation exercises were conducted in southern Quintana Roo State, Mexico in the municipalities of Othón P. Blanco (Chetumal), Bacalar, Felipe Carrillo Puerto, and José María Morelos intermittently from January to October 2017. Participants were recruited using a combination of public flyers advertising the need for volunteer participants, sign-up sheet recruitment, and snowball sampling, recruiting new participants through those who had participated previously. Participation was restricted to individuals with at least part-time residence in an ejido, at least basic literacy and fluency in Spanish, and were willing to dedicate two hours to a deliberative exercise, even if they were not eventually chosen for one of the deliberative groups.

A total of 305 individuals were selected to participate, in order to approximate regional ejidal membership in age, education, and landholding size, with 192 (63%) actually showing up to participate in one of the valuation exercises. Those 192 participants were divided into three groups of 62 (Group 1), 68 (Group 2), and 62 (Group 3) participants. Group 1 was given the survey questionnaire without any deliberation, as in a traditional contingent valuation survey. Group 2 was also given the survey questionnaire, but then engaged in a structured group deliberation, before being given the survey questionnaire a second time. Group 3 conducted the structured group deliberation before being given the questionnaire a single time. A copy of the survey questionnaire can be seen in Supplementary Materials.

Before the survey was given or deliberation begun, participants were read and given an informed consent form explaining their right to end their participation at any time, that their answers would be treated with confidentiality, and that no potentially personally-identifying information would be retained, published, or disseminated to any third party in any form. All participants expressed a willingness to participate in group deliberation and were randomly assigned into their particular group, so there was no selection bias in those who did participate in the deliberative groups. An outline of the demographic and attitudinal characteristics of the participants is shown below in Table 1.

Information on age, landholding size, non-farm income, education, and trust in government was taken from participants in the form of categorical choices. This choice was made after pilot testing found that participants were more comfortable with relatively broad categories. Given their ordinal/categorical nature, these variables were converted into a series of dummy variables for statistical

analysis. The baseline of each variable is the categorical choice which the largest number of participants chose. The baseline for age was 30–50 years old, for landholding size, 10–20 ha, for non-farm income, MX\$15,000–22,500/year, for education, completed primary schooling, and for trust in governmental institutions, moderate.

Table 1. Description of Participant Characteristic Variables.

Variable	Description	Mean	Standard Error
Gender	Participant's gender dummy (1 = male, 0 = female)	0.59	0.0355
Age L1	Participant's age lowest (under 30) dummy (1 = under 30, 0 = over 30)	0.21	0.0294
Age (Baseline)	Baseline for participant's age (30–50)	0.42	0.0357
Age H1	Participant's age highest (over 50) dummy (1 = over 50, 0 = under 50)	0.38	0.035
LandSize L1	Participant's household landholdings lowest (under 10 ha) dummy (1 = under 10 ha, 0 = over 10 ha)	0.12	0.023
LandSize (Baseline)	Baseline for participant's household landholdings (10–20 ha)	0.44	0.0359
LandSize H1	Participant's household landholdings higher (20–30 ha) dummy (1 = 20–30 ha, 0 = not 20–30 ha)	0.39	0.0352
LandSize H2	Participant's household landholdings highest (over 30 ha) dummy (1 = over 30 ha, 0 = under 30 ha)	0.06	0.0175
NonFarmIncome L1	Participant's household non-farm income lowest (under MX\$7500) dummy (1 = under MX\$7500, 0 = over MX\$7500)	0.14	0.0251
NonFarmIncome L2	Participant's household non-farm income lower (MX\$7500–15,000) dummy (1 = under MX\$7500, 0 = over MX\$7500)	0.35	0.0345
NonFarmIncome (Baseline)	Baseline for participant's non-farm income (MX\$15,000–22,500)	0.35	0.0346
NonFarmIncome H1	Participant's household non-farm income highest (over MX\$22,500) dummy (1 = over MX\$22,500, 0 = under MX\$22,500)	0.16	0.0263
PerAffluence	Does the participant perceive him/herself as better off than average member of their community? (1 = yes, 0 = no)	0.44	0.0359
Education L1	Participant's level of education lowest (under primary) dummy (1 = under primary, 0 = more than primary)	0.33	0.0341
Education (Baseline)	Baseline for participant's level of education (primary)	0.49	0.0362
Education H1	Participant's level of education highest (secondary +) dummy (1 = secondary +, 0 = under secondary)	0.18	0.0276
ConAttitude	Participant's averaged answer to 3 questions on conservation (1 = low conservationist, 2 = moderate conservationist, 3 = high conservationist)	2.32	0.0527
PESKnow	Has participant heard of/is familiar with PES? (1 = yes, 0 = no)	0.16	0.0263
GovTrust L1	Participant's trust in government institutions lowest dummy (1 = low, 0 = higher)	0.34	0.0342
GovTrust (Baseline)	Baseline for participant's trust in government institutions (moderate)	0.55	0.036
GovTrust H1	Participant's trust in government institutions highest dummy (1 = high, 0 = lower)	0.11	0.0226
Price	Starting price offered to participant to accept Offer B (ranged from MX\$1000 to MX\$1800)		
Confidence	Is the participant confident in their choice to accept Offer A or Offer B? (1 = yes, 0 = no)		

