

Making the right decisions?

- A Game Theoretical Analyse of the decision-making in the
WTO Dispute Settlement

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Abstract

This theory testing study investigates the decision-making of the member states in the Dispute Settlement Body of the WTO, using a game theoretical approach. Game theory has its origins in political philosophy and can thus be valuable when analysing the behaviour of states in international regimes. Through using the specific game theory model *Stag Hunt*, this study aims to examine if such a model can be used to explain the behaviour of states in dispute settlement situations, if there is a difference in strategies between the member states depending on their economic status and if there is a difference in strategies between member states before and after the Great Recession of 2008-2009.

To answer this, a quantitative analysis of the disputes is first made, to which a game theoretic model later is applied. When analysing the implications of the model on the dispute settlement, it is concluded that using the Stag Hunt game, many segments of the strategies of the member states can be explained using the model. However, there is a need for further development of the model to give a more complete and fair image of the states' strategies in dispute settlement situations. The result from the study also shows that there is a difference in behaviour depending on the economic status of the countries. However, there is no shown change in behaviour by the states after the financial crisis.

Keywords: WTO, Dispute Settlement, Game Theory, Stag Hunt, Great Recession

Number of words: 9999

List of Abbreviations

DSB	Dispute Settlement Body
DSM	Dispute Settlement Mechanism
DSS	Dispute Settlement System
GATT	General Agreement on Tariffs and Trade
GNI	Gross National Income
HIE	High Income Economies
LIE	Low Income Economies
LMI	Lower Middle Income Economies
NE	Nash Equilibrium
PD	Prisoner's Dilemma
SH	Stag Hunt
UMI	Upper Middle Income Economies
WTO	World Trade Organization

List of Tables and Figures

Table 1. Stag Hunt	14
Table 2. Prisoner's Dilemma.....	14
Figure 1. Extensive form of Prisoner's Dilemma and Stag Hunt.....	15
Table 3. Summation of disputes.....	17
Figure 2. Evolvement of disputes by complainant, 1995-2012	18
Figure 3. Evolvement of disputes by respondent, 1995-2012	18
Table 4. Status of cases	19
Table 5. Status of cases divided by income of the countries.....	19
Table 6. Status of reports from approved panel	20
Table 7. Appeal to Appellate Body.....	20
Table 8. Compliance of present cases.....	21
Figure 4. Reduced game of the dispute settlement.....	22
Table 9. Strategic Form.....	24
Figure 5. Dispute Settlement System.....	33
Table 10. Dispute Settlement Cases.....	34
Table 12. Extended status of dispute cases.....	39
Figure 6. Extensive game theory applied of the dispute settlement.....	40

Table of Contents

1	INTRODUCTION.....	1
1.1	RELATED LITERATURE	2
1.2	AIM AND PURPOSE.....	3
1.3	RESEARCH QUESTION.....	3
1.4	MATERIAL	4
1.5	LIMITATIONS	4
1.5.1	Definition of Country.....	5
1.6	METHOD AND MATERIAL	6
1.7	OUTLINE OF THE STUDY.....	6
2	BACKGROUND	7
2.1	WTO	7
2.2	DISPUTE SETTLEMENT.....	7
2.2.1	Proceeding of Dispute Settlement.....	8
2.3	DISPUTE SETTLEMENT AND THE GREAT RECESSION.....	9
3	THEORY	10
3.1	GAME THEORY	10
3.1.1	Game Theory and Utility	11
3.1.2	Game Theory and Rationality.....	11
3.1.3	Criticism of Game Theory	12
4	METHOD.....	13
4.1	GAME THEORY AND WTO'S DISPUTE SETTLEMENT	13
4.1.1	Strategic Form of the Games	14
4.1.2	Extensive Form of the Games.....	15
4.1.3	The use of Stag Hunt versus Prisoner's Dilemma on the DSM.....	16
5	ANALYSIS.....	17
5.1	STATISTICAL ANALYSIS OF THE DSM.....	17
5.2	APPLICATION OF THE EXTENSIVE GAME-SETTING	21
5.3	SIMPLIFICATION OF THE EXTENSIVE GAME	21
	Backward induction: first node	22
5.3.1	22
5.3.2	Backward induction: second node	23
5.3.3	Backward induction: third node.....	23
5.3.4	Strategic form and Nash equilibrium	24
6	RESULTS AND IMPLICATIONS.....	25
6.1	THE EFFECT OF BEING A LOWER-INCOME ECONOMY	25
6.2	PANEL REPORT	26
6.3	POSSIBLE OUTCOME.....	27
6.4	STAG HUNT IMPLICATIONS.....	27
7	CONCLUSION.....	28
8	REFERENCES.....	29

APPENDIX A 33
APPENDIX B..... 34
APPENDIX C 39
APPENDIX D 40

1 Introduction

In political and economic theories there has been considerable progress in trying to explain why sovereign states choose to cooperate in areas such as trade, war and in creating economic and social development. The threat of reprisal by an aggrieved actor still maintains the initial balance of concessions and prevents opportunism (Hoffman & Graham, 2009). However, most of the trade agreements nowadays contain provisions of dispute settlement, where the most well-known is *Dispute Settlement Mechanism* (DSM) in the World Trade Organizations (WTO). The DSM is often referred to as the centrepiece of the multilateral trading system and an important tool for limiting trade barriers between member states (Keck & Schropp, 2007).

During previous international economic crises, domestic pressure on governments for protectionism increased in order to maintain national economic growth. These measures often led to high trade barriers and import antagonism between countries, making the global economic market worse off than before (Tadelis, 2013). At the outbreak of the Great Recession in 2008, also known as the financial crisis, many therefore feared a new era of protectionism with high trade barriers and a dismantled WTO and dispute settlement.

Because of the mutual advantages of free trade, states would be better off if the barriers were eliminated (Axelrod, 1984; Milner, 2004; OECD, 2014; WTO E, 2014; IMF, 1996). But if either state were to unilaterally eliminate its barriers, it would find itself facing terms of trade that would hurt its own economy. In fact, whatever one state does, the other state is better off retaining its own trade barriers. Therefore, the problem is that each state has an incentive to retain its trade barriers and increase protectionism, leading to a non-functioning WTO and a worse outcome than would have been possible had both states cooperated (Love & Lattimore, 2009; Hoekman, 2012; Nash & Mitchell, 2005).

An appropriate theory in explaining this problem within international cooperation would be through using the game theory *Stag Hunt*. In Stag Hunt individuals face immediate rewards but with smaller gains through defecting from the group while cooperation leads to larger gains for the entire group.

Through analysing the DSM in the WTO through the game theoretical approach of *Stag Hunt*, the aim of this thesis is hence to try to contribute in providing a greater and deeper understanding of the decisions made by the member states in the WTO's Dispute Settlement Mechanism. Analysing the disputes cases from 1995-2012, this study further aims to investigate if there are any differences in behaviour depending on income of the member states in the DSM, before and after the Great Recession.

1.1 Related Literature

Many scholars have written about the link between international regimes and states' responses to crises, where the key work is that of Gourevitch. In his text he presented a framework of how states respond in crisis, which is most applicable in current financial crisis (Gourevitch, 1986).

More recent academic literature has also started to explore the political and economical motivations for international trade (Gould & Woodbridge, 1998; Sevilla, 1998). With the creation of the WTO and the dispute settlement process, a wider focus has in academic literature been given to the political and economical strategies made in international regimes. During the last 10 to 15 years, the behaviour of states has been a subject of interest in both political and economic science; hence, there are a number of empirical studies that deals with somewhat related issues to the dispute settlements in the WTO. During the past few years, Leither and Lester have presented yearly statistical analysis of the WTO dispute settlement. They present, in brief, summarized data and examine which countries who have submitted the largest number of complaints and how the decisions are made regarding the complaints they are party to (Leitner & Lester, 2012). In 2005 scholars studied if the outcomes of the dispute settlement in WTO were biased or not, and how this would affect the future outcome for the role of the WTO dispute settlement (Horn, Mavridos, & Nordström, 2005). In another study, the enforcement of the dispute settlement was seen as excessive when liberal trade has become the subject of interest for all members, and will thus in the future lead to full compliance in disputes by all states (Pauwelyn, 2008). Moonhawk on the other hand, argues that countries with greater economic capacity are more likely to utilize dispute settlement in the WTO than developing countries, and that the transformation of the WTO has mostly benefited developing countries (Moonhawk, 2008). In 2004, Narlikar and Odell investigated how strategic choices are made by developing countries in multilateral negotiation processes and showed through a game theoretic approach how a developing country coalition will gain less when having a strict distributive strategy in trade negotiations (Narlikar & Odell, 2006). Rose also found that states that joined the WTO does not exhibit particularly different trade patterns after joining the WTO, nor are they more liberal with respect to protectionist measures than non WTO members (Rose, 2004). This therefore challenges WTO's impact on the increasing trade flows, and also the welfare of its member states according to Grinols and Perrelli (2005).

