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# A Theory of Political Participation \*

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## Abstract

This paper lays down a mathematical model of political participation where participatory behavior functions as insurance against redistribution of resources. Abstracting a broad notion of political participation to its tangible benefits and costs, we elaborate the participatory behavior from the perspectives of *Expected Utility* and *Cumulative Prospect Theory*. Our elaboration reveals that the relative degrees of risk aversion and loss aversion yield a multiplicity of equilibria, sheds light on the recently observed absenteeism in political participation and suggest that participation would not increase unless the material domain of politics itself is altered.

**Keywords:** Political Participation, Cumulative Prospect Theory, Risk Aversion, Insurance, Lobbying.

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\*The article does not necessarily reflect the views of Garanti BBVA & BBVA Research.

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# 1 Introduction

May be one of the best definitions of political participation was made by Pericles who said “An Athenian citizen does not neglect the state because he takes care of his own household; and even those of us who are engaged in business have a fair idea of politics. We alone regard a man who takes no interest in public affairs, not as a harmless, but as a useless character; and if few of us are originators, we are all sound judges of policy.” Today, in a typical election involving many voters, the fact that one vote alone is unlikely to alter the vote result do not make people refrain from participating, as it did not throughout the human history. This situation is often termed as the *paradox of voting* and it keeps the study of political participation as a vivid topic.

In a popularly instructed textbook of introductory political science, the key characteristics of a democratic citizen were listed as tolerance, active participation, high level of interest and information and support for the state (Shively, 2003: 152-154). Among these, political participation prescribes citizens to do more than just voting. In that, campaign work, campaign contributions, intermittently contacting government officials, involving in demonstrations, undertaking informal yet collective work to tackle with community issues and serving in voluntary capacity on a local governing body can be considered as types of political participation which are not necessarily mutually exclusive (Shively, 2003: 155). Indeed, as covered in the next section, there are several and not necessarily rivalling perspectives to political participation. Despite, to the best of our knowledge, there is no *parsimoniously strong* microeconomic model of political participation which is simply based on agents’ behaviors.

Against this background, this paper lays down a mathematical framework of political participation where political participation is modeled as insurance against redistribution of resources. Considering a broad and abstract notion of political participation, where it is defined in terms of its tangible benefits and material costs, we elaborate the participatory behavior from the perspectives of *Expected Utility* and *Cumulative Prospect Theory* separately. Our findings shed light on abstention from political participation which has recently been observed as a worldwide phenomenon.

The novelty of this study comes from our approach to amalgamate a well-known microeconomic construct with concrete behavioral or psychological foundations of human behavior. It explicitly stems from **(i)** risk aversion within an agent model setup, **(ii)** factoring in the behavioral frictions and **(iii)** a dynamic approach to solve for equilibrium-level participation, given

the level of insurance premium, here the participation fee. In our model, without loss of generality, the society is thought to be composed of two kinds of agents, namely those being taxed (*Senders*) and those being subsidized (*Receivers*). In order to keep the model parsimonious enough, we envision an exogenous probability of taxation-subsidization and let the two kinds of agents reveal their optimal set of actions. Though these actions do not brightly reveal interesting outcomes from an *Expected Utility* point of view, formation of equilibria turns out to be very informing from a *Cumulative Prospect Theory* point of view. In that, optimal equilibria were characterized at the nexus of risk aversion and loss aversion of individuals. So, the paper provides fruitful insights to not only economists but also to political scientists, mainly owing to rich potential of the involved variables to be operationalized by these two groups.

The remainder of the paper is structured as follows: Section 2 presents the related literature in terms of the existing perspectives to political participation, Section 3 presents our agent model framework, and Section 4 provides the predictions of the model. Section 5 concludes.

## 2 Perspectives to Political Participation

A comprehensive list of political participatory efforts is called the Milbrath's (1965: 18) list and it includes in decreasing degree of participation **(i)** holding public or party office, **(ii)** being a candidate for office, **(iii)** attending a caucus or a strategy meeting, **(iv)** becoming an active member in a political party, **(v)** contributing time in a political campaign, **(vi)** attending a political meeting or rally, **(vii)** making a monetary contribution to a party or candidate, **(viii)** contacting a public official or a political leader, **(ix)** wearing a button or putting a sticker on the car, **(x)** attempting to talk another into voting a certain way, and **(xi)** initiating a political discussion. In Rueden (2007) the last four of these are classified as 'spectator actions', the middle three as 'transitional actions' and the first three as 'gladiator actions'. This list, despite originally given for Americans, is likely to apply to other societies with quite some generality. Still, leaving aside a general and casual tendency to equate political participation to sole action of voting in elections or referenda, it is hard to say that a unique definition of political participation is reached among the scholars.<sup>1</sup>

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<sup>1</sup>A narrow focus on voting reveals that while suburban residents, well-educated people, well-off people, farmers (USA), blue-collar workers (Europe) tend to participate more, young people, poor people, women (except in Europe and North America), racial minori-