Given the random assignment, there was minimal variance in participant characteristics between the groups. Fifty-nine percent of the participants were male, and roughly equal numbers, 42% and 38% respectively, were between the ages of 30–50 and over 50, with a smaller number (21%) under the age of 30. A bare majority of participants had completed a primary education with no further education, while smaller numbers had less than a completed primary education (34%) or a secondary education or above (16%).

Participants were then asked how much land their household had leasehold over, as well as how much non-farm income the household earned each year. These measures were thought to be good proxies of household income, given the fact that much of the agriculture undertaken by households is subsistence-related or does not generate cash income, and non-farm earnings provide a substantial share of household income, as is typical for SE Mexico [85–87]. 44% of participants had household landholdings between 10 and 20 ha, and 39% had landholdings between 20 and 30 ha, with substantially smaller numbers having less than 10 ha or more than 30 ha. These landholdings

are consistent with ejidal leaseholds in lowland south-eastern Mexico, which tend to be substantially larger than holdings in the highland areas of Mexico, with large portions kept fallow cyclically [85–87]. With regards to non-farm income, almost the same number of participants (35%) earned between MX\$15,000 and MX\$22,500 and between MX\$7500 and MX\$15,000 (35%) annually, with smaller numbers earning over MX\$22,500 (12%), and less than MX\$7500 (10%). Overall, the sample was relatively demographically representative of ejidatarios in southern Quintana Roo, except for the underrepresentation of women [85–87].

Given the difficulties accounting for relative household size, different income sources, and degree of monetization when asking about participants' income or wealth, participants were also asked to compare themselves to other members of their community. They were asked whether or not they believed they were more affluent, when accounting for income, landholdings, and savings, than the average member of their community. 44% believed themselves to be better off than average, with the rest believing they were not as well off as the average community member.

Participants were asked three questions concerning forest protection and preservation: (a) whether intact forests provide important benefits to people, including to farmers, (b) whether the protection of forests should sometimes take priority over economic growth or the opening of new agricultural lands, and (c) whether they believed that the government is doing enough to protect forests in their area. As participants' answers to each of the questions on forest protection and preservation showed high internal consistency (Cronbach's $\alpha \geq 0.7$), their answers to the three questions were averaged, giving them a "conservation attitude" score, with an overall average of 2.32 out of 3, with a higher score corresponding to more pro-conservationist attitudes.

Participants were asked whether they had heard of and were familiar with Payment for Ecosystem Services (PES), with only 16% stating that they were familiar with PES. This number is unsurprising given the limited public discussion and advertisement of Mexico's PES programs [18,53,64]. Participants were also asked how much trust they placed in government institutions on the federal, state, and local levels, with 55% expressing some trust, 34% expressing little trust, and only 11% expressing a great deal of trust.