In the master's thesis *Rules of the game* from 2008, Lannerberth also used a game theoretical approach in order to try to explain behaviour of the member states in the DS. Through analysing the years between 1995 and 2004 and applying a *Prisoner's Dilemma* (PG) game, the author finds that there is a *rather* strong correlation between the theoretic model and reality.

1.2 Aim and Purpose

The aim of this study is to address some of the questions raised by previous studies through investigating if the behaviour and decision-making of WTO members in the Dispute Settlement Body can be explained using the game theoretical approach of *Stag Hunt* (SH). Game theory is a useful, diverse and applicable theory that can be applied on many subjects in the range of political and social sciences (Varoufakis, 2008). The purpose of this study is therefore to, based on previous studies - especially Lannerberth (2008) - investigate if it is possible to further explain the behaviour of member states in the WTO dispute settlement by applying the theoretical model of SH on the dispute cases, and thereby strengthen the usefulness of game theory when studying international relations.

Lannerberth writes that "[a]s the outcomes of cooperative games depend on the agreements negotiated between the players it is impossible to say anything about the outcomes of such a game without knowing these agreements.[...]Because of these limitations of cooperative games, all games in the thesis are assumed to be noncooperative" (Lannerberth, 2008). However, in this thesis it will be argued that the Stag Hunt (a coordination game) is a more suitable model in explaining the Dispute Settlement. A coordination game is both a non-cooperative and a cooperative game, which means that states can face mutual gains, but only through making mutually consistent decisions. Since the negotiation in the Dispute Settlement can be seen as consistent, where the outcome of one negotiation implicates the outcome of the next negotiation between the states, a coordination game is more suitable for explaining the DSB.

Through observing a longer time period than previous studies, and hence accounting for more disputes cases, the ambition of the study is also to investigate whether there is a difference in behaviour depending on economical status of the country and if the economical and political effects of the Great Recession in 2008-2009, has effected the strategic behaviour of the member states in the DS.

1.3 Research Question

In light of previous research and the aim of this study, one main research questions and two sub-questions have been formulated. The questions have been put as follows:

- *Can the game theoretic approach of Stag Hunt further explain the behaviour of WTO members in the Dispute Settlement Mechanism?*

- *If so, is there a difference in strategic behaviour between member states depending on their GNI per capita in the Dispute Settlement?*
- *If so, is there a difference in strategic behaviour between member states before and after the Great Recession in the Dispute Settlement?*

1.4 Material

The empirical framework regarding the different disputes has been collected through reports and statistical documentation from the WTO website, where complete lists of the disputes are published. The disputes have then been put into quantitative form in the form of excel spread sheets, suitable for statistic and game theoretic analysis¹.

The study doesn't aim to compare the statistical result from this study with previous results. Instead, the statistical result will serve as a platform for answering the questions raised in this study.

The time frame of the dispute case date ranges from January 1995 to December 2012. The years are chosen to give a complete and accurate picture of how the settlements have been and are made in the WTO. The study has thus chosen not to include cases from 2013 or 2014. This is because the study was started before the end of 2013, which meant that some of the cases were not finished. Since this study aims to show an accurate and complete picture of how many disputes that have taken place during the years, the cases from 2013 and onwards are excluded.

All states that were or became members of the WTO during the chosen period are included in this study. In total, the disputes from 1995 to 2012 amount to 454 cases².

1.5 Limitations

There are some limitations to both the material and the analysis applied in this study. The first limitation concerning the material has its origin in the fact that the available information regarding the disputes are not as detailed as one would have wished, and hence a more complete picture of the strategies in the dispute settlement is not available.

¹ Some of the spreadsheet is shown in appendix B, table 10 and 11

² For further information regarding the distribution of the cases between the years 1995-2012, se appendix B.

Some of the larger economies, such as China and Russia, did not join the WTO until recently. Therefore, there can also be a somewhat incorrect image as to which countries are the most active in the disputes. Using a long time period in this study, the aim is to minimize these incorrect images of the countries involved in disputes. To continue to analyze the involvement of members' participation would hence be of great interest in order to truly capture the essence of the activities in the disputes.

Through not analyzing the countries solely by themselves and instead in groups of income, the aim is to give an indication of which type of country from which income group that are the most active in the dispute settlement in the WTO.

It is my belief that the limitations and choices made in the material will not affect the result of the study.

1.5.1 Definition of Country

The WTO has no specific classification of member states depending on income or development level. Instead, member states announce themselves whether they are developed or developing countries (WTO B, 2014). Since being a developing country in WTO brings certain special rights, some countries choose to label themselves as such, even though it could be strongly questioned (Kasteng, Karlsson, & Lindberg, 2004). To be able to analyse how the economic status of the countries affects their behaviour in the DSB, the different countries have in this study been divided into four income categories: "low income economies" (LIE), "lower middle income economies" (LMI), "upper middle income economies" (UMI) and "high income economies" (HIE). The division is made by the World Bank, and uses GNI per capita, calculated using the World Bank Atlas method³, as an indicator of division. The different income groups that the World Bank use are: low income, \$1,035 or less; lower middle income, \$1,036-4,085; upper middle income, \$4,086-\$12,615; and high income, \$12,616 or more (The World Bank, 2014). Using the definition from the World Bank contributes to give a clear and comprehensive image of the economic situation in the different countries and can hopefully provide a useful clarification to why the states act as they do in the DSM.

The World Bank's group division of income is however not a completely unquestioned method. Using the division by income, important issues such as inequality, human development, social exclusion, and government capacity are ignored which are just as important factors as GNI per capita when it comes to measuring the development status of a country. The cut-off points can also be questioned, since countries with an income of \$4,085 on average will be seen as lower middle income countries, while having average income of \$4,090 makes

³ For further information regarding the World Bank Atlas method see: <http://data.worldbank.org/about/country-classifications/world-bank-atlas-method>

the country a upper middle income. Even though the differences in income are small, the different group division has a major impact in the classification of the country and its political and economical situation.

However, the use of this classification does not imply a judgement concerning the development conditions of any country, which earlier classifications has made, and in this study it serves as a useful way of summarizing trends across a wide range of development indicators.

In summary, this study will use the four different groups as created by the World Bank. However, in some parts of the study the two lowest income groups will be combined and the two higher income groups will be combined in order to give a more comprehensive image of the disputes through reducing the amount of actors.

1.6 Method and Material

This study can be considered theory-testing, meaning that game theory will be applied on the material to see if it can explain the decision-making in the dispute settlement of the WTO or not. By using a statistical approach with a large set of cases, the study can test if the cases can be explained through the chosen theory and thus give the theory empirical support (Esaiasson, Gilljam, Oscarsson, & Wängnerud, 2009).

1.7 Outline of the study

The remainder of the thesis is structured as follows: part two will provide a background of WTO and its dispute settlement system. In the third part, game theory will be presented in order to serve as the theoretical framework. The fourth part describes the methodology, where the extensive and strategic form of game theory is showed and how it applies to decision-making. In the fifth part, the analyses will be conducted by presenting a statistical analysis of the dispute settlement cases and then an application of the extensive game on the settlement. In the sixth and seventh part results, implications and a conclusion will be made.

2 Background

In order to understand the dispute settlement in the World Trade Organization works and how it relates to game theory, a shorter background of the WTO and the dispute settlement will be presented in this chapter.

2.1 WTO

The World Trade Organization (WTO) is a multilateral organization for trade liberalization. It has its origin in the 1986-94 negotiations of the *Uruguay Round* and the earlier negotiations under the *General Agreement on Tariffs and Trade* (GATT). The GATT was a trade liberalization agreement developed from the Bretton Woods agreement in 1947. WTO's overarching purpose is to help trade flows to move as freely as possible, since improving trade flows is an important tool for facilitating trade and hence economic growth in the increasingly interdependent global economy (Hippler Bello, 1996; Sterling-Folker, 2010). The organization is a forum for governments to negotiate trade agreements and a place for states to settle different trade disputes, giving each member state equal votes (Hippler Bello, 1996). Through agreements and negotiations, signed by the member states, the documents provide the legal framework within which international commerce happens and binds governments to keep their trade policies within agreed limits (Lee, 2011). Overall, the WTO operations are premised on the neo-liberal idea that all nations benefit from free and open trade, and it is dedicated to reducing, and ultimately eliminating, barriers to trade.