A possible reason for lacking a commonly agreed definition may be the expansion of the political participation *repertoire* over time. While 1940s witnessed mainly voting and 1950s witnessed campaigning and contacting officials as conventional forms of participation, 1970s witnessed protest actions and social movements and 1990s came with social engagement and civic participation as unconventional forms. In that, as van Deth (2001) underlined, the study of political participation became the “study of everything”. As van Deth suggests, an *a priori* exclusion of specific areas like family, school or workplace, or development of a more substantive and problem-oriented research perspective can be useful in dealing with the expansion of the repertoire. The conceptual concerns seem to have continued, as one may reveal in the efforts of Teorell (2006) and Lamprianou (2013). Teorell (2006) provides a useful set of conceptions where he subdivides participation into influencing attempts, direct decision making and political discussion. In terms of consequences, political participation is directed toward equal protection of interests via influencing attempts, self-development via direct decision making and subjective legitimacy via political discussion, in Teorell (2006). In his synthesis of these elements to reach a sound analytical framework, Teorell (2006) underlines the resources (physical, human and social) as well as incentives (general and selective) and he attaches the key importance to the “interplay” between resources, incentives and action.<sup>2</sup> Lamprianou (2013), while providing a critical evaluation of the contemporary political participation research, underline the absence of a unique and commonly agreed definition of political participation.<sup>3</sup>

As a remedy for the lack of a robust definition for political participation, van Deth (2016) offers a set of eight rules to identify the ‘things’ that are forms of political participation. Such an approach can relieve the inherent

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ties and blue-collar workers (USA) tend to participate less (Shively, 2003: 233).

<sup>2</sup>This article proposes an agenda for political participation research aimed at providing empirical answers to questions derived from normative political theory. Based on a three-fold distinction between responsive, participatory and deliberative models of democracy, the article first distinguishes three conceptions of political participation: as influencing attempts, as direct decision making, and as political discussion. Second, it is argued that each of the three models is associated with different desired consequences of political participation: equal protection of interests, self-development and subjective legitimacy. Third, a procedural standard is identified from which to evaluate the mechanism generating the three types of participation. By analogy with theories of distributive justice, this mechanism should be sensitive to incentives but insensitive to resources. The empirical questions thus implied are finally drawn together into an integrated agenda for future participation studies.

<sup>3</sup>In Lamprianou’s work, political participation is elaborated with respect to social contexts, Bourdieu’s concept of ‘habitus’, class, post-modernism and socialization theories.

tensions between scholars vis-a-vis an array of new developments. In that, (1) political participation must be an activity or action rather than a simple interest, (2) this action must be voluntary rather than pressure-induced, (3) this voluntary action must be performed by nonprofessionals rather than paid professionals, (4) the nonprofessional voluntary action should never lose the adjective ‘political’, (5) it must be targeted at the sphere of government, state and politics (6) it must be aimed at solving collective or community problems (7) it must remain within a political context or (8) it must be used to express political aims and intentions. van Deth’s (2016) set of rules seem to have addressed the concerns by Teorell (2006) and Lamprinou (2013) while embracing Milbrath’s (1965) basic list.

Potential disagreements or confusions seem infrequent in the literature, possibly owing to the relative ease of operationalization even in the absence of a unique conceptualization. For instance, McAllister and Makkai (1992) report substantial variations in the levels of participation observable among different social groups. Their results show that immigrants socialized in countries lacking continuous democratic traditions have political trust, but also display more authoritarian values. Furthermore, differences are not only in type of participation but also among ethnic groups.<sup>4</sup> Back et al. (2004) present collective interests and selective incentives as two alternative explanations to political participation and two solutions to paradox of participation. Based on their analysis, individuals who are active in parties are not mainly driven by the goal to influence policy; instead, such activity seems to be motivated by selective, in specific expressive, incentives. Rueden’s (2007) computer simulation to empirically test the Milbrath’s framework reveals that Milbrath’s framework may be viable. Both political institutions and social capital seem to be significant contributors to political participation. Rueden (2007) with regard to social capital, reveals that personal contacts appear to be more important for political participation compared to *just* the time spent in a community.<sup>5</sup>

The work of Dawes et al. (2011) is an interesting one owing to the preference-related aspects of political participation revealed. Upon their study of the impacts of social preferences, they reveal that those who were most interested in increasing total welfare were more likely to participate in politics compared to subjects with selfish preferences, whereas subjects most

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<sup>4</sup>According to McAllister and Makkai (1992), resource and social learning theories of political participation are complementary rather than exclusive.