Participants were then presented with the hypothetical valuation scenario, with one of three randomly chosen bid values. In the scenario, they were asked to consider two offers, which were presented to their ejido, both with the opportunity to generate income from the ejido's communal forest lands. The first, Offer A, was presented by a landowner from a neighboring community, who wishes to lease a portion of the forest land for 5 years, to graze cattle on the land and undertake the clearing of trees. The second, Offer B, was presented by the government, which is interested in enrolling the same portion of land into a Payment for Ecosystem Services (PES) program for 5 years, planning to ensure the continued production of environmental benefits/ecosystem services by conserving the land as is. If the participant votes to accept Offer A, their household would be paid MX\$1800 each year, for 5 years. In this scenario, the PES program struggles to match this offer. After being reminded of their budget and other spending needs, the participant was asked, given the scenario above, if he or she would be willing to accept a bid value of either MX\$1000, 1400, or 1800, depending on the survey version, per year for 5 years, and to accept Offer B, over the MX\$1800 from Offer A.

This question aims to see whether participants are inclined to accept Offer B (PES program) over Offer A (lease for cattle grazing) at an equitable payment level and then at lower payment levels. The difference between the value they would be WTA to enroll their land into a PES program versus leasing for cattle grazing represents their (implied) WTP for the benefits of not deforesting the land in questions, such as ecosystem services.

Participants were then asked how confident they felt in the answer to the valuation question, followed by asking those participants who answered "no" to the valuation question their reasoning. This was designed to highlight potential protest bids.

The bid mechanism used above is a single-bounded dichotomous choice bid format, where an offer price is given to the participant, which they can either accept or decline. Following Hanemann,

(1984), Hanemann et al. (1991), and Baral et al. (2008), the probability $P(A)$ of a participant accepting Offer B at price p can be seen as:

$$P(A) = (1 + e^{-(\alpha + \beta p + X\phi)})^{-1} \quad (1)$$

where α is a constant parameter, β is the coefficient of price p , X is the vector of all other variables potentially impacting a participant's acceptance of Offer B, and ϕ is the vector of corresponding slope parameters [88–90].

In order to calculate median (implied) WTP, a demand curve was then modeled from the participants' choice of whether or not to accept Offer B using least squares method, with a model fitted to the curve by the function $q = ae^{-bs}$, where q is the percentage of participants who are willing to forgo sum s in order to accept Offer B, and a and b are constants. This equation represents the best-fit model for the observed data for the impact of the forgone sum s on a participant's willingness to accept Offer B.

After the valuation survey (Group 2), or before the survey was given (Group 3), a deliberation was conducted using the minimalist framework proposed earlier in this paper. Participants were given preliminary information on ecosystem services and PES programs, and were then brought into a deliberative group of 20–24 participants. Information on ecosystem services and PES was reviewed through a neutral presentation, drawing on work that was both optimistic about the benefits of PES, such as Sims and Alix-Garcia (2017) and Ramirez-Reyes et al. (2018), and more skeptical, such as McAfee and Shapiro (2010) and Ibarra et al. (2011) [60,66,68,71]. Participants were then divided into smaller groups of 5–6 and asked to discuss the benefits, particularly possible ecosystem services, which they/their families/their communities derived from the ejidal forest lands and that they might receive less of if the forests were degraded. They were also asked to think about any benefits that they/their families/their communities might accrue if Offer A, to lease the land for grazing were accepted. After the groups' answers were listed, the groups were asked to consider these in greater depth, coming up with specific examples for each idea listed. After these ideas were listed and discussed, each participant was given the valuation survey to complete individually.

A recurring issue in environmental valuation is the disparity between individual's expressed willingness to pay (WTP) for a good or service and their willingness to accept (WTA) compensation for the loss of the same good or service. Conceptually, WTP should be used to value a gain or prevent a loss, whereas WTA should be used to value a loss; however, losses are instead generally repurposed into asking individuals how much they would pay to keep the environmental good they are losing [33,91,92]. The reluctance to use WTA stems from concerns with violating long-standing best practice norms such as Arrow et al. (1993), strategic over-bidding, lack of budgetary constraints, and the disequilibrium between WTP values and WTA values for the same goods [3,24,33,91–93].

However, given that this disparity is observable in real-world, real-money economic transactions and not just a hypothetical setting, as per Brown and Gregory (1999), Lienhoop and McMillan (2007), Plott and Zeiler (2011), and Tunçel and Hammitt (2014), amongst others, the WTP–WTA disparity should be considered an example of an actual decision-making phenomenon, and not a flaw in experimental design [34,91–93]. Thus, when estimating the value of a good where the property rights reside with the respondent, the valuation should be conducting using WTA as the appropriate welfare measure. This may also be the case where property rights are ill-defined, but respondents believe that the rights lie or should lie with him or her. Rather than seeing WTA values as aberrant, they should be viewed as an authentic expression of individual's preferences given the nature of the exchange suggested [33,34,91–93].

