

Strategic Analysis in International Business Negotiation: Unravelling Price Formation and Strategic Decision-Making Dynamics Through a Game-Theoretic Approach

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Abstract: The emphasis of the paper is on the unraveling of the dynamics of price formation and strategic decision-making in international business negotiation by a thorough game-theoretic analysis. The discussion will start with a detailed examination of price negotiation as part of the wider discussion of international business negotiations. Using game theory as an analytical tool, this paper explores the complex character of the negotiation process, breaking it down into its game-like features and developing a game model that reflects its subtle dynamics. Based on the Rubinstein alternating-offers bargaining model, the paper examines the game solution to benefit sharing and expected prices results. Moreover, the utility theory is used to determine the possible points of solutions in the international commercial price negotiation especially when there are payments involved. The discussion ends with a powerful discussion of game solutions based on international business negotiations, discussing effective strategies and giving suggestions to negotiating parties on how to maximize benefits during the process. This discussion does not only provide light on theoretical concepts but also provides practical advice on real life situations and helps to gain a better insight into strategic decision-making in international business negotiations.

Keywords: Game Theory; Price Formation; Strategic Analysis; International Business; Negotiation Strategies

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1. Introduction

The game theory has developed into a competitive situation to a strategic decision-making tool especially in business negotiations where dynamic interactions require innovative structures. The paper presents the game-theoretic approach to unraveling price formation in international business negotiations. Price formation becomes an important issue that affects strategies and interests of the concerned parties. Knowing its subtle dynamics is essential to developing effective strategies^[1, 2].

1.1 Research Objectives

The purpose of this paper is to explore the game-theoretic approach to price formation in business negotiations. The goals are to trace the historical development of game theory, examine the game-like structure of international business negotiations, develop a detailed game model for price formation, use game theory to draw strategic implications, and offer practical advice for negotiators^[3, 4].

1.2 Significance of the Research

The knowledge of the complexities of price formation in international business negotiations based on the game theory has a great importance to negotiating parties. This study makes theoretical contributions that are based on practical applications and enable negotiators to have rational analytical framework to make better decisions, improve negotiation efficiency and profitability.

2. Literature Review

International business negotiation is the core of international business theory, which involves the deliberations and interactions between organizations in different countries or territories. It is a complex process whereby individuals or groups negotiate to meet certain needs or meet set goals. It has some peculiarities such as an international character, commercial character, and confrontational character.

The key to successful international business negotiation is to effectively manage the complex game processes involved in international business negotiations. International business negotiations are more complex and

challenging than domestic negotiations because of differences in economic, cultural, political, linguistic and lifestyle factors among countries and regions. As such, it is essential to prepare and plan well before participating in international business negotiations [5].

When it comes to international business negotiations, the dynamics of price formation are of utmost importance. The game theory offers a powerful tool of understanding the complexity of the processes of price negotiations. With negotiating parties seeking to achieve the best terms and reduce trade risks, game theory application is a strategic necessity.

The negotiation process entails the parties using different skills and strategies to maximize the results and recognize the different economic, cultural, and political factors involved [6]. The application of game theory concepts, especially the rotating bidding model by Rubin Stein and utility theory, gives the negotiators the power to strategically evaluate benefit sharing and anticipated pricing outcomes. Through the incorporation of game theory in the analysis, the negotiators are able to make their goals compatible with rational decision making hence maximizing on expected benefits.

3.Methodology

This paper is based on certain assumptions to explain the intricacies of the international business negotiation process:

Hypothesis 1: There are only two players in the negotiation process, namely Sally (S) and Burt (B).

Hypothesis 2: Sally and Burt are on the same level, and no social factors affect their decision-making.

Hypothesis 3: It is a purely commercial negotiation and price is one of the most important factors that both parties consider.

Hypothesis 4: No international standard price or guidance on the subject matter of the transaction is predetermined.

Hypothesis 5: Both actors are rational and have the goal of maximizing their own self-interest.

Although the international business negotiations may involve multi-participants, this paper focuses on the most common case of two parties- a typical case in international business negotiations. In this case, two can be people, company or institution agents, or alliance representatives. The hypotheses do not consider external and internal factors other than those affecting the negotiating parties but only the process of international business negotiations. Hypothesis 4 guarantees the viability and importance of international business negotiations, and Hypothesis 5 is the cornerstone of developing a game theory model. This economic rationality approach, contrary to psychological or sociological approaches, corresponds with the principles of constructing models of games [7]. It is important to note that this article explores dynamics of a dynamic game without considering repeated games.