<sup>5</sup>Vrablikova’s (2010) study can be further visited to see an empirical decomposition of political participation in terms of predispositions (socioeconomic status and motivations), mobilizing channels, contextual effects and cross-level effects.

interested in reducing the difference between their own well-being and well-being of others were no more likely to participate than the selfish. These findings have strong parallels with the effects of possible psychological dispositions. In a similar (yet not subsequent) spirit, Aytac and Stokes (2016) offer a new theory to explain why people take part in political action, in particular why they vote and join protests. They mainly underline the potential benefits of considering the costs of abstention in addition to direct material costs of participation. With regard to the existing approaches to political participation, they find the rational choice theory interpretation as “problematic”<sup>6</sup>, calling for a higher share of psychology rather than economics for better comprehension of political participation.

All in all, *the paradox of participation* is neither a dominant mode, nor is it totally absent. Especially recently, people’s interest in political processes seem to have declined worldwide. Though, it is hard to say that benefits of politics have declined at the same proportion. Observations of this class call for further re-examinations of political participation. In this paper, by considering a broader and possibly an abstract notion of political participation, we introduce an economic as well as psychological perspective. Where participation comes with certain tangible benefits and material costs, it is considered to be an activity of economic nature along with the individual decisions pertained. This economic nature is not different than that of Acemoglu and Robinson (2006) which attribute the ultimate outcome of a democratic era or a dictatorship to direction of power relations among three classes with robust bilateral power relations. In further detail, Alesina and Passarelli (2014) investigate loss aversion in a majority voting setup and they reveal loss aversion implying a moderating effect. In our case, loss- or risk-aversion plays a central role rather than having moderating effects alone.<sup>7</sup>

Based on the literature given, we abstract a broad notion of political participation to its tangible benefits and costs and elaborate the participatory behavior from the perspectives of *Expected Utility* and *Cumulative Prospect Theory*. Our abstraction, as demonstrated in the next section in detail, allows us to reflect upon the earlier classifications of participatory behavior without risking over-reduction. More importantly, by allowing for a non-mechanical vision of rationality through the Cumulative Prospect Theory we provide a simultaneously economic and psychological treatment of the

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<sup>6</sup>According to Aytac and Stokes (2016), (1) abstention can be costly, (2) many people think about the strategic setting of elections and protests from a supra-individual vantage point, (3) to understand political participation, we need less economics, more psychology.

<sup>7</sup>Alesina and Giuliano (2009) can also be seen for some insights.

question at hand, in a way to address the criticism by Aytac and Stokes (2016).

### 3 Agent Model

The model<sup>8</sup> hosts, without loss of generality, two representative agents who are determined at time  $t$  by the *status quo* to be either *Receiver* or *Sender*. Utility function for both is homogeneous and both derive utility from their current wealth levels that are betoken as  $W_{t,R}$  and  $W_{t,S}$  as in (1) and (2):

$$U_R(W_{t,R}) = W_{t,R}^\delta \quad (1)$$

$$U_S(W_{t,S}) = W_{t,S}^\gamma \quad (2)$$

where  $\gamma, \delta \in R^+$  and  $0 < \gamma < 1$ ,  $0 < \delta < 1$ ; so, both functions satisfy the concavity conditions (3) and (4) where  $W_{t,R}, W_{t,S} \in R^+$ .

$$\frac{\partial U_R(W_{t,R})}{\partial W_{t,R}} > 0, \quad \frac{\partial^2 U_R(W_{t,R})}{\partial W_{t,R}^2} < 0 \quad (3)$$

$$\frac{\partial U_S(W_{t,S})}{\partial W_{t,S}} > 0, \quad \frac{\partial^2 U_S(W_{t,S})}{\partial W_{t,S}^2} < 0 \quad (4)$$

At any period  $t$ , a pre-determined amount of tax might be imposed on *Sender*, which is denoted by  $T$ , to be transferred to *Receiver*.  $T \in R^+$  and incurs with the probability of  $0 < p < 1$ . When  $T$  is incurred on *Sender*, the agents' wealth in period  $t + 1$  become:

$$W_{t+1,S} = W_{t,S} - T \quad (5)$$

$$W_{t+1,R} = W_{t,R} + T \quad (6)$$

where agents calculate their expected utility for the period  $t + 1$  as:

$$EU_R(W_{t+1,R}) = p(W_{t,R} + T)^\delta + (1 - p)(W_{t,R})^\delta \quad (7)$$

$$EU_S(W_{t+1,S}) = p(W_{t,S} - T)^\gamma + (1 - p)(W_{t,S})^\gamma \quad (8)$$

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<sup>8</sup>In this submitted version of the paper, all the derivation stages are given for editorial convenience.