Therefore, participants in this study were asked to estimate their WTA compensation for putting their land into the PES program and thus refraining from undertaking environmentally degrading practices and losing some income. However, what is of greatest interest is the divergence between the respondents' estimation of the value they would be WTA and the hypothetical alternative income

they could generate from renting the land. This value represents the respondents' (implied) WTP for the benefits they derive from participating in the PES program, especially ecosystem service benefits. This WTA, and thus (implied) WTP, are estimated twice to determine the impact of minimalist deliberation on the value estimation and respondent confidence in their estimates.

This valuation model draws off of Cranford and Mourato (2011)'s two-stage model of measuring PES participants' WTP for current ecosystem service benefits, with a few notable differences [55]. Cranford and Mourato (2011) had respondents estimate WTA twice, before and after a deliberative exercise. However, Cranford and Mourato (2011) believed that respondents in the first, pre-deliberation estimation, only took in to account the loss of income they would experience by participating in the PES program, and not the benefits they are deriving from the ecosystem services which will be preserved by not undergoing degrading practices [55]. After respondents engaged in a group discussion on ecosystem services and discussed the services which they benefit from related to the property in question, Cranford and Mourato (2011) conducted a second value estimation, where, on average, WTA dropped 30% over the original estimates. Cranford and Mourato (2011) treated this amount as a reflection of the respondents' estimation of their (implied) WTP for the ecosystem services associated with the property in question [55].

This paper, on the other hand, takes the position, in line with the observations of Corbera et al. (2007), Kosoy et al. (2008), and Muradian and Rival (2012), that respondents are already incorporating the benefits that they perceive that they receive from ecosystem services into their WTA compensation to participate in a PES program versus an alternative, degrading but more lucrative option [57,64,82]. Thus, the difference between the alternative income payment and the minimum PES payment they would be WTA represents their (implied) WTP for the ecosystem services provisioned by the land in question. The differences between the pre-deliberation WTA/(implied) WTP and their post-deliberation WTA/(implied) WTP, on the other hand, represents the impact of deliberation.

This conceptualization also maintains theoretical consistency with regards to the WTP/WTA disparity. WTA is being estimated for the land being rented, a familiar commodity, whereas participants are being asked their (implied) WTP (in the form of the difference between the price they could get via a different rental) for ecosystem services, a less familiar good/service.

5. Results

The results of the valuation exercise, both before/without deliberation and after deliberation, are shown below in Table 2.

Table 2. Acceptance Ratio for Offer B—Payment for Ecosystem Service (PES) Program Before/Without and After Deliberation.

Price	Before/Without Deliberation		After Deliberation		% Difference	
	% WTA	% Confident	% WTA	% Confident	% WTA	% Confident
Mex\$1000 (US\$55)	41.7%	59.7%	49.3%	83.6%	+ 18.1%	+ 40.0%
Mex\$1400 (US\$77)	52.9%	61.4%	58.5%	76.9%	+ 10.5%	+ 25.2%
Mex\$1800 (US\$99)	69.6%	71.0%	82.4%	91.2%	+ 12.8%	+ 28.4%

US\$1 = Mex\$18.17 (exchange rate as of June 2017)

Both before/without deliberation and after deliberation, large majorities (70% and 82%) of participants selected participation in the PES program (Offer B) over leasing the land for cattle grazing (Offer A) when the payment was equitable at MX\$1800/ha/year. When the payment for Offer B was decreased to MX\$1400, the percentage of participants selecting Offer B decreased, while remaining the majority decision (53% and 58%). When the payment for Offer B was decreased further to MX\$1000, a majority of participants declined to accept Offer B (42% and 49%).