3.1 Price Formation Process in International Business Negotiation Game Model

The basic game play of international business negotiation can be described as follows: Sally makes a bid, P^* and Burt either accepts or rejects the offer. In case Burt agrees, then negotiations are over. Should it be rejected, Burt will make a counteroffer of P^* and leave Sally with the option of accepting or rejecting. Should Sally accept, then negotiations are over; otherwise, Sally makes another offer, P^* , and the process repeats itself. This repeated process goes on until the Nth game, at which point one of the parties accepts the offer, ending the negotiation, and rejection leads to a zero-profit payoff to both parties [8].

In this paper, the Bertrand oligopoly model is used to analyze the price strategies of both parties. Although there is a high degree of substitution between products of firms A and B, it is not perfect. When prices vary (P_1 and P_2 for A and B respectively) and there are no fixed costs with marginal production costs C_1 and C_2 for A and B respectively, the benefit functions of the two parties can be written as:

$$u_1(P_1, P_2) = P_1 q_1 - c_1 q_1 = (P_1 - c_1)(a_1 - b_1 P_1 + d_1 P_2) \quad (1)$$

$$u_2(P_1, P_2) = P_2 q_2 - c_2 q_2 = (P_2 - c_2)(a_2 - b_2 P_2 + d_2 P_1) \quad (2)$$

The analysis utilizes the response function method. By deriving the partial conductance for P_1 and P_2 and setting the partial derivatives to zero, we obtain:

$$\frac{\partial u_1}{\partial P_1} = a_1 + b_1 c_1 - 2b_1 P_1 + d_1 P_2 = 0 \quad (3)$$

$$\frac{\partial u_2}{\partial P_2} = a_2 + b_2 c_2 - 2b_2 P_2 + d_2 P_1 = 0 \quad (4)$$

The derived response functions depict the vendors' reactions to each other's pricing strategies.

$$P_1 = Q_1(P_2) = \frac{1}{2b_1}(a_1 + b_1 c_1 + d_1 P_2) \quad (5)$$

$$P_2 = Q_2(P_1) = \frac{1}{2b_2}(a_2 + b_2 c_2 + d_2 P_1) \quad (6)$$

The Nash equilibrium (P^*, P) is the point where these two reaction functions meet and it is such that:

The above calculations show that the best Nash equilibrium is one where both parties have equal market share. The prices can be adjusted in case one of the parties is not satisfied with its share in the market. But as the price of the product comes closer to the purchase price, the room to reduce further becomes less and price wars are difficult to implement. It requires operations to be improved, transportation costs to be minimized, and new price wars to occur with better management [9].

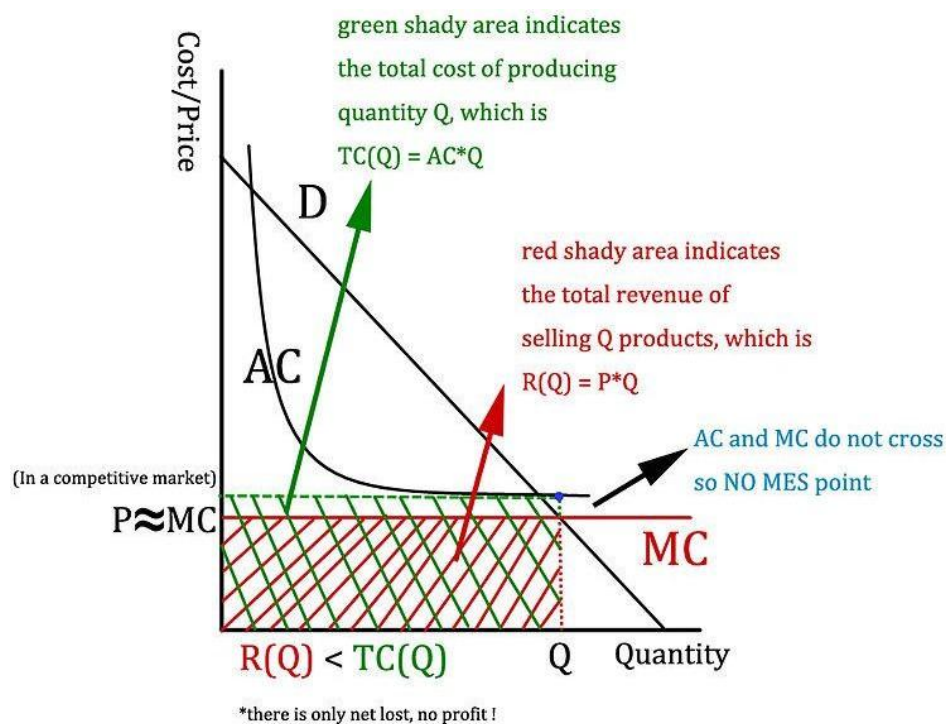


Fig. 1: Schematic Representation of the Dynamic Process in International Business Negotiation: Unveiling Price Formation Dynamics through Game Theory Analysis [10]