If *Sender* wants to avoid the possibility of this tax incurrence, she has the option to buy an insurance policy that requires her to pay a premium of  $PR$ . If she pays the premium  $PR$ , then she would have no obligation to pay  $T$ . Note that, she only buys the insurance package if expected utility in  $t + 1$  under the possibility of tax incurrence is smaller than the expected utility under the purchase of insurance in  $t + 1$ . When *Sender* buys the insurance, her expected utility becomes:

$$EU_S(W_{t+1,S}) = p(W_{t,S} - PR)^\gamma + (1 - p)(W_{t,S} - PR)^\gamma = (W_{t,S} - PR)^\gamma \quad (9)$$

Alternatively, when *Sender* does not buy the insurance:

$$EU_S(W_{t+1,S}) = p(W_{t,S} - T)^\gamma + (1 - p)(W_{t,S})^\gamma \quad (10)$$

Therefore,

$$(W_{t,S} - PR)^\gamma > p(W_{t,S} - T)^\gamma + (1 - p)(W_{t,S})^\gamma \quad (11)$$

$$((W_{t,S} - PR)^\gamma)^{1/\gamma} > (p(W_{t,S} - T)^\gamma + (1 - p)(W_{t,S})^\gamma)^{1/\gamma} \quad (12)$$

$$W_{t,S} - PR > (p(W_{t,S} - T)^\gamma + (1 - p)(W_{t,S})^\gamma)^{1/\gamma} \quad (13)$$

$$PR \leq W_{t,S} - (p(W_{t,S} - T)^\gamma + (1 - p)(W_{t,S})^\gamma)^{1/\gamma} \quad (14)$$

The condition in (14) depicts the situation where *Sender* opts for the insurance. If  $PR$  is low enough, *Sender* pays the premium and maintains a higher level of utility, which is quite an intuitive outcome under the *usual* assumptions, which from here on will refer to expected utility theory conditions.

### 3.1 Departure to Cumulative Prospect Theory

In a situation where agents measure their utility levels in line with Cumulative Prospect Theory's assumptions, CPT hereafter, the condition (14) is due to change. Under CPT, probabilities are not weighted linearly, thus prospective gains are multiplied by weighted probabilities. In the case of positive prospects, the envision of wealth by the agents become:

$$W^+(p) = \frac{p^\alpha}{[p^\alpha + (1 - p)^\alpha]^{1/\alpha}} \quad (15)$$

whereas, in the case of negative prospects, we have:

$$W^-(p) = \frac{p^\theta}{[p^\theta + (1-p)^\theta]^{1/\theta}} \quad (16)$$

According to CPT, all agents embody a certain degree of loss aversion, which is denoted here by  $\lambda$ . As the CPT utilizes reference dependence principle in order to reflect the effect of loss aversion, a new set of utility functions is considered as in (17) and (18):

$$U_R(W_{t+1,R}) = (W_{t,R} + T)^\delta + T \quad (17)$$

$$U_S(W_{t+1,S}) = (W_{t,S} - T)^\gamma - \lambda T \quad (18)$$

where  $\lambda \in R^+$  and  $\lambda > 1$ . Therefore, the CPT compatible expected utility of the *Sender* is:

$$CPT(W_{t+1,S}) = [W^-(p) - W^-(0)][(W_{t,S} - T)^\gamma - \lambda T] + [W^+(1-p) - W^+(0)]W_{t,S}^\gamma \quad (19)$$

This projection depicts the case where *Sender* does not opt for the insurance package. If *Sender* decides to purchase the package, then her projection would be:

$$CPT(W_{t+1,S}) = (W_{t,S} - PR)^\gamma - \lambda PR \quad (20)$$

For *Sender*, CPT compatible expected utility projection in the case where she decides to purchase insurance must be higher than the expected utility projection in (19) in order to convince her that purchasing the insurance package is the sound strategy. Hence, she would buy the package if the condition in (22) is satisfied:

$$(W_{t,S} - PR)^\gamma - \lambda PR > W^-(p)[(W_{t,S} - T)^\gamma - \lambda T] + W^+(1-p)W_{t,S}^\gamma \quad (21)$$

$$PR \leq \frac{1}{\lambda} [(W_{t,S} - PR)^\gamma - W^-(p)[(W_{t,S} - T)^\gamma - \lambda T] - W^+(1-p)W_{t,S}^\gamma] \quad (22)$$

Under usual assumptions, only effective factors were mere probabilities. However,  $PR$  level where *Sender* is willing to buy the insurance package depends highly on two other factors: (i) degree of risk aversion and (ii) degree

of loss aversion. Former factor is derived from the coefficient of constant relative risk aversion for *Sender*, namely  $(1 - \gamma)$ , and as  $\alpha$  and  $\theta$  variables in equations (17) and (18) are functions of  $(1 - \gamma)$ , risk aversion degree of *Sender* becomes a notable factor on critical *PR* value. It is important to highlight that *Sender* and *Receiver* have different coefficients of constant relative risk aversion, since  $\gamma \neq \delta$ . That being said, degree of loss aversion for both agents is assumed to be the same.