A demand curve was then modeled from the respondents' responses to the willingness to pay questions on the survey questionnaire at each of the prices asked in the survey (MX\$1000, 1400, 1800) using Microsoft Excel and StataIC 15, with a model fitted to the curve, using the least squares method, by the functions $q = 69.154e^{-0.00064s}$ before/without deliberation and $q = 81.366e^{-0.00064s}$ after deliberation, where q is the percentage of participants willing to forgo sum s in order to accept Offer B over Offer A. This equation represents the best-fit function for the observed data for the impact of the sum s offered for Offer B on the proportion of participants WTA Offer B. The median (implied) WTP, representing the amount of compensation (s) given up at which 50% of participants (q) were willing to accept Offer B over Offer A, was MX\$507 (US\$28.17) before/without deliberation and MX\$761 (US\$42.28) after deliberation.

These results, while generated by a hypothetical scenario, suggest that a majority of participants were indeed willing to forgo a portion of the income potentially generated by forest land in order to prevent its degradation. This is in accord with evidence from Corbera et al. [57], Kosoy et al. [64], and Muradian and Rival [82] that awareness of the potential benefits received from conserving forest lands is a major contributor to landholders accepting lower payments from PES programs than alternative, destructive income sources would generate.

At all three payment levels, a higher percentage of participants selected Offer B after deliberation than before/without deliberation. This increase in the number of participants who were WTA Offer B varied between 10.5% to 18.1%, averaging 13.8%, with the largest increase at the MX\$1000 payment level. Median (implied) WTP increased after deliberation as well, from MX\$507 (US\$28.17) to MX\$761 (US\$42.28), an increase of MX\$254 (US\$14.11).

An increase was also seen in participant confidence in their decision between Offer A and Offer B. At all three payment levels there was an increase in participant confidence, with an average increase of 31.2%. There was a 40% increase in confidence for participants offered MX\$1000, with an increase from 60% of participants to 84% of participants expressing confidence. This increase in confidence was experienced both by those accepting Offer B and those declining it.

Examining the participants who took the survey twice, before and after deliberation, 4% changed their answer from "yes" to "no", while 17% changed their answer from "no" to "yes", suggesting that participants were open to changing their decisions based on the deliberation, and that the deliberation did have a small, but positive impact on (implied) WTP. There was no statistically significant difference in the percentage of participants WTA Offer B or expressing confidence in their answer between those who had taken the survey before deliberation and those who went straight to the deliberation phase.

With participants' answers to both the willingness to accept questions and those categorizing demographic and attitudinal characteristics, it is possible to analyze how those characteristics affected WTA estimates. Following Hanemann et al. (1991) and Asafu-Adjaye and Tapsuwan (2008), the probability $P(A)$ that a respondent will accept Offer B at price p can be represented as:

$$P(A) = \frac{1}{1 + e^{-(\chi + \beta_1 p + \beta_2 CON + \beta_3 G + \beta_4 AGE + \beta_5 LS + \beta_6 NFI + \beta_7 PA + \beta_8 ED + \beta_9 CA + \beta_{10} PK + \beta_{11} GT)}} \quad (2)$$

where χ is the intercept, and β represents the coefficients of the price (p), respondent confidence (CON), respondent's gender (G), respondent's age (AGE), size of respondent's household's landholdings (LS), respondent's household's non-farm income (NFI), respondent's perceived affluence (PA), respondent's level of education (ED), respondent's conservation attitudes (CA), respondent's prior knowledge of PES (PK), and respondent's trust in government (GT) [89,94]. The regression model was evaluated using respondent variables, as can be seen in Table 3. A bivariate probit regression was chosen as marginally superior over a bivariate logit regression for this data using Akaike information criterion (AIC) and deviance information criterion (DIC).

Table 3. Regression Model for Respondent Willingness to Accept Offer B—Payment for Ecosystem Services (PES) Program.