Trade relations often involve conflicting interests. To solve these differences, WTO has established dispute settlement processes for its members to solve trade disputes that may occur between the countries in order to reduce trade barriers, eliminate protectionism and increase economic development (Ritzer, 2011).

2.2 Dispute Settlement

The Dispute Settlement System (DSS) is one of the central pillars of the multilateral trading system. Without this rules-based system, the WTO would be less effective since the rules and regulation of the WTO could not be enforced upon its member states (WTO, 2013).

When a member state believes that another member state is violating WTO's agreements and regulations, making the first member state deprived of the benefits related to trade, the first member state can pursue three different strategies. The member state can either decide to not carry out any sanctions against the accused country; or the countries can try to solve the problem bilaterally; or lastly, the member state can take the conflict to WTO for problem solving. It is when the country chooses the last option, that the conflict ends up in the Dispute Settlement System.

The DSS is based on rules and the priority of the system is to settle disputes, through consultations if possible. The Dispute Settlement Body (DSB) is responsible for settling the disputes and consists of all the WTO members. The DSB monitors the implementation of rulings and recommendation, and has the power to authorize relation when a state does not comply with the rulings (WTO, 2013).

2.2.1 Proceeding of Dispute Settlement

The rules and proceeding of the DSS can be summarized in the following steps:

1. When the complaint is made to the WTO, the disputing parties first have to meet in order to see if it is possible to solve the conflict through consultation and mediation.
2. If the consultation fails, the second step is for the DSB to appoint and establish a panel, which consists of three trade policy experts. The panel has then six months to hear the disputing parties, examine the case and come to a conclusion. The conclusions are published in a report, which specifies if and in what ways the accused member state has violated the WTO agreements or not.
3. Both parties can appeal the report from the panel if they believe that the interpretation by the panel of the relevant agreements is incorrect. If the report is not appealed, three of the seven permanent members of the Appellate Body have 90 days to examine the case and verify if the panel report is correctly made. The decisions of the Appellate Body are published in a new report.
4. If the responding member state is found guilty, the country is recommended to correct the measures, which is determined by the DSB. If the complainant is not satisfied with the outcome, the state can either choose to report to DSB again (which means that the issue will be treated in the same way as the original complaint in step 2); or the state can pledge the Appellate Body of permission to start retaliation measures against the respondent. If the complaint is approved, the complainant is supposed to be compensated⁴.

⁴ Illustrating image of the panel process is presented in Appendix A

2.3 Dispute Settlement and the Great Recession

The Great Recession hit the global economy in 2008, making trade flows collapse across all the regions of the world while increasing the uncertainty regarding trade policies on the global market (Bown, 2011). Strong economic interdependence between countries meant that the crisis instantly became a global problem and hence an important problem for the WTO to cope with (Meunier, 2009). During the crisis WTO has allowed member states to apply temporary trade barriers if certain conditions are met, which has served as an important part in upholding the free trade regime and avoiding protectionism in the time of crisis.

However, as there are always winners under such a regime like WTO, there are also losers. In recent years, the biggest criticism towards the WTO has been that due to the economic recession, more and more countries have gradually introduced more protectionist measures, which often have hit the most vulnerable countries, without receiving major implications from the WTO.

3 THEORY

This chapter will present a general theoretical background on game theory, how it emerged and how it can be used to explain the decision-making in the dispute settlement.

3.1 Game Theory

The behaviour and interactions among individuals, organizations or states are often complex in their nature. Many scholars have studied the ways in which individuals, or *agents*, interact strategically using game theory, since it highlights the cooperative difficulties of these agents. Game theory can be seen as a subcategory to *Rational Choice Theory* since they share the same positivistic view of the state of the world, or rather, game theory can be seen as the application of rational decision theory (Binmore, 2009). Traditional game theory proceeds from strong assumptions about human rationality in order to make strong conclusions about the nature of equilibrium (McCain, 2009). The field of game theory first received attention through the book *Theory of Games and Economic Behaviour* in 1944 by Neumann and Morgenstern and throughout the years many different evolutions of these theories have developed. Game theory can be used to analyse strategic interactions between individuals when making decisions, in order to either predict or explain the actions of the agents involved and can be used to explain how effective sanctions are in international relations (Fink, Gates, & Humes, 1998). In game theory, the agents' rewards, or pay-offs, when committing different strategies are shown in payoff-matrices with columns and rows denoting different choices (Dodge, 2012).

Since the 1940s several different game theories have evolved. The most well-known game is the non-cooperative game Prisoner's Dilemma, where agents act with deliberate secrecy and distrust one another and choose to not cooperate.

In cooperative game theory, the agents can form coalitions and thus choose to either cooperate or defect, together. When a coalition can be formed, the expectation is that by working together and choosing a joint strategy they will improve the overall outcome. The advantages of using game theoretic tools when conducting studies on decision making, is that it effectively isolates real world phenomena to simple models that can be thoroughly analysed. Scholars have then discovered that iteration makes actors less likely to defect from cooperative arrangements than actors engaged in one-shot relationship (Marrow, 1994). The recurrent ability for international institutions to exchange

information, as well as monitor state behaviour, reduces concerns over actual intentions and the consequence of being cheated by constant and regular meetings.

3.1.1 Game Theory and Utility

In game theory, international cooperation has a state-centric perspective, which considers the state to be a unitary, rational and utility-maximizing actor. Utility can be defined as preferences or the payoffs when making different decisions. These preferences can be seen as explaining the economic behaviour or motive of the states or other agents (Varian, 2006; Feltonovich, Iwasaki, & Oda, 2012). The utilities can be assigned values, which thereby can be ranked by the value of preference. To describe the value of the different decisions, a *utility function* can be made. If the outcomes of the decisions are uncertain, the states must take different probabilities into account. An example of this function is when the utility (u) of a certain decision (d) can be seen as a function of the different outcomes (x) times the probability (p) of the different outcome. This can be shown by the following equation 1 and through the summation of the decisions in equation 2.

$$(1) \quad u(d) = p_1 \times x_1 + p_2 \times x_2 + \dots p_n \times x_n$$

$$(2) \quad u(d) = \sum(p_i \times x_i)$$

3.1.2 Game Theory and Rationality

In game theory, agents, or in this case states, can be assumed to make its decisions based on rational self-interest in consistency with strategic cost-benefit analysis of possible choices and outcomes (Sterling-Folker, 2010). In a study made by Hasenclever, Mayer and Rittberg (1997), rationality of states is defined as making “consistent, ordered preferences, and that they [states] calculate costs and benefits of alternative courses of action in order to maximize their utility in view of those preferences. Egoism means then that their utility functions are independent of one another: they do not gain or lose utility simply because of the gains or losses of others” (Hasenclever, Mayer, & Rittberg, 1997, s. 29)

This clarification can be used in illustrating the fundamental motives as regards to why states want to establish cooperation and international regimes (Keohane, 1984). However, cooperation of states is not always easy to achieve. States may fail to cooperate because they lack information about another state’s true preference. States may also fear that others will take advantage of a cooperative arrangement by cheating or that others will free ride on their cooperative efforts. Therefore, even when all actors share the same interests and would gain from a cooperative effort, there are still significant barriers to the

ability of self-interested states to cooperate. Since states cannot trust the future intentions of their cooperative partners, states will avoid potential agreements if they involve different potential pay-off levels (ibid). Using a game-theoretical model to explain the main reasoning behind cooperation and defection can therefore prove useful.

3.1.3 Criticism of Game Theory

The criticism most often presented against the use of game theory is that the real world is far more complex than what is explained in the game theoretic models and can hence paint a narrow picture of the world. Other scholars also argue that the assumptions made in game theory are often not relevant in empirical studies. The theory is also based on rationality, which means that the actors will always act to individual gain as much as possible in every situation, regardless of how it affects others. This assumption can be questioned, since empirical studies shows that policy makers often don't make the "rational" decisions that are a prerequisite in game theory (Fors, 1997). There are constant difficulties to using game theory in that the modelling is defining, limiting and isolating for almost all set of factors and variables that influence the strategic outcome. When conducting a study, there will always be factors that cannot be accounted for. Using a game theoretic model in the study, important aspects may be excluded which can impact the result.

However, game theory contributes to political science, since it lets scholars focus on specific events and certain aspects, and can be a useful tool when studying subjects such as cooperation, trust or trade.

4 Method

In this chapter the methodology of game theory will be discussed, explaining the theory-testing approach of the paper and motivating the theory and case selection further.