### 3.2 Certainty Equivalents and Risk Premiums

If we assume that *Sender* calculates her future utility in line with EU theory, her certainty equivalent,  $CE(\cdot)$ , as a function of wealth would be:

$$EU(W_{t+1,S}) = p(W_{t,S} - T)^\gamma + (1 - p)W_{t,S}^\gamma \quad (23)$$

$$CE(W_{t+1,S}) = m_S^\gamma = p(W_{t,S} - T)^\gamma + (1 - p)W_{t,S}^\gamma \quad (24)$$

$$m_S^1 = [p(W_{t,S} - T)^\gamma + (1 - p)W_{t,S}^\gamma]^{1/\gamma} \quad (25)$$

and the risk premium for *Sender* is:

$$RP_S = p(W_{t,S} - T) + (1 - p)W_{t,S} - m_S \quad (26)$$

$$RP_S = p(W_{t,S} - T) + (1 - p)W_{t,S} - [p(W_{t,S} - T)^\gamma + (1 - p)W_{t,S}^\gamma]^{1/\gamma} \quad (27)$$

If she calculates her future utility in line with CPT, then her certainty equivalent becomes:

$$CPT(W_{t+1,S}) = W^-(p)[(W_{t,S} - T)^\gamma - \lambda T] + W^+(1 - p)W_{t,S}^\gamma \quad (28)$$

$$CE(W_{t+1,S}) = m_s^\gamma = W^-(p)[(W_{t,S} - T)^\gamma - \lambda T] + W^+(1 - p)W_{t,S}^\gamma \quad (29)$$

$$m_{S,2} = [W^-(p)[(W_{t,S} - T)^\gamma - \lambda T] + W^+(1 - p)W_{t,S}^\gamma]^{1/\gamma} \quad (30)$$

### 3.3 Lower Bound and Upper Bound

In the previous subsections, we have examined two different scenarios for the *Sender* agent. In the first scenario, *Sender* calculates a benchmark insurance premium according to EU theory, which equals to:

$$W_{t,S} - [p(W_{t,S} - T)^\gamma + (1 - p)W_{t,S}^\gamma]^{1/\gamma} \quad (31)$$

Under the assumptions of CPT, *Sender* calculates another benchmark insurance premium according to:

$$\frac{1}{\lambda} [(W_{t,S} - PR)^\gamma - W^-(p)[(W_{t,S} - T)^\gamma - \lambda T] - W^+(1 - p)W_{t,S}^\gamma] \quad (32)$$

*Proposition 1:* For any  $W_{t,S} > 0$  and  $\lambda > 1$ ,  $PR_{max,CPT} > PR_{max,EU}$ .

**Proof.** Under the CPT conditions agents in this model are more willing to pay insurance. Thus  $PR_{max,CPT}$  represents the upper bound of premium curve i.e. the maximum premium amount which *Sender* is willing to pay under CPT conditions. Moreover, EU just takes expected losses into account, nothing more. Thus, for any  $\lambda > 1$  i.e. additional effect of loss aversion degree, the maximum premium amount which *Sender* is ready to pay is always higher than  $PR_{max,EU}$ .  $PR_{max,EU}$  in this model represents the lower bound i.e. the maximum premium amount which *Sender* is willing to pay under EU conditions.

*Proposition 2:* Actual market level of  $PR$ , namely  $PR_A \in R^+$ , is such that  $PR_{max,CPT} \geq PR_A \geq PR_{max,EU}$ .

**Proof.** Note that neither  $PR_{max,CPT}$  nor  $PR_{max,EU}$  represent the extremis, the extremis is rather sustained as  $T$  approaches to  $W_{t,S}$  as shown in (33) and (34):

$$\lim_{T \rightarrow W} PR_{CPT} = \infty \quad (33)$$

$$\lim_{T \rightarrow W} PR_{EU} = W_{t,S} - [(1 - p)W_{t,S}^\gamma]^{1/\gamma} = W_{t,S}[1 - (1 - p)^{1/\gamma}] \quad (34)$$

It is important to highlight that  $PR_A$  is exogenously given at  $t=0$ . Under EU theory assumptions, there exists a limit when  $T$  goes to  $W_{t,S}$ . However,

under the CPT conditions, there is no limit for  $PR_{CPT}$ , since a limit does not exist when we approach to  $W_{t,S}$  from left. In plain terms, when  $T$  approaches to  $W_{t,S}$ , i.e. the entire wealth of *Sender*, there is no value for  $PR$  in the negative zone since *Sender* is risk averse and  $T \rightarrow W_{t,S}$  indicates the situation where she loses everything.

### 3.4 Measures of Political Participation

Due to the nature of this model, what is betoken as  $PR$  represents the cost of political participation. *Sender*, essentially, faces with a decision where current state might drastically affect her utility through her wealth. On the other hand, *Receiver* is only facing with positive prospects. That being said, her facing with positive prospects only does not mean that political participation offers nothing to *Receiver*.