Variable	Before/Without Deliberation		After Deliberation	
	Coefficient	Standard Error	Coefficient	Standard Error
<i>Gender</i>	−0.3256	0.2841	−0.4263	0.3396
<i>Age L1</i>	0.1011	0.3888	−0.3136	0.48887
<i>Age L2</i>	0.6494 *	0.352	0.2406	0.397
<i>LandSize L1</i>	−0.2327	0.446	−0.6084	0.5605
<i>LandSize H1</i>	0.0721	0.3464	−0.1473	0.4325
<i>LandSize H2</i>	0.4305	0.6483	0.7685	0.9055
<i>NonFarmIncome L1</i>	−0.8577 **	0.4509	−1.0835 **	0.4906
<i>NonFarmIncome L2</i>	−0.1932	0.3259	−0.6362	0.4221
<i>NonFarmIncome H1</i>	0.2362	0.4345	1.4803 *	0.878
<i>PerAffluence</i>	0.9024 ***	0.3506	0.8785 **	0.4192
<i>Education L1</i>	−0.6080 *	0.3446	−0.4721	0.3781
<i>Education H1</i>	0.5773	0.4636	0.8203	0.6737
<i>ConAttitude</i>	0.3161 *	0.1866	0.9215 ***	0.2728
<i>PESKnow</i>	0.9166 **	0.4591	−0.5461	0.51
<i>GovTrust L1</i>	0.2222	0.3086	0.2578	0.3881
<i>GovTrust H1</i>	0.3163	0.442	0.6946	0.7776
Price	0.0327 ***	0.009	0.0383 ***	0.0114
Confidence	0.0647	0.308	0.6004	0.5644
Log Likelihood	−60.25		−41.95	
χ^2	56.62		61.2	
Pseudo R ²	0.3197		0.4218	

Note: A single asterisk (*) denotes statistical significance at the 10% level, double asterisk (**) denotes statistical significance at the 5% level, and a triple asterisk (***) denotes statistical significance at the 1% level.

Gender, size of landholdings, and trust in government were not found to have a significant influence on a participant's WTA Offer B, either before/without or after deliberation. A participant's confidence in their choice was also not found to exhibit a significant explanatory power on their WTA. Age and education also showed relatively low explanatory power for a participant's WTA Offer B, with only the highest age category (over 50) and lowest education category (under primary) having a marginally significant influence before/without deliberation, positive and negative, respectively.

Perceived affluence, on the other hand, had a statistically significant, positive impact on a particular participant's WTA Offer B, both before/without and after deliberation. The lowest non-farm income category (under MX\$7500/year) also had a statistically significant, negative impact on WTA Offer B, when compared to the baseline non-farm income level, regardless of deliberation. The highest non-farm income category (over MX\$22,500/year), on the other hand, was marginally significant after deliberation. The starting price given to participants for accepting Offer B, as determined by the survey variant a particular respondent was given, was also found to be strongly significant in determining WTA Offer B.

Most interesting were the variables related to knowledge of PES and conservation attitude. For the surveys given before/without deliberation, knowledge of PES was a significant, positive predictor of WTA, whereas after the deliberation was conducted, it was no longer significant. Deliberation had the opposite impact on conservation attitude; conservation attitude was marginally predictive of participants' WTA in the before/without deliberation surveys, but was a significant, positive influence on those taken after deliberation.

It is, perhaps, unsurprising that the deliberation led to a diminishment of the explanatory power of knowledge about PES; after all, the purpose of the deliberations was to inform participants about PES and ecosystem services. These results suggest that the minimalist deliberations did indeed have that effect, as this knowledge was no longer restricted to a small minority of participants.

The increased effect of conservation attitudes is also potentially indicative of the impact of the deliberations, suggesting that some participants who held pro-conservationist attitudes may not have realized which option best represented their preferences. The increased impact of conservation attitudes on WTA after deliberations suggests that the deliberations resulted in a greater degree of inter-subjective rationality, with participants choosing the option that better fit their preferences.

The deliberative groups came up with a number of important benefits which were derived from the ejidal forest lands, including wood and firewood, water provision and regulation, climate and temperature regulation, non-wood forest products and hunting, recreation, passing the forest on to future generations, and tourism potential. On the other hand, participants identified more income for ejidal projects, future grazing, non-reliance on the government, and less need to carefully follow environmental regulations as benefits from accepting Offer A instead.

6. Discussion

While the scenario tested in this case study was necessarily hypothetical, the results of the valuation exercise suggest that, in line with the expectations of Corbera et al. (2007), Kosoy et al. (2008), and Muradian and Rival (2012) and the results of Cranford and Mourato (2011), many landholders were willing to accept less in compensation from degradative income sources to preserve the benefits of their forest land [55,57,64,82]. Since the test scenario excluded overvaluation and non-additionality as causes of landholders accepting payments lower than alternative income sources, it is plausible that the difference between the payments for Offer A and for Offer B represent participants' genuine (implied) WTP for the benefits they, their families, or their communities are deriving from the preservation of the forests. When evaluating the responses produced by the deliberative groups, a large number of the benefits described are provisioning (water, wood, hunting) regulating (flood control, temperature, climate), or cultural (tourism, recreation) ecosystem services.