4.1 Game Theory and WTO's Dispute Settlement

In Jean-Jacque Rousseau's *Discourse on the origin and foundations of inequality among men* from 1755, the story behind the stag hunt game is given:

If a group of hunters set out to take a stag, they are fully aware that they would all have to remain faithfully at their posts in order to succeed; but if a hare happens to pass near one of them, there can be no doubt that he pursued it without qualm, and that once he had caught his pray, he cared very little whether or not he had made his companions miss theirs (Stirling, 2012, s. 190).

Despite the collective benefits that can be obtained by removing trade barriers and liberalising trade, coordinating trade liberalization can be relatively difficult to achieve and maintain. There are often domestic producers that pressure governments for protectionism. A form of game theory that can explain these difficulties is the game *Stag Hunt* which describes a conflict between safety and social cooperation (Osborne, 2004). In the original game, which was presented by Rousseau in the quote above, hunters must cooperate in order to provide stag that would contribute considerable gains for all of them. However, any individual hunter may be tempted to defect by unilaterally pursuing a rabbit, which will cause the stag hunt to fail. By defecting, the hunter will be provided with immediate gains, but ultimately short-lived and comparatively smaller gains (Skyrms, 2009).

In trade liberalization, the same theory can be applied since all participants can obtain comparatively greater aggregate gains if they reduce barriers to trade, yet in the face of immediate domestic pressure, a state can be tempted to resort to protectionism. By pursuing the short-term interest, all states end up being economically worse off through the use of protectionism (Gates & Humes, 1997).

Since the creation of the WTO, the organization has served as the primary international institution through which the normative and behavioural expectations of global free trade has been extended and affirmed, and thus it should be possible to apply the game theoretical framework of Stag Hunt to the dispute settlement.

4.1.1 Strategic Form of the Games

To illustrate the Stag Hunt (SH) game further, the table below shows the strategic form of the game in a payoff matrix. A strategic game is a model of interacting decision-makers or *agents*. The two states in the dispute are illustrated as agent A and agent B. Each of the agents must choose an action without knowing the choice of the other.

Table 1. Stag Hunt

Stag Hunt-Game Setting

		Agent B	
		Stag (Cooperation)	Hare (Defect)
Agent A	Stag (Cooperation)	5, 5	0, 3
	Hare (Defect)	3, 0	3, 3

In the table, the number on the left in each square denotes agent A's gain in the game, whereas the number on the right denotes agent B's gain.

Assuming that agents are rational actors, it is possible to investigate their different strategies. If the agents are well informed and rational, they will make their decision so as to try to maximize their own gain in the SH. This means that they will not only make the choice that maximizes their profit, but also make the choice which maximize their profit depending on what they believe will be their counterparts' choice. This type of strategy is called a *Nash equilibrium*, and means that neither agent has a unilateral incentive to change his/her strategy.

The widely known *Prisoner's Dilemma* (PD) game that previous studies have used, is a non-cooperative game where the agents will choose not to cooperate and hence only have one Nash-equilibrium; when both agent defect.

Table 2. Prisoner's Dilemma

Prisoner's Dilemma Setting

		Agent B	
		Cooperate	Defect
Agent A	Cooperate	3, 3	0, 5
	Defect	5, 0	1, 1

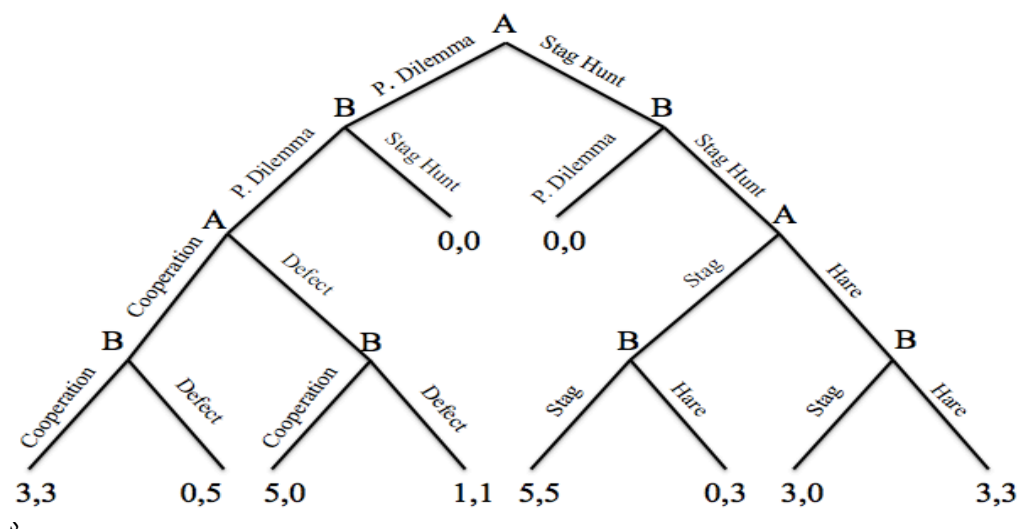
The SH game thus differs from the PD in that there are two Nash equilibriums; when both players cooperate and when both players defect (*stag, stag*) and (*hare, hare*). Hunting stag appears to be a possible outcome since both would be worse off defecting and hunting hare, but if both agents believe that the other agent will hunt hare and thus defect, each is better off hunting hare (Fudenberg & Tirole, 1993).

To see why, the situation of agent A is described. If agent B chooses to cooperate, agent A will cooperate since 5 is better than 3. If agent B chooses to defect, agent A is also better off to defect than cooperate since 3 is better than 0 (Varian, 2006, pp. 504-518); there are hence two *Nash equilibrium* (NE). This type of game is usually defined as an assurance game or coordination game. Another useful concept is *Pareto efficiency*, which defines a situation where no actor can be made better off without making someone else worse off. In Stag Hunt, the preferences of *stag-stag* is Pareto efficient but the *hare-hare* preferences can be considered as being *risk efficient* (Rajko, 2012) since when choosing hare (or when states choose protectionism), there is no risk of being left with nothing, which is the case when choosing stag (or not implementing trade barriers when everyone else have implemented them). In the PD setting above, there is one Pareto efficient allocation: when both actors choose to cooperate. If both players cooperate, no player can be made better off without making the other actor worse off (Varian, 2006 p. 15). Therefore, even though both players would be better off cooperating, as rational actors they would instead choose to defect; thus ending up in a Pareto inefficient allocation.

4.1.2 Extensive Form of the Games

In its extensive form, the different choices are formed into a game tree. In figure 1 the two games; PD and SH have been combined into one large extensive game in order to compare the two games and their outcome. Each new tip of the line is a *node* where a player can make different choices. When a game is finished, the payoff of the strategies is shown below. The extensive game setting is very similar between the two games and hence the only difference is the outcome; i.e. two NE in the SH and one NE in the PD.

Figure 1. Extensive form of Prisoner's Dilemma and Stag Hunt



source: own illustration

4.1.3 The use of Stag Hunt versus Prisoner's Dilemma on the DSM

The fundamental role of the dispute settlement in the WTO is to facilitate and support trade liberalization and cooperation between member states. In order to analyse the behaviour of the member states, it is thus of importance to use a suitable game theory model that captures all the aspects of the dispute settlement.

The most widely used game model for analysing the nature of state behaviour is the PD. Through using a PD game analysis, it can be seen as if the member states always will favour protectionism or other measures that states view as favourable for their own self-interest through the concerns for relative gains (Powell, 1991). Countries prefer to limit other states' access to their own markets while attaining unrestricted access to trading partners. In the game setting of the PD, states have a dominant strategy to defect, so cooperation fails and the potential gains from international trade are lost. Liberal trade would only be achieved if a mutual agreement were made with an outcome that would be best for both of the member states. This would thus imply a strong enforcement mechanism, as there would be member states tempted to defect from the agreements.

However, if member states instead saw liberal trade as in both of their interests, the use of a PD game would not be suitable for explaining the dispute settlement in the WTO, but rather a Stag Hunt game. In a coordination game such as the SH, states share a common interest in coordinating their activities (McAdams, 2008). In the SH all states realize that liberal trade is in their own interest and hence, in game theoretical terms, this implies that hunting a stag together would be more beneficial than defecting and hunting a hare. In this situation, cooperation between the states would also be easier to achieve, since they would be able to assure each other through the absolute gains from the liberal trade.

Even though PD is widely known and cited, the cooperative outcome in SH might be seen as providing a better model for situations where cooperation is difficult but still possible (Kuhn, 2014). Hence, SH are more suitable for explaining the trade disputes in the DSB and can be considered as being more realistic and helpful in understanding international regimes.

