

# Delegation games

## Citation for published version (APA):

Akbulut Merchant, C. (2016). *Delegation games: analysis and applications*. [Doctoral Thesis, Maastricht University]. Datawyse / Universitaire Pers Maastricht. <https://doi.org/10.26481/dis.20160330ca>

## Document status and date:

Published: 01/01/2016

## DOI:

[10.26481/dis.20160330ca](https://doi.org/10.26481/dis.20160330ca)

## Document Version:

Publisher's PDF, also known as Version of record

## Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

## General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

[www.umlib.nl/taverne-license](http://www.umlib.nl/taverne-license)

## Take down policy

If you believe that this document breaches copyright please contact us at:

[repository@maastrichtuniversity.nl](mailto:repository@maastrichtuniversity.nl)

providing details and we will investigate your claim.

# Valorization

The National Valorization Committee describes knowledge valorization as the “process of creating value from knowledge, by making knowledge suitable and/or available for social (and/or economic) use and by making knowledge suitable for translation into competitive products, services, processes and new commercial activities”. Based on this definition, in this chapter, I will explain the knowledge valorization of this dissertation. For this, I will first outline the general idea of this research. Then, I will elaborate how the findings of this thesis have social and economic relevance, in other words, importance. I will describe which target groups can benefit from this research. Furthermore, I will explain the activities and products in which this thesis may result. Finally, I will mention the innovative features and possible implementations of this dissertation.

To begin with, this dissertation considers managerial delegation and remuneration systems from a game theoretical perspective. It investigates how these managerial incentive schemes interact with each other in a two-firm industry. It studies how profits, production, welfare and international trade are affected by employing performance evaluation systems for managers. Furthermore, it tries to find the best incentive system for enterprises and introduces a new managerial incentive scheme for companies. In addition to the aforementioned contributions, the research reported in this dissertation introduces a new solution method to the game theory literature. By developing and applying this new solution technique, we provide an easy, elegant, short and intuitive way of examining managerial performance evaluations in game theoretical models. In this regard, this disserta-

---

tion has two main aspects. First it is applying the game theory principals and models to economic and business models. Second, it is providing new solution techniques which will be useful for other researchers in game theory.

When I described the general idea of this dissertation, I already hinted at its social and economic relevance, in other words the importance of this research. Now, I will elaborate further on this relevance and importance. Many companies nowadays delegate certain responsibilities and authority to their managers. Companies employ managers for either practical, legal or administrative reasons. However, no matter what the reason is, the good performance of managers and the success of companies are vital elements for firms. Therefore, organizations and researchers always ask : How can we increase the profits of a company? Is there a way to improve the performance of managers? How can a company fulfill certain aims (such as high sales, high market share etc.)? At this point managerial incentives play a key role. As indicated by Armstrong et al. (2007), managerial bonuses can be a way of increasing the motivation, commitment and engagement of employees; moreover, it is a way of realizing certain aims. Besides that, managerial incentives can provide a way of being a winner, a leader in market competition. As an example, take a two-firm industry where one firm is only owner-led and the other firm employs a manager with a reward system based on the firm's sales. Both firms produce homogeneous products and compete à la Cournot. Basu (1995) (by using game theoretic tools) proved that the firm that benefits from the managerial bonuses based on sales would be the winner in the market. Irwin (1991) demonstrated empirically that this was the case when the Dutch East India Company beat its British rival in the pepper trade in the 17<sup>th</sup> Century. This is a nice example of the economic validity of a theoretical result. Although the thesis results are theoretical, they can provide enterprizes with a general view and contingency strategies about several remuneration schemes. In this regard, this research presents theoretical answers to some possible "what if" scenarios about managerial reward systems. Therefore, companies, consultancy firms, and governmental institutions can use them to produce strategies and policies. This thesis also examines social welfare and the effects of

performance evaluation schemes on international trade. The thesis shows theoretically that both social welfare and international trade are affected positively by using managerial reward systems. Empirically, this can be seen by considering the Netherlands again. Going back to the paper of Irwin (1991), we observe that one of the reasons which gave an advantage to the Netherlands in the “Golden Age” was the gains in the international trade in the 17<sup>th</sup> Century<sup>16</sup>. Therefore, this thesis has theoretical findings which have both social, economic importance and validity.

