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THEORETICAL & MODELLING RESPONSE FOR RETHINKING MULTIPLE EQUILIBRIA IN TULLOCK CONTEST:

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Abstract
The current research focuses on verifying enough economic circumstances for numerous equilibria in particular Tullock-type contents to exist exactly, scientifically showing that asymmetric equilibria may occur even when the price and cost structure are symmetric. The academic study has more significance because it has extended the fundamental understanding in a theoretical context, as well as carefully presenting the current contests in the scenario multiple equilibria remain alive economically while being surrounded by the proper context of substantial unsatisfactory conditions.
Key Words: Contest; Multiple Equilibria; Rent – Seeking; Asymmetric Equilibrium

Introduction and Theoretical Background

Contests are games where players spend expensive effort (resources) to win the prize(s). Players' effort expenditures determine their respective odds of winning a prize. The function that matches the chances of winning efforts is called a Contest Success Function (CSF). Among CSF used in the competition, literature is the Tullock CSF Lottery (1980), Where the likelihood of becoming champion is the same as the total efforts of all the players, (Chowdhury and Sheremeta 2011b).

We demonstrate that asymmetric balances can occur even under symmetric price and cost structures. Under this structure, we find adequate conditions for the existence of multiple equilibria in this competition. We demonstrate that asymmetric balances can occur even under symmetric price and cost structures. We also identify several contests where multiple balances can occur under very general conditions.
The available literature documents that the asymmetry in the evaluated price. The cost structure and the effectiveness of the influence on the CSF may result in an asymmetric balance. The cost structure and the efficiency of the impact on the CSF may lead to an asymmetrical balance, (Chowdhury and Sheremeta 2011a).

The conclusion that multiple equilibria may occur in one-time Tullock competitions is essential for several reasons. First of all, in games in several stages or repeated, the existence of several equivalent balances without payment makes it possible to condition the selection of the balance in the sub-game depending on past behavior. It helps manage a wide range of payouts as a perfect underplay balance, (Chowdhury and Sheremeta 2011a).

Theoretical Background

The study has identified and employed the three theories of general equilibrium theory, the theory of contest, and the rent seeking theory for extending the theoretical knowledge on the key notions of the study which are the contests, equilibria, and the rent seeking.

Motivation of the study

Sufficient conditions exist for the existence of several balances in the Tullock type Contests and shows that asymmetrical equilibria can arise even under symmetrical price and cost structures, (Chowdhury and Sheremeta 2011b).

Significance of the study

the academic study has more significance extended the fundamental understanding in a theoretical context, accompanied by carefully presenting the present contests in the scenario multiple equilibria remain alive economically surrounded by the proper context of substantial unsatisfactory conditions.

Research Questions & Methodology

Research Question

What is the Rethinking Multiple Equilibria In Tullock Contest in Theoretical & Modelling Response?

Methodology

The study has employed the multiple equilibria in specific Tullock-type contents for analysizing enough economic conditions for multiple equilibria in specific Tullock-type contents to exist precisely, scientifically proving that asymmetric equilibria might happen even under symmetric prize and cost structure.

Appart from that, the study has further research in theoretical context to extend the understanding of contests, equilibria, and rent seeking in the theoretical perspective.

Findings of the Study and Practical Implication

The contemporary study appropriately concentrates on sufficiently confirming enough economic conditions for multiple equilibria in specific Tullock-type contents to exist precisely, scientifically proving that asymmetric equilibria might happen even under symmetric prize and cost structure. From that sufficient ground, the academic study has more significance extended the fundamental understanding in a theoretical context, accompanied by carefully presenting the present contests in the scenario multiple equilibria remain alive economically surrounded by the proper context of substantial unsatisfactory conditions.

Objective of the study

The Objective of the study is to analysizing enough economic conditions for multiple equilibria in specific Tullock-type contents to exist precisely, scientifically proving that asymmetric equilibria might happen even under symmetric prize and cost structure.

Summary of the study

From this introductory part of the study, the significant contributions of the study have been made from the following parts; Theoretical part of the study, Quantitative methodology,

Literatures findings supporting the methodology, Emperical part of the study, Findings of the study and practical Implications, Conclusion

Theoretical Extension of the study knowledge

The study has identified and employed the three theories of general equilibrium theory, the theory of the contest, and the rent seeking theory for extending the theoretical knowledge on the key notions of the study which are the contests, equilibria, and the rent seeking.

General Equilibrium Theory

General equilibrium theory is succinctly illustrating the remarkable behaviors of economic demand, supply, and conceivable price under his functional capacity of the interaction market in anticipated results of overall general equilibrium,(Bryant 2015).

The theory is illustrated decision-making on demand and supply in the context of goods, labor type and assets to address their fundamental economic desire, (Bryant 2015).

The economic theory is properly governed by the theoretical constructs of demand behavior, supply behavior, price behavior, interaction market, and overall general equilibrium as comprehensively and thoroughly described in the below improved table; (Bryant 2015).