In the upcoming subsections, prospective benefits of political participation for *Receiver* will be depicted in detail. In this case,  $T$  naturally accounts for the actual wealth transfer between different agents in a society. In  $t = 0$ , the identities of *Senders* and *Receivers* are predetermined and salient, but not neither side has any information about the identity of their counter parties. Wealth transfer is intermediated by an institution which has only one function, directing the wealth transfer. The institution does not have any effects on the foretold process, but decisions of both agents shape the actions of the institution.

If *Sender* wants to pay the premium and manage to avoid wealth transfer, she also agrees to politically commit to a political establishment. One might perceive this commitment as a declaration of individual preference. On the other part, in  $t = 0$  *Receiver* pays a fee to to be a part of the political establishment and maintain the status quo. *Receiver's* decision to pay a fee could also be perceived as a preference revelation.

The fee,  $C$ , corresponds to lobbying efforts by *Receiver*. Nevertheless, this fee does not guarantee anything. These efforts affect the  $t = 0$  and  $t = 0$  probability of *Receiver* getting the wealth transfer, where  $C \in R^+$  and  $C < W_{t,R}$  and  $C < T$ . To simply describe the effect of  $C$ , we assume that it doubles down the original probability of wealth transfer incurrence, namely from  $p$  to  $2p$ . Under these circumstances, if *Receiver* calculates her future utility in line with expected utility theory's assumptions:

$$EU_R(W_{t+1,R}) = 2p(W_{t,R} + T - C)^\delta + (1 - 2p)(W_{t,R} - C)^\delta \quad (35)$$

If *Receiver* does not pay  $C$  and chooses to depend on pure probabilities, then:

$$EU_R(W_{t+1,R}) = p(W_{t,R} + T)^\delta + (1 - p)(W_{t,R})^\delta \quad (36)$$

Under these terms, *Receiver* opts to put lobbying efforts only when:

$$2p(W_{t,R} + T - C)^\delta + (1 - 2p)(W_{t,R} - C)^\delta > p(W_{t,R} + T)^\delta + (1 - p)(W_{t,R})^\delta \quad (37)$$

Solving for  $C$ , we obtain:

$$C \leq (W_{t,R} + T - \frac{(p(W_{t,R} + T)^\delta + (1 - p)(W_{t,R})^\delta - (1 - 2p)(W_{t,R} - C)^\delta)}{2p})^{1/\delta} \quad (38)$$

Condition (38) expresses the point of indifference for *Receiver*, under expected utility theory assumptions. The right hand side of the equation is heretofore betoken as  $PI_{R,EU}$ . On the other hand, *Receiver* calculates a different path under cumulative prospect theory. If she chooses to put on lobbying efforts, she has:

$$CPT(W_{t+1,R}) = [W^-(1 - 2p) - W^-(0)][(W_{t,R} - C)^\gamma - \lambda C] + [W^+(2p) - W^+(0)][(W_{t,R} + T - C)^\gamma] \quad (39)$$

and otherwise:

$$CPT(W_{t+1,R}) = [W^+(p) - W^+(0)][(W_{t,R} + T)^\delta] + [W^+(1 - p) - W^+(0)][W_{t,R}^\delta] \quad (40)$$

From (39) and (40) we obtain (41), where the point of indifference for *Receiver* is found by setting the left hand side of the inequality to 1.

$$\frac{W^-(1 - 2p) - W^-(0)[(W_{t,R} - C)^\delta - \lambda C] + [W^+(2p) - W^+(0)][(W_{t,R} + T - C)^\delta]}{W^+(p) - W^+(0)[(W_{t,R} + T)^\delta] + [W^+(1 - p) - W^+(0)][W_{t,R}^\delta]} > 1 \quad (41)$$

As (41) suggests, the point of indifference for *Receiver* is highly dependent on the degree of risk aversion and current wealth level, under CPT conditions. This dependence, indeed, allow us to reach different characterizations of participatory behavior, as elaborated in the following subsections.

### 3.5 Participation Under Two Theories

Under the assumptions of expected utility theory, there is a definitive upper bound for the cost which *Receiver* is willing to bear for lobbying, as Proposition 2 implies. On the other part, under CPT conditions, *Receiver* has to bear the burden of a probable loss, nonetheless cost of lobbying never reaches to a point where it equals her current wealth level,  $W_{t,R}$ , as assumptions of this agent model dictate. Therefore, the main intuition here is point of indifference for *Receiver* has narrower bounds when compared to *Sender*. After setting up the points of indifference for both agents, heretofore point of indifference for *Receiver* and *Sender* will be betoken as  $PI_{t,R}$  and  $PI_{t,S}$ , respectively.