When I emphasized the social and economic importance of this thesis, I alluded to the target groups which can benefit from this research by providing possible reasons. For the sake of completeness, let us mention some key aspects. Companies, consultancy firms, manufacturers and investment banks generally remunerate their managers on a reward system. For instance, as Ritz (2008) notes General Motors, Daimler Chrysler, Ford, Toyota, Morgan Stanley and Merrill Lynch<sup>17</sup> employ managerial bonus systems for their executive compensation. Therefore, the results reported in this thesis can be utilized to construct the remuneration strategies. The outcomes of this thesis are concerned with two-firm industries. Considering some sectors where there are generally two firms which are dominant (e.g., Apple versus Microsoft) in the market, the findings of this thesis show how to develop remuneration strategies for business. Similarly, the findings which are related to social welfare and international trade can be used to implement policies by government agencies and research institutions. For instance, the Organisation for Economic Cooperation and Development (OECD), the Institute for the Study of Labor (IZA), the National Bureau of Economic Research (NBER) and the International Labour Organization (ILO) mostly have empirical studies on employee reward systems. The results of this dissertation can provide theoretical perspectives on the studies of those institutions. Aside from these target groups, another target group is game theorists. As previously explained, in this thesis, a new solution technique (called “geometric approach”) is proposed to make the equilibrium calculations easier, shorter and more intuitive. Departing from this

---

<sup>16</sup>See the book of Rietbergen (1998).

<sup>17</sup>Examples can be found by also considering publicly disclosed proxy statements.

---

technical aspect of the thesis, other game theorists could apply the methods proposed in this research, to other problems<sup>18</sup>. Also, as a target group, experimental economists can test our theoretical results. Consequently, the findings of this dissertation can be interesting to several academic and non-academic target groups.

Now, I will elaborate on the products, activities which can result from this research. I do this considering each chapter separately. To begin with, the findings of Chapter 2 can shape business strategies about profits, market competition and social welfare when the industry employs relative profit performance evaluation for the managers. Similarly, the outcomes of Chapter 3 can be translated into business strategies about profits, market competition and social welfare when the industry employs market share performance evaluation for managers. The results of Chapter 4 do not only shape business and welfare strategies considering all types of managerial remuneration schemes, but also shape technical methods which other scientists can use. The results of Chapter 5 can be translated into a new type of managerial incentive and strategies about how to employ this incentive type. Finally, the research of Chapter 6 examines the implications of managerial remuneration schemes on international trade from a game theoretical view. Therefore, the outcomes of Chapter 6 can shape international trade policies and business strategies.

When it comes to do research, the natural questions would be about its innovative characteristics: Are the results new? To what extent are the outcomes of the research original? etc. In general terms, the contributions of this thesis to the literature are explained in Chapter 1. Each chapter also includes a detailed discussion about the contributions of each project per se as well. Departing from these discussions, it can be claimed that the findings of this research are innovative. To clarify, in Chapter 2, we fill a gap concerning to a two-firm industry where both firms employ relative profit performance evaluations for their managers. In the same Chapter, we find that even a small change in the difference between firms' marginal costs for production causes huge differences between the profits. In Chap-

---

<sup>18</sup>For example, two-stage perfect and complete information games, or the VFJS strategic delegation game.

ter 3, we consider a two-firm industry where both firms use market share performance evaluations for their managers. In the same Chapter, we conclude that a certain change in the difference between firms' marginal costs causes the efficient firm to capture the Stackelberg Leadership profits in the market and improvements in Social Welfare. In Chapter 4, we develop a solution technique which can be applied to analyze strategic delegation and managerial incentives in a game theoretical view. In the same chapter, we first implemented our new solution method to the problems solved in the literature. Therefore, we verified our method and checked the literature results. Then we implemented it to the problems which are not solved in the literature yet. In Chapter 5, we pioneered a new managerial incentive type for owners. We studied how our new managerial remuneration scheme interacts with other bonus types. In both Chapter 4 and 5, we determined which managerial incentive type is optimal for owners. In Chapter 6, we contributed extensively to the literature by investigating the impact of managerial incentives systems on international trade, tariffs and welfare gains from trade. Therefore, this dissertation does not only verify (or review) existent findings, but also completes the gaps of the literature especially with respect to the different marginal costs. It proposes a new managerial incentive type. It also fills the gaps with respect to the relationship between tariffs, welfare and strategic delegation. As a consequence, this thesis presents many new and innovative findings.

Once I described the possible valorization plans for the results of this thesis, how to implement and schedule these plans are natural questions. The answers differ depending on the valorization plan. As it is elaborated above, one valorization plan is to create strategies and policies for business, companies and governments based on the theoretical results of this thesis. For this, aside from the theoretical approach, verifying (testing) the possible strategies by empirical analysis could be useful. Companies publicly disclose the managerial remunerations schemes (with amounts) in their annual proxy statements. These proxy statements are already available to everyone via Internet. However, the collection of other types of data to do empirical analysis could require some cost. Since these proxy statements and other data about companies are generally published yearly,

---

the schedule of the implementation of this type of valorization plan could take a year. Another valorization plan is to test the theoretical results by experimental economists. Setting experiments and analysing the data could take cost and time. The last valorization plan is the implementation of technical methods (proposed in this thesis) by other game theorists. For this, there is no specific cost or scheduling involved.

Of course, this dissertation explores managerial remuneration schemes and their impact on business, market, social welfare and international trade by using game theory. It would be interesting to see the extensions, applications and empirical implication of this research.