Number	Theoretical Construct/Actor	Sufficient Explanations
1	Demand Behavior	Is the behavior of consumers looking for particular goods and ready to pay to meet their needs and satisfaction on the market.
2	Supply Behavior	Is the producer's behaviour to deliver goods to market to meet consumer demand at the agreed price
3	Price Behavior	Monetary quantity guides buyers and sellers in the marketplace and directs demand and supply behaviour.
4	Interacting Market	It is the platform where all the actors in commercial transactions come together, actors like the buyer, the seller and the price.
5	Overall General	This is the situation in which all players interact in the market within a reasonable and satisfactory period of

	Equilibrium	time.

Source: (Bryant 2015).
Despite proving it to be a mathematical equation, the theory of general equilibrium may not be applicable in practical and economic situations of reality in life, (Davar 2015).

The Theory of Contests
The theory of the contest focuses principally on the description of applications of online services, including rent research, sports, scientific projects, and others through the application of the theoretical constructions of all the agents, the expected action (investments and efforts), a price, a function, and the cost of the function, (Vojnović 2016).

The theory is governed by the theoretical constructs of agents, the expected action (investments and efforts), a price, a function, and the cost of the function (Corchón 2007). The following table comprehensively describes these theoretical constructs ;

Number	Theoretical Actors	Explanations
1	Agents	This is the group of agents or suitors who undertake the specific online service application.
2	Actions	These are the specific steps taken by agents in carrying out the particular online service.
3	A Prize	Is the monetary gain, which depends mostly on the stocks of agents.
4	A Function	Is the sequence of actions taken by officers in facilitating the achievements of the prize.
5	Costs of Function	All costs required for the performance of the function.

Source: (Vojnović 2016)
By focusing on the application of competitions, theory, Content theory has been applied by addressing sports, puzzle issues such as selecting the team and distributing incentives in proportion to the player's contribution, (Frick 2003).

The Rent Seeking Theory
The rental seeking theory describes the reallocation of existing wealth in order to benefit the respective agent without making new efforts and investments, (Andrey 2015). That is to say,

incur social costs by using existing resources that are already engaged in production somewhere by lobbying for favours or rent, (Tollison 2012)

The theory of rent-seeking is built on the three theoretical constructs, which are: social costs, lobbying, and favor-seeking as clearly elaborated in the table below;(Tollison 2012).

Number	Theoretical Construct	Explanations
1	Social Costs	Is the act of using resources already engaged in production somewhere in lobbying to promote or rent in another production scheme for the costs of the corporation or others
2	Lobbying	Lobbying is the pursuit of favor without creating new efforts or investments
3	Favor Seeking	Is looking rental without making new riches or values

Source : (Tollison 2012)

Modeling Methodology

Contests are games where players spend money on effort (resources) to win the prize (s). Players' effort expenditures determine their respective odds of winning a prize. The function that matches the chances of winning efforts is called a Contest Success Function (CSF). Among the CSF used in the competition, the literature is the Tullock CSF Lottery (1980), where the likelihood of becoming champion is the same as the total efforts of all the players.

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The available literature documents the asymmetry in the evaluated price. The cost structure and the effectiveness of the influence on the CSF may result in an asymmetric balance. The cost structure and the efficiency of the impact on the CSF may lead to an asymmetrical balance.

The conclusion that multiple equilibria may occur in one-time Tullock competitions is essential for several reasons. First of all, in games in several stages or repeated, the existence of several equivalent balances without payment makes it possible to condition the selection of the balance in the sub-game depending on past behavior. It helps manage a wide range of payouts as a perfect underplay balance.

Supporting literature supports methodological modeling.

Sufficient conditions exist for the existence of several balances in the Tullock type contests, and this shows that asymmetrical equilibria can arise even under symmetrical price and cost structures (Chowdhury and Sheremeta 2011b). We also identify competitions in the literature where multiple equilibria occur under reasonably low conditions (Chowdhury and Sheremeta 2011b). Any symmetrical balance of mixed strategy in a Tullock contest with many ground points, (Ewerhart 2014). All probability weights are focused on the mass points, which mediate the values of the decision parameter («2 < R < ») has infinitely numerous mass points, (Ewerhart 2014). We're building a generalised Tullock contest under complete info where, contingent on win or lose, a player's gain is a linear function of the prize, effort, and effort of the rival, (Chowdhury and Sheremeta 2011a). We demonstrate that the optimal prize structure for symmetrical n-player Tullock tournaments awards the entire prize pool to the winner, provided that a symmetrical pure strategy balance exists (Schweinzer and Segev 2012).