Following the subsection 2.4, nine different states might emerge under each theory's assumptions:

1.  $PI_{t,R} < C$  and  $PI_{t,S} > PR$
2.  $PI_{t,R} < C$  and  $PI_{t,S} < PR$
3.  $PI_{t,R} > C$  and  $PI_{t,S} < PR$
4.  $PI_{t,R} = C$  and  $PI_{t,S} = PR$
5.  $PI_{t,R} > C$  and  $PI_{t,S} > PR$
6.  $PI_{t,R} < C$  and  $PI_{t,S} = PR$
7.  $PI_{t,R} > C$  and  $PI_{t,S} = PR$
8.  $PI_{t,R} = C$  and  $PI_{t,S} < PR$
9.  $PI_{t,R} = C$  and  $PI_{t,S} > PR$ .

#### 3.5.1 Handling the Nine States Under Cumulative Prospect Theory

If the point of indifference for *Receiver* is lower than the cost of lobbying while the cost of insurance premium is lower than point of indifference for *Sender*, no *Receiver* opts for bearing the cost of lobbying. On the other side, every *Sender* opts to buy insurance and pays the current  $PR$ , which can be described formally as a state where  $PI_{t,R} < C$ , and  $PI_{t,S} > PR$ . As a result, *Sender* fully participate through insuring themselves against any incurrences whereas *Receivers* do not wish to take any action. This first state indicates the case of full participation by *Senders* where no wealth

transfer between agents takes place. Second, if  $PI_{t,R} < C$ , and  $PI_{t,S} < PR$ , then neither *Senders* nor *Receivers* take any action to create an advantage for themselves. Second state, as elaborated here, reflects the case of maintained status quo. Third, if  $PI_{t,R} > C$ , and  $PI_{t,S} < PR$ , all *Receivers* prefer to bear the cost of lobbying, while no *Sender* opts to buy insurance. This state reflects the case of full participation by *Receivers* where wealth transfer between agents is twice as likely. Fourth, if  $PI_{t,R} = C$ , and  $PI_{t,S} = PR$ , then an equilibrium can be sustained in a case where  $PR=C$  because when the insurance premium is equal to cost of lobbying, all agents make moves to protect or create a more advantageous environment for themselves. At this point, it is vital to remember that these two distinct agents have two distinct degrees of risk aversion. In addition to that, Proposition 2 clearly expresses the increasing tendency to buy insurance as  $T$  approaches to  $W$ . In the light of these assumptions, *Senders* gain a unique position in terms of sustaining the equilibrium, as following proposition reflects.

*Proposition 3:* There must be a small enough  $\gamma$  for every level of  $T$  that sustains  $PR = C$ , in other words,  $PI_{t,R} = PI_{t,S}$ . Under all other conditions,  $PR < C$  when  $PI_{t,R} = C$  and  $PI_{t,S} = PR$ .

If there is no such  $\gamma$  for every possible level of  $T$ , i.e. if *Sender* is comparatively more risk averse than *Receiver*, aforementioned equilibrium where all agents participate in their own terms cannot be sustained.

Table 1: Four Different Equilibria Under CPT

Condition	$PI_{t,R} < C$	$PI_{t,R} > C$	$PI_{t,R} = C$
$PI_{t,S} < PR$	(N, N)	(N, F)	(N, I)
$PI_{t,S} > PR$	(F, N)	(F, F)	(F, I)
$PI_{t,S} = PR$	(I, N)	(I, F)	(I, I)

Fifth condition depicts a set of circumstances where both agents are willing to commit to a political establishment. However, because of the



dominance of *Sender's* choice, no wealth transfer occurs even though *Receiver* is willing to bear the cost of participation. Sixth condition describes a situation where *Receiver* is not willing to commit to a political establishment as the cost of lobbying is higher than the point of indifference. On the other side, *Sender* is indifferent between committing to a political establishment and taking no action at all. Seventh condition brings a different picture. *Receiver* is willing to bear the cost of political participation, whereas *Sender* is indifferent. Under these circumstances, *Sender* might choose to participate only if  $PR = C$ . Here, Proposition 3 is valid once more, thus under given level of  $T$ , *Sender* must be significantly more risk averse than *Receiver* in order to decide to participate. Eight condition provides a set of circumstances where *Sender* is not willing to participate whereas *Receiver* is indifferent, therefore if *Receiver* is more risk loving than *Sender* for the given level of  $T$ , she will bear the cost of participation. Ninth and final condition also provides the same result with the fifth condition, because of the dominance of *Sender's* choice.

### 3.5.2 States Under the Expected Utility Theory

The first three states of the previous subsection apply here, whereas the fourth state changes, as equilibrium is sustained where  $PR = C$ .

When equations (41) and (16) are solved together, one can observe that equilibrium can only be sustained when  $(1 - p)W_{t,S}^\gamma > 1/2(p(W_{t,R} + T)^\delta)$ . If this condition is satisfied, all *Receivers* and *Senders* actively participate in their own terms, the condition implying a significantly low risk aversion for *Sender*.