5 Analysis

To be able to conduct a thorough investigation of how well the game theoretical framework applies on the dispute settlement, a brief statistical analysis is made on the DSM, followed by an application of an extensive game.

5.1 Statistical analysis of the DSM

In table 3, a summation of the disputes in the WTO, between 1995-2012, is displayed⁵. As can be seen in the table, only 38% of all the member states have taken part in the disputes during this period. Only 0,2% of the low-income economies participated in a dispute, while between 38-50 % of the other income group countries participated. This shows that there is a strong correlation between the income of the country and participation in the dispute settlement. As can be seen in appendix B, countries such as United States represent 25 % of the complainants and 31% in the respondent cases in the disputes. Not far behind comes the EU, while most of the low-income economies never have participated as neither complainants nor respondents. The statistics is however somewhat irregular. The EU acts as a joint actor for the EU member states in the WTO, but before many European countries joined the EU they participated in the dispute settlement as single countries. The entire activeness of European states is hence not completely captured by the EU, making EU look less active in the dispute settlement than what is actually the case.

Table 3. Summation of disputes

	All countries	LIE	LME	MHI	HIE
Number of member states	159	27	37	37	58
Participated in a least one dispute	38 %	0,2%	38%	40,5%	50%
Participated as complainant	28%	0,2%	35%	38%	31%
Participated as respondent	29%	0	24%	38%	41%
Participated as both complainant and respondent	19%	0	19%	35%	19%

Source: WTO, Dispute Settlement, 1995 to 2012

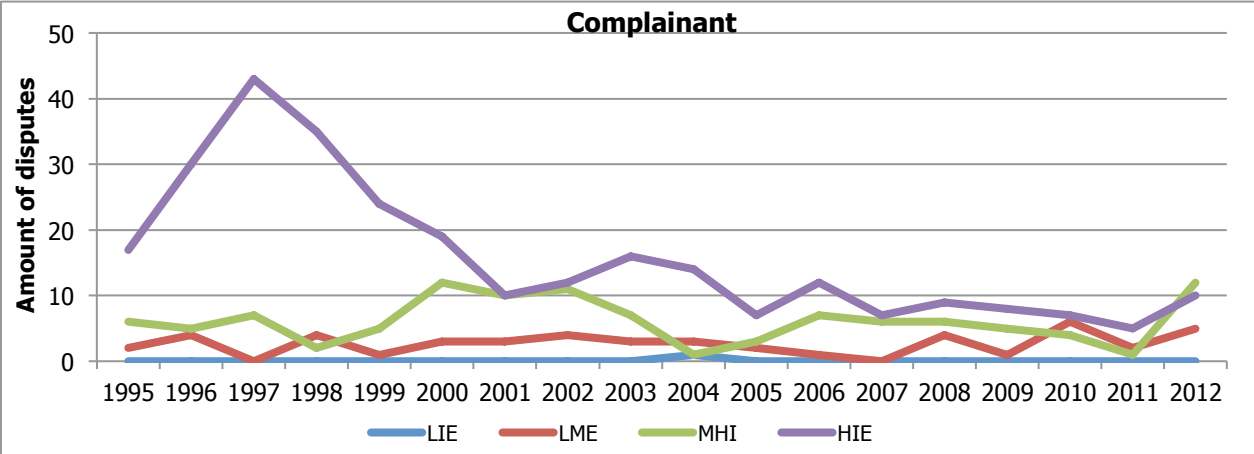
Figure 2 and 3 shows the evolvement of the dispute cases in the DSB from 1995 to 2012. During these years, WTO has gone from 112 member states to 157 where most

⁵ For a more detailed image of the member states participation in the dispute settlement, see appendix B.

of the new members come from lower income groups. The figures show an overall low participation of the LIE group throughout the years. During the beginning of the observed period, high-income economies were dominant in the dispute settlement, as both complainant and respondent. Over the years the number of disputes has evened out between the different groups. The participation of low-income economies still remains low as both complainant and respondent. During recent years, however, an increased amount of participants has been seen from lower-middle and upper-middle income economies.

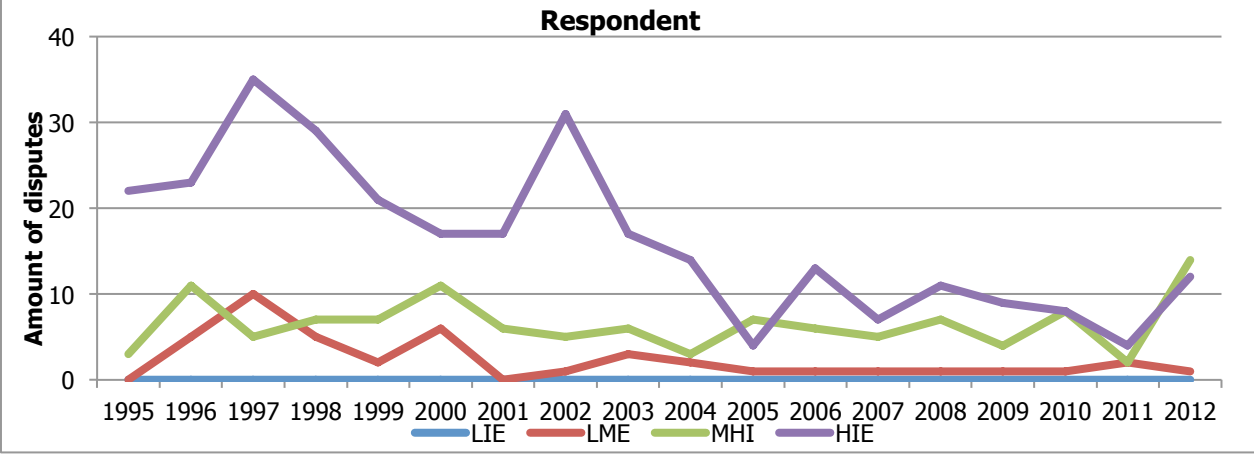
There are few effects from the Great Recession that can be deduced on the amount of disputes. There is a decrease in the number of disputes among the high-income countries, at the beginning of the recession. However, it is difficult to determine whether this is an effect of the economic crisis or the effect of a longer downward trend in number of disputes. With the slow recovery of the economies in 2011 and 2012, the number of disputes seems however to be rising in number.

Figure 2. Evolvement of disputes by complainant, 1995-2012



Source: WTO, Dispute Settlement, 1995 to 2012

Figure 3. Evolvement of disputes by respondent, 1995-2012



Source: WTO, Dispute Settlement, 1995 to 2012

Table 4. Status of cases

	Amount	Percent
Settled cases	91	20%
No settlement, no panel	137	30%
Establishment of panel	226	50%
Total sum	454	100%

Source: WTO, Dispute Settlement, 1995 to 2012

In table 4, the status of the member states' different cases is shown.⁶ The table shows that only 20 % of all the cases in the dispute settlement are settled and can thereby be regarded as finished. Most of the cases are not settled and are still proceeding, which shows to prove that the dispute settlement is not as efficient and fast moving as one might wish.

Table 5. Status of cases divided by income of the countries

Status of Cases	Proceedings			
	Settled Cases	No settlement, no panel	Establishment of panel	Total Sum
Complainant: LIE + LMI Respondent: LIE+ LMI	0% (0)	100% (4)	0% (0)	100% (4)
Complainant: LIE + LMI Respondent: UMI+ HIE	15.5% (7)	35.5% (16)	49% (22)	100 % (45)
Complainant: UMI + HIE Respondent: UMI+ HIE	21% (76)	29% (103)	50% (181)	100% (360)
Complainant: UMI + HIE Respondent: LIE+ LMI	18% (8)	31% (14)	51% (23)	100% (45)
Total Sum	91	137	226	100%

Source: WTO, Dispute Settlement, 1995 to 2012

In table 5, one can observe if the status of the cases differ depending on the economic situation of the different countries, i.e. if there are differences in how the cases have proceeded, depending on which income group the countries involved belong to. Since there were few dispute cases from LIE and LMI countries and since the table would have been very extensive with different combinations of few cases, the table combines the two lower income groups as well as the HIE and MHI groups together for easier comparison. The numbers in brackets are the actual number of cases. The table shows a higher probability of settled cases if the state was high and upper-middle income country, than if the complaint was made by a low and lower-middle income economy. What is also shown in the table is that when the lower income group is making the complaint,

⁶ A more detailed summarize of the procedures of the member states cases are presented in Appendix C.

there is a great risk of the case to be faced with no settlement, or at the best, an establishment of a panel. In most cases the income group will face no settlement in their disputes.