4.Stage Observable Action Game Model in International Business Negotiation

Games can be classified as cooperative and non-cooperative based on the possibility of participants to create enforceable contracts during their interactions. This study dwells specifically on non-cooperative games, which emphasizes competition in the market. The main characters of this scheme are the primary stakeholders in global commercial bargaining, namely, purchasers and vendors. In this non-cooperative game model, the main hypotheses include:

(1) Knowledge of previous decisions: When the participants decide their strategies in phase k , they have knowledge about the particular decisions taken by the other party during all the previous periods $(0, 1, 2, k-1)$.

(2) Concurrent Operations: Purchasers and vendors operate simultaneously at phase k , but this does not exclude the possibility of stakeholders taking turns in execution.

In the bargaining model, buyers are well aware of their reservation prices, while sellers operate with incomplete information about the client's bidding strategies. This assumes that providers have knowledge of the consumer's acquisition range between $P1$ and $P2$ ($P1 < P2$). Therefore, the provider's decision space $S1$ is only an initial bid in the first phase, while decisions phases are {accept, counter-offer} for both parties.

In the main stage (stage 0), the vendor selects a strategy among the set S , establishing a price $P0$ (with $P0 \in (P1 < P2)$) to be accepted or negotiated by the purchaser. In case of agreement by the buyer, the deal is completed, in case of refusal by the buyer, the bargaining process moves to the next level where the buyer proposes a price that the vendor may accept or reply to. This recursive process continues until one of the parties accepts a bid or the conversation reaches the final round ^[11]. This kind of framework resembles an ideal information game. Results based on this schema include:

(1) Inefficiency in Bargaining: The bargaining process leads to inefficacy because it moves on to the second stage, causing lags and diminished results.

(2) Impact of the Perspective of the Purchaser: Although the buyer offers a lower rate, the perception of the seller that the buyer is a high-end customer can influence the bargaining process. Without complete data, providers may adjust prices based on their predictions and may raise prices around $P2$.

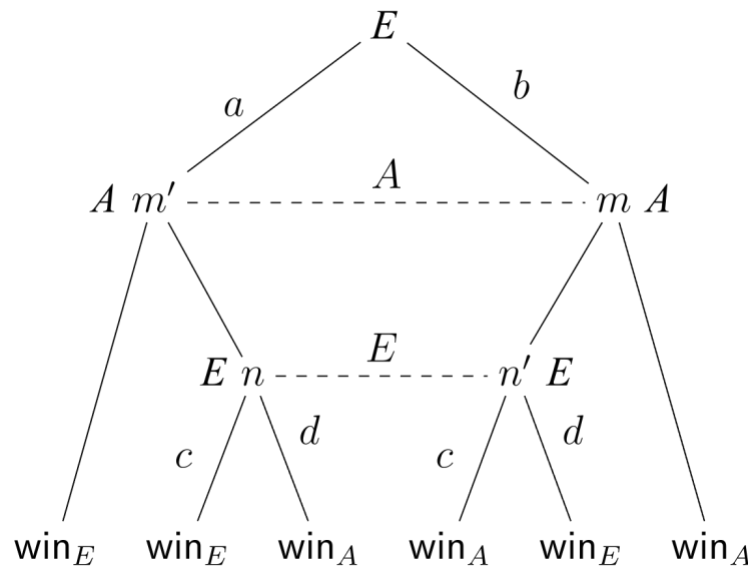


Fig. 2: Game Model Illustrating Stage-Observable Actions in International Business Negotiation ^[12, 13]

5. Negotiation Research on Joining Payment Terms in International Business Trade

Since international trade is a unique phenomenon, the terms of payment are directly connected with prices and represent a very important aspect of negotiations after price. Nonetheless, preferences of parties play a significant role in selection based on such factors as financial environment, risks, company reputation, volume of transactions, creditworthiness of counterparties, and expectations of exchange rates. The interaction of these elements forms a complicated picture where the parties have to maneuver and make decisions regarding the terms of payments that are consistent with their strategic goals.