Even without, for the most part, having heard of, or having familiarity with, the concept of Payment for Ecosystem Services (PES) or having the benefit of informative deliberation, 41.7% of participants expressed a willingness to accept (WTA) a 45% reduction in payment, with a median (implied) WTP of MX\$507 (US\$28.17) in order to preserve a portion of communal forest in the pre-deliberation surveys.

While these numbers should be evaluated within their hypothetical context and with an understanding of the potential impact of social desirability bias, they are indicative of a need for PES programs to account for the value that potential participants place on the continued provision of ecosystem services for personal/community consumptions. This is particularly the case given the noted divergence between the alternative economic value of land enrolled in most PES programs in Latin America when compared to PES payment level [52,55,57,64,77–81]. Further examination and estimation of the value placed on these ecosystem services, particularly within a more situationally specific context, could be a potentially productive field of inquiry for future studies.

The minimalist deliberation framework used in two of the three survey groups had a small but noticeable impact on participants' WTA estimations. Averaged across all three bid levels, there was a 13.8% increase in the percentage of participants accepting Offer B after deliberation. Additionally, the median (implied) WTP of participants increased by MX\$254 (US\$14.11) after deliberation. Looking at just those participants who took the survey both before and after deliberation, more than 20% changed their answer after the deliberation, with over 4 times as many choosing to change from "no" to "yes" than the reverse.

When examining participant confidence, the impact of the deliberation stands out to a greater degree. On average, there was a 31.2% increase in the percentage of participants who expressed confidence in their choice after the deliberation. Both those choosing to accept Offer B and those declining it expressed more confidence after the deliberation.

When examining the explanatory power of participant characteristics on WTA, the effect of the deliberation also stands out. While non-farm income and perceived affluence were impactful on WTA both before/without and after deliberation, the impact of prior knowledge of PES and

conservation attitudes was substantially impacted by the deliberation. Knowledge of PES ceased to be significantly explanatory once participants had deliberated, indicating that participants received sufficient information about ecosystem services and PES during the deliberative session. The increased explanatory power of conservation attitudes, on the other hand, suggests that participants who may have been unclear about the impacts of PES or not incorporating a consideration of ecosystem services into their answer were better able to express their accurate preferences. These changes indicate that the minimalist deliberation framework succeeded in giving some of the participants sufficient information, time, and discussion to feel confident in the decision they made and even to feel sufficiently well-informed to reverse a previous position.

The relatively unique methodology of each deliberative valuation makes direct comparison of results somewhat problematic. Looking only at changes in WTP/WTA from before to after deliberation, the results are very mixed, with some studies, like Alvarez-Farizo and Hanley (2006) or Szabo (2011), seeing substantial increases in WTP, some, like Howarth and Wilson (2006), seeing substantial decreases, and others, like Dietz et al. (2009), noting little change at all [5,14,22,29,35]. Examining the results of the most similar study, Cranford and Mourato (2011) found an average increase of 18.1% in WTA and US\$25 in median (implied) WTP after deliberation when examining participation in PES in southern Peru [55]. This is somewhat higher than the average increase (13.8%) in WTA and median (implied) WTP (US\$14.11) expressed by participants after this paper's minimalist deliberation [55]. It is likely that the exact effect of deliberations on WTP/WTA will be highly contextual and vary from study to study, depending on whether the deliberation leads to increased participant appreciation and consideration for the good or service being valued, or increased understanding of their own budgetary limitations or alternative spending priorities.

When evaluating willingness to participate in a PES program, deliberative valuation will likely be preferable to traditional stated preference methodologies due to the complexity of the subject and participants' expected lack of familiarity with the concept of ecosystem services and PES programs. Deliberation allows participants the time and information necessary to make informed decisions on the benefits and trade-offs involved with a given PES program when compared to other alternatives.