With comprehensive and private information, our main conclusion is that, in balance, the auctioneer can now perfectly deduct the reserve prices of the players. However, this is not because each tender presents his or her maximum willingness to pay, but rather because his or her reserve price is disclosed by his or her opponents, (Dimitri 2014). We show that, although the strategies of balance do not allow a survival wait, for specific achievements by mixed methods of players, the total amount spent in competition for rentals can exceed the value of the prize (Baye, Kovenock, and De Vries 1999). We show that in a classic common-value Tullock contest with incomplete information, an information benefit of a player is rewarded (Einy, Moreno, and Shitovitz 2016).

We draw the conditions from a rule of monopolisation that dominates an egalitarian rule, if the objective of the rule design is to maximise the probability of group gain (Kobayashi and Konishi 2020). We find conditions in which the rule of monopolisation maximises the winning likelihood of the group, while egalitarian rule is strictly preferred by all members of the group (Kobayashi and Konishi 2020).

We characterise the unique symmetrical equilibrium and show that small parameter changes can lead to significantly different types of contests and hence different levels of equilibrium effort (Roman and Subhasish 2010).

By providing a broader framework, we show that the reverse can also be true and we draw the conditions under which this is the case, Our approach then allows us to rationalize, within the

context of daring stone competition, the observations that rents may become more hotly contested as they become scarcer, as was clearly the case with the recent overall contraction in public funds available for public action (Dickson, MacKenzie, and Sekeris 2018).

Findings from the study and their practical implications

The contemporary study appropriately concentrates on sufficiently confirming enough economic conditions for multiple equilibria in specific Tullock-type content to exist precisely, scientifically proving that asymmetric equilibria might happen even under symmetric price and cost structure. From that sufficient foundation, the academic study has more significance in extending the fundamental understanding in a theoretical context, accompanied by carefully presenting the current contests in the scenario of multiple equilibria remaining economically viable while surrounded by the proper context of significant unsatisfactory conditions.

Empirical Extension of the study knowledge

Emperically literatures have been reviewed in the key notions of the study; Multi equilibrium, Tullock Contests, and rent seeking to extend the knowledge of enough economic conditions for multiple equilibria in specific Tullock-type contents to exist precisely, scientifically proving that asymmetric equilibria might happen even under symmetric prize and cost structure.

1. **Multi Equilibrium Notion**

Multiple Equilibria may only occur and become irrelevant and thus be discarded, We discuss the existence of balances in the model and find that some candidates to balance are irrelevant and are therefore excluded (Gaspar, Vasconcelos, and Afonso 2014).
Our goal in this article is to encourage a reconsideration of the theoretical basis for multiple equilibria, (Morris and Shin 2001).

We doubt that the beliefs of economic agents are as indeterminate as the patterns of multiple equilibrium suggest, Rather, the apparent indeterminacy of beliefs can be seen as the consequence of two modelling hypotheses introduced to simplify the theory, (Morris and Shin 2001).

Seen from the angle of multiple equilibrium, a sound market transformation policy will sufficiently distance the market from the present equilibrium to move towards a different, preferred, balance of one's own free will, (Woods and Kandel 2002).

2. **Tullock Contests Notion**

This article also presents a new type of Tullock contest which incorporates the main mechanism behind the mining proof work of cryptocurrencies such as Bitcoin,(Soria and Ogarrio 2020).
This document proposes to use Tullock competitions as an alternative tool to design mechanisms to encourage open outsourcing, (Luo et al. 2015). We are inspired by Tullock's propensity to attract user input (but not necessarily higher income) in other areas, (Luo et al. 2015)
We consider a Tullock multiplayer contest in which players differ in their rating of prizes, (Deng, Fu, and Wu 2021).

3. Rent Seeking Notion

Social loss through the use of resources to politically or administratively influence the preferred benefit awarded, known as 'rent research',is an idea put forward by Gordon Tullock (1922-2014), founder of the Public-Choice School of Economics and the journal Public Choice, (Hillman and Ursprung 2015).

The search for rents, defined as awards and prizes that are not won or that are not compatible with the competitive returns of the market, is therefore clearly ancient, (Congleton, Hillman, and Konrad 2008).

There are reasons why countries in search of productive technologies, such as easy bribery, poor laws and permissive legal systems, can suffer economically, (Murphy, Shleifer, and Vishny 1993). The argument is that rent-seeking activity is prone to very natural increasing returns, which means that very high levels of rent-seeking can be self-sustaining, (Murphy, Shleifer, and Vishny 1993).

When individuals equally differ in their productivity, not all wealthy agents become rent seekers and the social costs of searching for rent are generally lower, (Chakraborty 2014). In both cases, multiple balances with various levels of rent and production search are possible, (Chakraborty 2014).

Conclusions

We show that asymmetric equilibria may appear even under symmetric price and cost structures. We also identify several contests where multiple balances can occur under very general conditions. The study could be helpful in the areas of competition design, R&D spinoffs, litigation, and repeated games, where multiple balances can occur.The present study can also be expanded in terms of incomplete information, players, risk aversion, and non-linear CSFs. These issues are left to future research.

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Non

Statement of Research Interests

No Research Interest

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