In those cases where a panel is established, a report should be made where the panel's conclusions regarding the case are made. In table 6 the panel's judgements of the cases are shown. In 226 cases where a panel was established, most of the reports (81%) were approved. If "not yet a report" had been eliminated from the table, the approved reports would have been accounted for 85 % of the cases, which show that if a report is made, it is likely to be approved.

Table 6. Status of reports from approved panel

	Amount	Percentage
Approved	182	81%
Dismissed	32	14%
Not yet a report	12	5%
Total Sum	226	100%

Source: WTO, 2012

When reports are made either approving or dismissing the disputes, both parties can appeal the case to the Appellate Body. In table 7, it is shown that respondent appeals when the report has approved the dispute and the complainant appeals when the case has been dismissed.

Table 7. Appeal to Appellate Body

		Appeal to Appellate Body				Total
		No Appeal	Complainant Appeal	Respondent Appeal	Appeal by both parts	
Judgment of case	Approved	71	8	102	1	182
	Dismissed	13	19	0	0	32
Total		84	27	102	1	214

Source: WTO, 2012; WTO D, 2014

If the respondent is found guilty after the report(s), the DSB stipulates that the member state has to comply with the ruling. In article 21 in the rules of membership in the WTO, it is written that "[p]rompt compliance with recommendations or rulings of the DSB is essential in order to ensure effective resolution of disputes to the benefit of all Members" (WTO A, 2014). For the first ten years, the DSB had a compliance rate of 83 % (Dewey, 2009), however, when analysing the status of present cases, it shows that half of the present cases can be seen as being complied to.

Table 8. Compliance of present cases

	Amount	Percentage
Compliance	28	53%
Non-compliance	25	47%
Total	53	100%

Source: WTO, 2012

5.2 Application of the extensive game-setting

The entire extensive game applied on the DSB is shown in appendix D, figure 5 and shows a similar setting to that which was presented in Lannerberths study.

In figure 5, the complainant's (C) payoff is first shown in the brackets to the left. From the beginning complainant's costs for disputing will be zero when not choosing to proceed. The only cost that C will face will be c , the economic impact of the respondent (R)'s trade measures. R's, however, will have a payoff of r when the complainant chooses *not* to take the trade dispute to the DSB. If C chooses to proceed with the dispute, the costs will accumulate throughout the dispute.

If the states are able to settle the dispute in the second node, the complainant will receive $c-d$, i.e. the amount demanded as compensation for the trade losses, minus the dispute costs and the respondent will "receive" $r-c-d$.

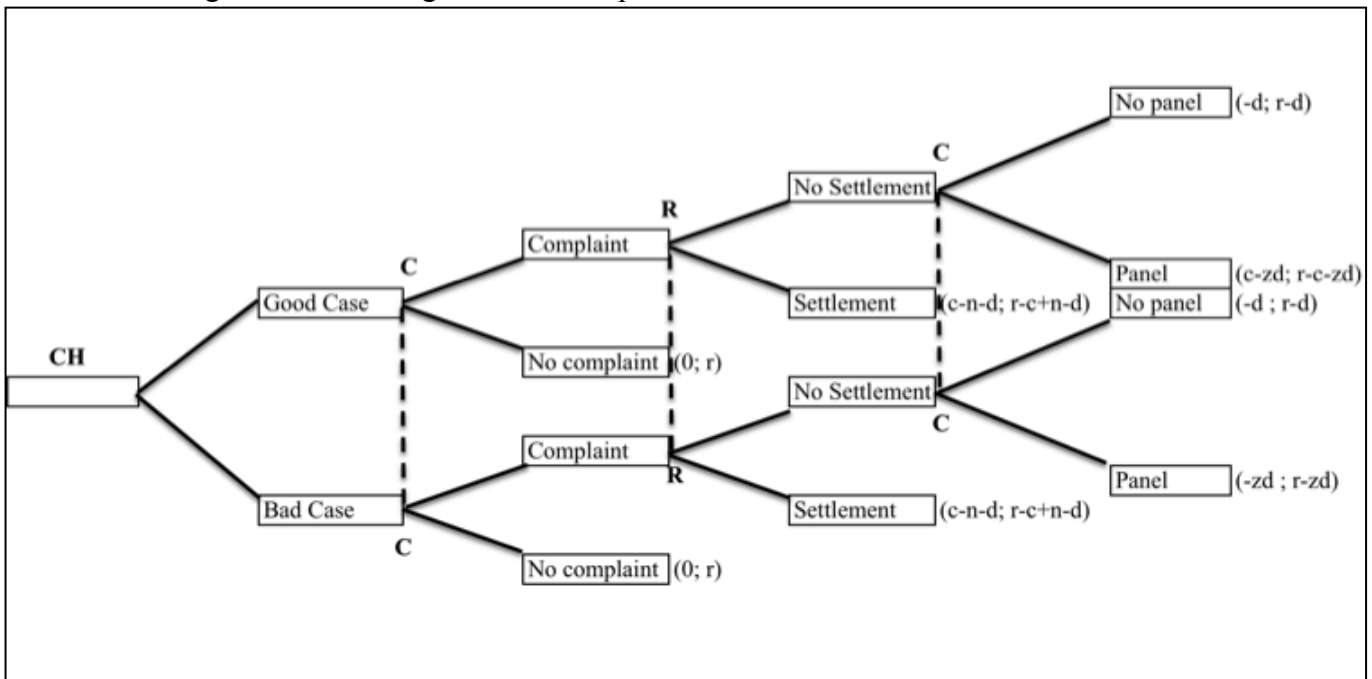
If the disputes continue to reach the panel, the agent's payoff will depend strictly on the panel's report (in some cases also the Appellate Body's report) and if the respondent is willing to comply with the verdict or not. If the respondent does not comply with the judgement made, the compliance can take three different actions; either do nothing at all, conduct counter measures against the respondent and cause negative trade effects on the respondent, or the state can conduct implementation appeals. Making an implementation appeal will certainly lead to higher dispute costs for the complainant and the process is not as clear and transparent as for previous options, and is hence associated with a greater economic risk for the complainant.

5.3 Simplification of the extensive game

As can be seen in figure 5, most of the important decisions in the DSB are made by the Panel and Appellate Body and not by the two agents (the complainant and the respondent). In order to truly understand how the agents strategically think in the decision-making, a simplification of the game will be made. Through the implementation of a *chance node* (CH), the models lets chance decide whether

the filed complainant will be accepted or not, instead of the Appellate Body or Panel. A chance node can be seen as a node that identifies an event in a decision tree where a degree of uncertainty exists, and represents at least two possible outcomes (Hammond & Zank, 2014). The chance node doesn't only reduce the agents; it can be used in order to find the utilities of the two agents in the game too (Lannerberth, 2008). In figure 4, the new reduced game can be seen where the unknown dispute costs can be summarized to zd . The broken lines in the figure symbolizes that the agent in a certain node cannot determine which of the options the agent is positioned at, i.e. if the case can be considered as being "good" or "bad", where the good implies wining the case.

Figure 4. Reduced game of the dispute settlement



Source: Own illustration, originally from Lannerberth 2008

5.3.1 Backward induction: first node

The strategic decision-making can be evaluated using backward induction, i.e. through evaluating the strategies starting from the end of the game. The complainant's different decisions can result in three different utility functions. When there is no panel established the complainants utility function is:

$$(3) \quad u(\text{no panel}) = -d$$

If however, a panel is established the outcome for the complainant may either be:

$$(4) \quad u(\text{panel}_{\text{Good case}}) = (c - zd) \text{ or}$$

$$(5) \quad u(\text{panel}_{\text{Bad case}}) = (-zd)$$

Depending if the case can be considered being a good or a bad case, comparing the utility functions with the different probabilities of the outcomes, a utility function can be made:

$$(6) \quad u(\text{panel}) = p(c - zd) + (1 - p)(-zd) = pc - pzd - zd + pzd = pc - zd$$

Supposing that the complainant is rational in its actions, the state knows that it should proceed to establish a panel if the utility for doing so is higher then not, hence if;

$$(7) \quad pc - zd > -d.$$

It can thus seem irrational for the state to choose the option of not establishing a panel, since the state would be better off not engaging in the dispute at all. When not disputing the outcome would be 0 instead of $-d$.