Payments from PES programs are often set at broad levels, such as the income from a hectare of maize in the case of Mexico, in order to reduce the transaction costs involved in managing PES programs. Where there is variable pricing, it is often in broad categories, such as by type of forest [60,62,66]. This is an understandable choice; it reduces administrative costs and the need to negotiate a separate payment level for each PES contract. While setting an individual price per hectare for each farmer or community would likely be impractical, deliberations like the one shown in this paper offer the potential to guide a more sophisticated direction for relatively broad PES pricing. While deliberations, even ones conducted using the proposed minimalist format are not without cost, sub-optimally priced PES programs, such as the Costa Rica's PSA, are likely considerably more expensive [57,84].

The minimalist deliberation framework can also be evaluated against the previously stated strengths and weaknesses of deliberation. The increased confidence, changes in WTA estimations, and increased inter-subjective rationality expressed by participants suggest that participants benefited from sufficient the time and information to consider the environmental issue being valued. While most participants were not directly familiar with the concept of ecosystem services and PES, most went into the valuation with an understanding that the ejidal forests provided benefits to them and their community. This undoubtedly made the process of value formation easier than if the good being evaluated was less familiar. Participants changing their decisions to better reflect their values on conservation indicate that the deliberation was likely to lead to more valid and reliable preferences, and the large deliberation groups, with smaller, more manageable subgroups, would have introduced participants to a diversity of viewpoints. Finally, the increased confidence expressed by participants about their answers indicates that the deliberation did indeed provide for more confident value estimations.

On the weaknesses side, the minimalist deliberation had an overall sample size of 192, which places it on the higher end for deliberative valuation, and somewhat closer to the sample sizes expected from traditional stated preference surveys. With regards to cost, the deliberation was only around twice as expensive per participant as Witt (2019)'s contingent valuation study in the same geographic area, which compares favorably to the estimate of 3 to 7 times more expensive per participant estimated by Balderas Torres et al. (2013) [18,95]. The limited time cost experienced by participants may have led to broader participation, as is seen with the largely representative sample. The minimalist deliberation presents a mixed picture with regards to hierarchies. On the one hand, the lessened role for the facilitator in moderating discussions may lead to less equitable communications. Alternatively, the use of sub-groups within the deliberations could allow for the recognition of marginalized groups, like all female, LGBTQ, indigenous, etc. subgroups, allowing for a higher degree of presence. Finally, the explicit lack of any form of consensual decision making and the work of multiple subgroups made it unlikely that group think would negatively impact the deliberation.

While the proposed minimalist framework is designed to address the issues of representation and cost that have limited the effectiveness of deliberative valuation exercises, it is not a panacea. Recruiting an adequately representative survey sample is challenging, particularly when any number of respondents must be in the same place at the same time. While the diminished time requirements of the minimalist framework go some way to addressing this problem, it is likely that any deliberative exercise will involve a more challenging recruitment process than a traditional stated preference survey. The same can also be said for the costs of conducting a deliberative valuation. The requirements of facilitation, securing the physical location for a deliberation, providing some sort of remuneration, even if in the form of food or drink, to participants, and the increased difficulty of sampling will likely keep the costs of even a minimalist deliberation higher than a traditional stated preference survey.

The possibility of conducting deliberations virtually via videotelephony offers perhaps the best possibilities for recruiting large, representative samples and keeping down costs, by eliminating the requirement of physical presence and ensuring a much greater degree of flexibility. While the requirement for participants to have access to the requisite electronic devices limits the applicability of this option in many contexts, where possible it may be the most effective solution. An evaluation of deliberations conducted partly or entirely via video chat, compared against in-person deliberative exercises, might be a useful future research step.

Overall, the minimalist framework outlined here may be an appropriate deliberative methodology in some contexts. It may be particularly appropriate when organizers are seeking to minimize the monetary cost of the study, maximize the number and diversity of participants, or need to conduct a deliberation remotely. The use of subgroups also makes the minimalist framework a possible solution where there are concerns that some participants would be marginalized within a single group. The minimalist framework would likely be less appropriate if the good being valued were exceptionally complex or unfamiliar to participants, and thus require more time for information processing and discussion. It would also likely be inappropriate in a context where intensive moderation is required or if a less structured, more participant-led deliberation is desired.

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