In order to solve the game in international business negotiations, namely, integration of payment terms, a similar Edgeworth box diagram is used in the following analysis. This diagrammatic method gives a pictorial view of the possible results and plans in negotiating the terms of payments and helps in getting a complete insight into the

dynamics at hand.

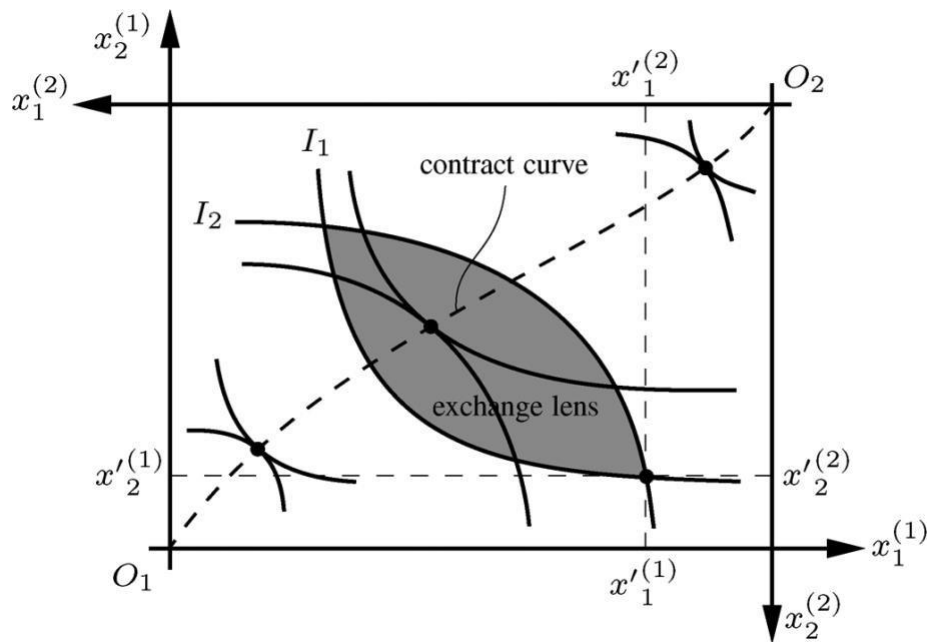


Fig. 3: Edgeworth Box-Type Pricing Game in International Business Negotiation ^[14]

6. Recommendations of International Business Negotiation based on Game Theory

6.1 Correct Estimation of Information Factors

Information is the key to success in international business negotiation. During the initial value declaration phase, the communication of interests is crucial ^[15]. The parties involved in negotiations must be able to identify the underlying needs of the other party by filtering out irrelevant information based on their knowledge and experience. As the negotiations progress, the parties move on to the value creation stage. Here, accuracy of information, especially an accurate assessment of the other party's financial resources, is crucial. These estimates guide decision-making, with ongoing refinement during negotiations to maintain accuracy and prevent errors.

6.2 Practical Understanding of Negotiation Dominance

In contrast to the old ideas, negotiation power is based on strategic factors rather than group size. The analysis of games shows that parties should promote their interests and take into account the price budget of the opponent in a strategic manner. Precise forecasts, control of intentions, and manipulative shaping of expectations come into play. Intentional communication of certain actions, true or false, influences the perception of opponents and places negotiators in a favorable position.

6.3 Be mindful of Deadline Management and Cost of Delay

Quoting at the last minute can compel opponents to take or make zero gains. Negotiators need to master deadline dynamics in order to get favorable conditions. Game equilibrium solutions emphasize the importance of the newest compromised price, the cost of delay, a variable that varies between (0,1). This is indicative of patience dynamics which affect terms of agreement. Clever negotiators reduce their own impatience and impact on that of the other party to ensure prompt and beneficial deals during international business negotiations ^[16].

7. Conclusion

The game theory has been an eye opener in exploring international business negotiation. This exploration breaks down the complex nature of negotiation, using the principles of game-theory to decode subtle complexities. Exploring underlying models, we can unlock new research opportunities and encourage a more detailed study of important aspects. They are identifying the retention price of each party, negotiating with asymmetric information on

reserve prices, exploring known reserve prices with some probabilities, analyzing simultaneous revelation of bottom-line solutions, and unraveling multi-party negotiations. At the end of this exploration, it is clear that the application of game theory in international business negotiation is not a one-time activity. This excursion is a prelude to more profound stories waiting to be discovered, inviting researchers and practitioners to sail into uncharted territories and add to our knowledge of the negotiation processes in the ever-changing world of global business. The strategic opportunities and issues uncovered are not destinations but milestones in a continuous discovery of the complexities that characterize successful negotiations.

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