5.3.2 Backward induction: second node

The second node can be seen as the negotiating node. The negotiation is related to the variable n that is included in figure 6. Both agents can affect the value of variable n . In the dispute the complainant would prefer $n=0$ whereas the respondent would prefer $n=c$. In the game, the complainant will however not accept an output where $(c - n - d > pc - zd)$. This implies that the complainant will only accept a solution when $(n < c - pc + zd - d)$. The decision by the respondent will depend on which of the outputs the agent prefers; either that of a settlement or that of the establishment of a panel. If a panel is established the utility is either:

$$(8) \quad u(\text{panel}_{\text{Good case}}) = p(r - c - zd) \text{ or}$$

$$(9) \quad u(\text{panel}_{\text{Bad case}}) = (1 - p)(r - zd)$$

Hence the entire utility function for the respondent when not settling, can be seen as:

$$(10) \quad u(\text{panel}) = p(r - c - zd) + (1 - p)(r - zd) = r - pc - zd$$

The respondent will however settle when the utility for settlement is higher than establishing $(r - c + n - d > r - pc - zd)$, otherwise the respondent will choose to continue to the panel.

5.3.3 Backward induction: third node

In the first node when the complainant chooses whether the state should make a complaint or not, there are two different utility functions:

$$(11) \quad u(\text{settlement}) = c - n - d, \text{ if the respondent want to settle, or:}$$

$$(12) \quad u(\text{panel}) = pc - zd, \text{ if the respondent doesn't want to settle.}$$

If we can assume a situation of perfect information (i.e. that both states know the strategy of the other state), the choice of the complainant is fairly easy to make. If the utility function exceeds zero, the state should make the complainant and if the outcome is less than zero, the complainant should not make a complaint.

5.3.4 Strategic form and Nash equilibrium

The extensive game, which has been explained in the previous parts can also be shown in a strategic form.

Table 9. Strategic Form

		Respondent	
		Settlement (S)	No settlement (NS)
Complainant	Complaint, no panel (CNP)	$c - n - d; r - c + n - d$	$-d; r - d$
	Complaint, panel (CP)	$c - n - d; r - c + n - d$	$pc - zd; r - pc - zd$
	No complaint (NP)	$(o; r)$	$(o; r)$

In the strategic form, the NE can be found which shows the most rational strategies for both of the member states. In the table there are four NE in the decision-game.

However, what can be seen from the statistical analyses and from the models when accounting for the NE, is that it seems most likely that most of the states will choose either (CP; S) or (CP; NS).

These strategies which are shown in the strategic form are in line with the theories of Stag Hunt; since it shows that there can be more than one Nash equilibrium.

Making a complaint and then having no panel will never be rational for the complainant and hence there cannot be a NE. However, if the complainant chooses to have a panel, the respondent are willing to both choose to settle and not settle, depending on external factors and different costs. Using a Stag Hunt approach, this implies that if a settlement is less costly than other alternatives for the respondent, the state will choose to settle. But if the respondent can make a greater gain from not settling, then the state will do so. Hence, the member states have no greater value of non-cooperation. If it is possible to coordinate so that both parties maximize their own utility, then cooperation can be achieved.

6 Results and Implications

The aim of this study has been to investigate how well the Stag Hunt game can explain the decision-making in the WTO dispute settlement, if there are any differences in behaviour between income groups and if there is a difference in behaviour after the Great recession. In this part the different parts will be further investigated.

6.1 The effect of being a lower-income economy

The most significant part in the decision-making process are all the costs that are related to making a complaint in the DSB. If there wouldn't be any costs related to making a complaint, there would be no reason not to make one. It is however difficult to make good analysis regarding the decision-making, since the value of r and c are the values that are most unknown values. The value of r and c also differs from case to case, which make them difficult to analyse.

In today's disputes the complainant has to expect that the outcome from the dispute will be higher or cover the costs for making the complaint. However, the costs are not small, in fact previous studies has shown that the cost per turn in the dispute amounts to a minimum of \$500 000 (Moonhawk, 2008; Bown & Hoekman, 2005). This means that a member state must first consider if the cost of the dispute outweighs the possible trade gains in the event of winning the dispute.

The aim is for the DSB to include disputes with members from all income groups. However, a higher cost for disputes leads to fewer disputes by countries with lower GNI per capita, since high-income countries have higher amounts at stake in the disputes, they will be participating in more disputes than countries with lower income.

This claim can actually be confirmed, based on the statistical model in table 3 it can be seen that it is much more likely that HIE, MHI and LMI-countries participate in disputes than low-income economies. Even though low-income countries could afford the costs of participating in disputes, the risk of the dispute being prolonged and hence increasing in cost could be reason enough for not participating. If a low-income country would, against all odds, participate in a dispute, they would have to choose their battles with care and hence defend the case with all their means.

Table 5 shows that the highest rate of settled cases are when both the complainant and the respondent are defined as countries in the higher income groups. When the country is defined into a lower income group, the rate of settled cases is lower. The table also shows that there is a higher rate of non-settlement if the country that complains is a low-income economy and the

respondent is from an economy with a higher income. This table can thus be seen as supporting the implication of the model.

The effects of the Great Recession in the DSB are not as significant as one might have wished. Some changes in the amount of cases could be seen under the recession. However it is difficult to see if this is an effect of the financial situation or just a long-term development. During the years there has been an increase of lower-income groups disputing in the DSB and all the dispute cases has started to even out between the income groups. It is therefore difficult to state if it's the effect of lower-income groups having greater political say in the WTO after the recession or if it is due to the steadily increasing number of lower-income groups joining the WTO.

6.2 Panel report

It is first when the panel report is released that the agents know if the case can be considered as being "good" or "bad". When the agents know how the case is viewed, the utility functions of the parts can be changed in order to adapt to the new information.

As can be seen from the statistical analysis in table 6, in most situations the panel will approve the filed dispute cases. When this happens, the respondent that had chosen not to settle, since they believed that there was a chance to win the case, will make a new utility function based on the report being approved. The risk of the Appellate Body not accepting the report (p_a) can be included in the utility function.

If the respondent choses to appeal then:

$$(13) u(\text{appeal}) = p_a(r - 3d) + (1 - p_a)(r - c - 3d) = r - c - 3d - p_a c$$

or if they comply (not complying, would not be rational):

$$(14) \quad u(\text{comply}) = r - c - 2d$$

Since p_a is very small⁷, the respondent must have very strong belief in the case or the value of c must be very high, making the case worthy to challenge. When it comes to decision by the complainant in figure 6 after the Appellate Body, the utility function of the complainant can be seen as either:

$$(15) \quad u(\text{appeal}) = p_a(c - 3d) + (1 - p_a)(-3d) = p_a c - 3d$$

and if the compliant does not make an appeal:

⁷ See table 6 and 7.

$$(16) u(\text{no appeal}) = -2d$$

This implies that even though the value (p_a) is higher for the complainant⁸ there should be strong reasons why the state should appeal. What the model thus shows is that the most important decisions are made before the establishment of a panel.

6.3 Possible outcome

In the model there are some outcomes that have not been as discussed as others, such as the decision of making no settlement or no panel. In the model it is shown that these are irrational choices to make by the agents. However what can be seen from table 4, is that there is still a large amount of cases that ends up in these nodes. The game theoretic model therefore fails to explain this behavior of decision-making. It would be of great interest to further investigate why this behavior exists in the DSB even though this decision is seen as not rational when using game theory. It would also be of interest to examine if there are other game theoretic models that could possibly explain this behavior better, such as battle of sexes or other coordination games.

6.4 Stag hunt implications

The analytic result from applying the prisoners' dilemma has been similar to the result that has been presented in this study. However there are some differences between the analyses that affect the outcome of the results. In the PD model, the outcome will always be that the agents defect from cooperation. However, what the Stag Hunt shows is that the agents will either choose to totally cooperate or completely defect. Hence there are two possible outcomes of the game, rather than one in the prisoner's dilemma. Previous studies using the PD model have failed to explain that in practice, agents or states do not always choose one strict line of decision; rather, the states will optimize their decisions based on the expected outcome or utility of their decisions.

The stag hunt model sought to explain that in international relations, states are not aiming to create conflicts as their main mission. However in areas such as trade where the outcome from making large trade measures can generate huge economic benefits, the decisions will be based on maximizing the economic profit for the own state.

⁸ See also table 7.