Main difference between two theories' implications on this model in terms of equilibrium stage is, under CPT conditions, *Sender* gets closer toward utilising all of her wealth towards protecting herself against the probable burden of wealth transfer, whereas *Receiver* is in a sole attempt of maximizing the amount of the subject transfer. Hence, CPT conditions require a substantially low risk aversion level from *Sender* which shapes her final utility level.

## 4 Predictions

In the 21st century, one of the most controversial issues that social scientists face has been the political engagement and its nature. How do people decide to participate in a political organization? What are the driving forces which

nudge people towards political engagement? Do “transfers” from one segment of people to another play the largest role? These questions provided the starting point of this work. In the relevant literature of political participation and political economics, these questions were commonly handled by assuming that all agents are *fully* rational. In this work, however, we factored in the risk aversion degree that all agents embody and search for the possible effects which inclusion of risk aversion degree may bring onto the table of relevant literature. Hence, we utilize the tools provided by behavioral economics literature in order to examine the dynamics of political participation. So, by including the risk aversion feature, this study suggested a model handling the issue of political participation from the perspective of transfers between agents.

The agent model and derived conditions in this work attempts to examine political participation preferences from the individual risk perception point of view. Both agents shape their preferences according to probabilities in a one-shot game environment. The reason why this work utilizes two widely expected theories of individual utility is to create a frame in which boundaries of risk taking behavior is well defined and limited. Agent model is specified in a way that depicts the effect of wealth transfer between two agents on micro level, thus deriving the aggregated effects is subject to future work.

As the previous section has shown, decision of both agents in terms of participation is dependent on their risk aversion degrees. Indeed, specification of the model creates a dominance in the favor of *Sender*, as her decision shapes up the result directly. Rationale behind this specification is, “insurance” approach to political participation covers multiple factors, hence the “usual” expected price of participation i.e. insurance is high however when agents factor in loss aversion and risk aversion, namely CPT conditions, implied cost of insurance for agents becomes less significant. Naturally, driving factor behind agents’ perception is their risk aversion. The difference in their risk aversion is what makes wealth transfer possible between them.

The most important prediction of our model emerges when both agents are indifferent between participation and taking no action. Under these circumstances, comparative state of two agents’ risk aversion degrees comes on to the stage. There is a probable equilibrium of participation costs ( $C$  and  $PR$ ) an equilibrium which is created by the equivalence of points of indifference of both agents and only occurs if *Sender* is less risk averse than *Receiver* for a given level of tax ( $T$ ). If this condition is satisfied, cost of participation becomes unique, where neither of the two agents move away and *status quo* is maintained.

In cases where *Receiver* is willing to participate politically even though *Sender* also decides to participate, a net welfare loss ( $C$ ) occurs in the model as the dominance of *Sender*'s choice eradicates any possibility of wealth transfer. These cases lead us to the prediction that in a framework where risk aversion degrees of all agents are not well-defined, full participation always creates a net welfare loss; however, no directed inequality is created through an institution.

Another prediction emerges from the Proposition 2. Upper bound assumption in the second section provides us the potential behavior of *Senders* in case of increased taxes ( $T$ ) or a lower level of wealth ( $W_{t,S}$ ). If amount of prospective wealth transfer increases or initial wealth of *Sender* decreases, *Senders* will be more likely to participate. For *Receiver*, initial wealth also plays an important role in terms of likelihood of participation, however, she does not move towards upper bound as much as *Sender* does since only burden *Receiver* might bear is the cost of participation and as model indicates, it is lower than the amount of taxes ( $T$ ) under all circumstances.

For future work, setting up a framework in order to calculate the  $PR_A$  for *Sender* agents after the first period we handle here, as well as examining the aggregated effects might produce interesting insights about participation preferences. An empirical study on the predictions of this model would also provide valuable information about participation preferences which we attempt to model here.

## 5 Concluding Remarks

In this study, we lay down a mathematical model of political participation. Abstracting the relevant constructs of the earlier literature to tangible benefits and costs of participatory behavior, and separately solving for equilibria under the *Expected Utility Theory* and *Cumulative Prospect Theory*, we shed some theoretical light on differing degrees of political participation. Owing to the very nature of our model, a change in participatory behavior cannot be expected in the absence of changes in the material domain of politics. This suggestion, of course, mechanically follows from our abstraction of benefits and costs involved. What matters more, on the other hand, is that our model's ability to relate the occurrence of a multiplicity of equilibria to alterations in material factors, in a realistic world of agents who are endowed with a bounded rationality.

The model is novel not because it invents a new construct. Rather, its ability to apply a well-known microeconomic framework (insurance) to a

political scientific construct (political participation) is the source of novelty. In that, accounting for the bounded rationality of agents and for the resulting differentiation between agents' risk aversion and loss aversion enable us to have a good grip of the topic. So, the paper is believed to provide rich insights to a broad range of social scientists.

## Conflict of interest

We, the authors, declare that we do not have any conflict of interest.

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