7 Conclusion

Using a game theoretic model, this study has aimed to investigate the decision-making of member states in the WTO dispute settlement during 1995 to 2012. During this period the WTO has undergone rapid transformation and now⁹ contains 160 member states. With more countries that have to come together in different trade areas, the work of the dispute settlement has not been on a downward trend. On the contrary, the increased accession rate has made the role of the dispute settlement even more important than before. It has therefore been of great interest to investigate the behavior of the member state in the DSB, by transforming the dispute cases into statistical data suitable for quantitative and game theoretical analysis. Based on the research questions, the result of the study shows that the game theoretical model of stag hunt can be used to explain extensive parts of the decision-making in the DSB. The study also shows that there is a difference between the cases depending on the GNI per capita of countries. However, the study cannot show any direct effects of the Great Recession on the amount and distribution of cases in the DSB.

When using this statistical approach it can be problematic to make too great assumptions on the strategic decision-making, since none of the disputes has been completely reviewed in detail. Hence, it would be of interest to further analyze a smaller amount of disputes more profoundly and test if other game theories can explain the disputes better.

Another issue with using this kind of approach is that through using a game theoretic model, the only costs accounted for in the model are the costs that can be connected to actual dispute costs. However, when it comes to trade there are other factors and costs not included that can have equally large effects as the actual dispute costs, such as the long term costs related to political and economical embargo that the disputing countries can put up against each other. A resolved dispute can also lead to new disputes between the countries as acts of revenge or because of hidden political agendas; these costs are not accounted for in the game. What should be seen from this study is that by using the game theoretical model of stag hunt on the dispute settlement, the study can give a good indication on how the different member states act in the DSB. When comparing with previous studies, the implementation of Stag Hunt shows that in the DSB there is not a constant conflict or constant concern for relative gains (non-cooperation implication) between states, Rather, states tries to maximize their outcome and will chose to cooperate or defect depending on which decision contributes to the highest outcome.

⁹ October 15th, 2014 (http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm)

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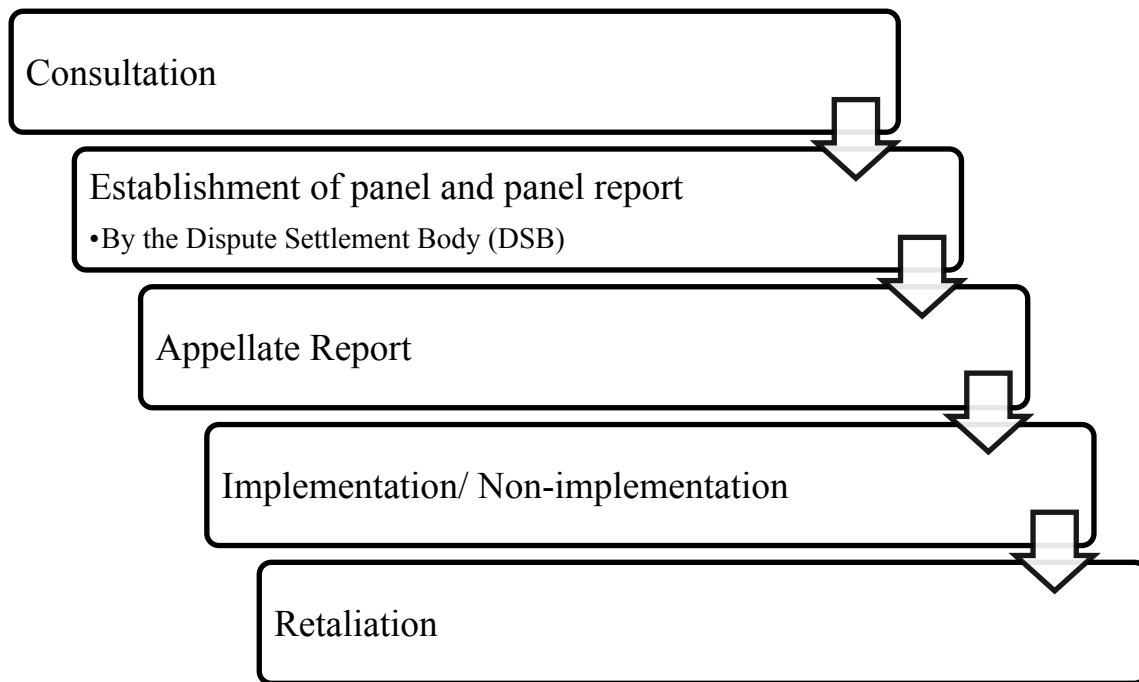
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Appendix A

Figure 5. Dispute Settlement System



Appendix B

Table 1. Dispute Settlement Cases

Year	Number of Cases
1995	25
1996	39
1997	50
1998	41
1999	30
2000	34
2001	23
2002	37
2003	26
2004	19
2005	12
2006	20
2007	13
2008	19
2009	14
2010	17
2011	8
2012	27
SUM	454

Source: WTO, Dispute Settlement, 1995 to 2012

Table 2. Dispute participation 1995 to 2012

Countries	Participated	Complainant	Respondent	Both
Low income economies				
Bangladesh	1	1		
Benin				
Burkina Faso				
Burundi				
Cambodia				
Central African Republic				
Chad				
Gambia, The				
Guinea				
Guinea-Bissau				

Haiti				
Kenya				
Kyrgyz Republic				
Madagascar				
Mali				
Malawi				
Mozambique				
Myanmar				
Nepal				
Niger				
Rwanda				
Sierra Leone				
Tajikistan				
Tanzania				
Togo				
Uganda				
Zimbabwe				
SUM	1	1	0	0
Lower-middle income economies				
Armenia				
Bolivia				
Cameroon				
Cape Verde				
Congo, rep				
Cote d'Ivoire				
Djibouti				
Egypt	1		4	
El Salvador	1	1		
Georgia				
Ghana				
Guatemala	1	8	2	1
Guyana				
Honduras	1	8		
India	1	19	21	1
Indonesia	1	6	4	
Lesotho				
Mauritania				
Moldova	1	1	1	1
Mongolia				
Morocco				
Nicaragua	1	1	2	1
Nigeria				
Pakistan	1	3	2	1
Papua New Guinea				
Paraguay				

Philippines	1	5	6	1
Samoa				
Senegal				
Solomon Islands				
Sri Lanka	1	1		
Swaziland				
Taipei, China	1	2		
Ukraine	1	3	1	1
Vanuatu				
Viet Nam	1	2		
Zambia				
SUM	14	60	43	7
Upper-middle income economies				
Albania				
Angola				
Argentina	1	18	22	1
Belize				
Botswana				
Brazil	1	25	14	1
China	1	11	30	1
Colombia	1	6	3	1
Costa Rica	1	5		
Cuba				
Dominica				
Dominican Republic	1	1	7	1
Ecuador	1	3	3	1
Fiji				
Gabon				
Grenada				
Jamaica				
Jordan				
Macedonia (FYROM)				
Malaysia	1	2	1	1
Maldives				
Mauritius				
Mexico	1	23	13	1
Montenegro				
Namibia				
Panama	1	6	1	1
Peru	1	3	4	1
Saint Kitts and Nevis				
Saint Lucia				
Saint Vincent the Grenadines				
South Africa	1		4	
Surinam				

Thailand	1	13	3	1
Tonga				
Tunisia				
Turkey	1	2	8	1
Venezuela , RB	1	1	1	1
SUM	15	119	114	13
High income economies				
Antigua and Barbuda	1	1		
Australia	1	7	11	1
Austria				
Bahrain, Kingdom of				
Barbados				
Belgium	1		3	
Brunei Darussalam				
Bulgaria				
Canada	1	33	17	1
Chile	1	10	13	1
Croatia	1		1	
Cyprus				
Czech Republic	1	1	2	1
Denmark	1		1	
Estonia				
European Union	1	87	73	1
Faeroe Islands				
Finland				
France	1		2	
Germany				
Greece	1		2	
Hong Kong SAR, China	1	1		
Hungary	1	5	2	1
Iceland				
Ireland	1		2	
Israel				
Italy				
Japan	1	16	15	1
Korea, Republic of	1	16	14	1
Kuwait				
Latvia				
Liechtenstein				
Lithuania				
Luxembourg				
Macao, China				
Malta				
Netherlands	1		1	
New Zealand	1	7		

Norway	1	4		
Oman				
Poland	1	3	1	1
Portugal	1		1	
Qatar				
Romania	1		2	
Russian Federation				
Samoa				
Saudi Arabia				
Singapore	1	1		
Slovak Republic	1		3	
Slovenia				
Spain				
Sweden	1		1	
Switzerland	1	4		
Trinidad and Tobago	1		2	
United Arab Emirates				
United Kingdoms	1		1	
United States	1	104	119	1
Uruguay	1	1	1	1
SUM	29	301	290	11
Total Sum	60	481	425	31

Source: WTO, Dispute Settlement, 1995 to 2012

Appendix C

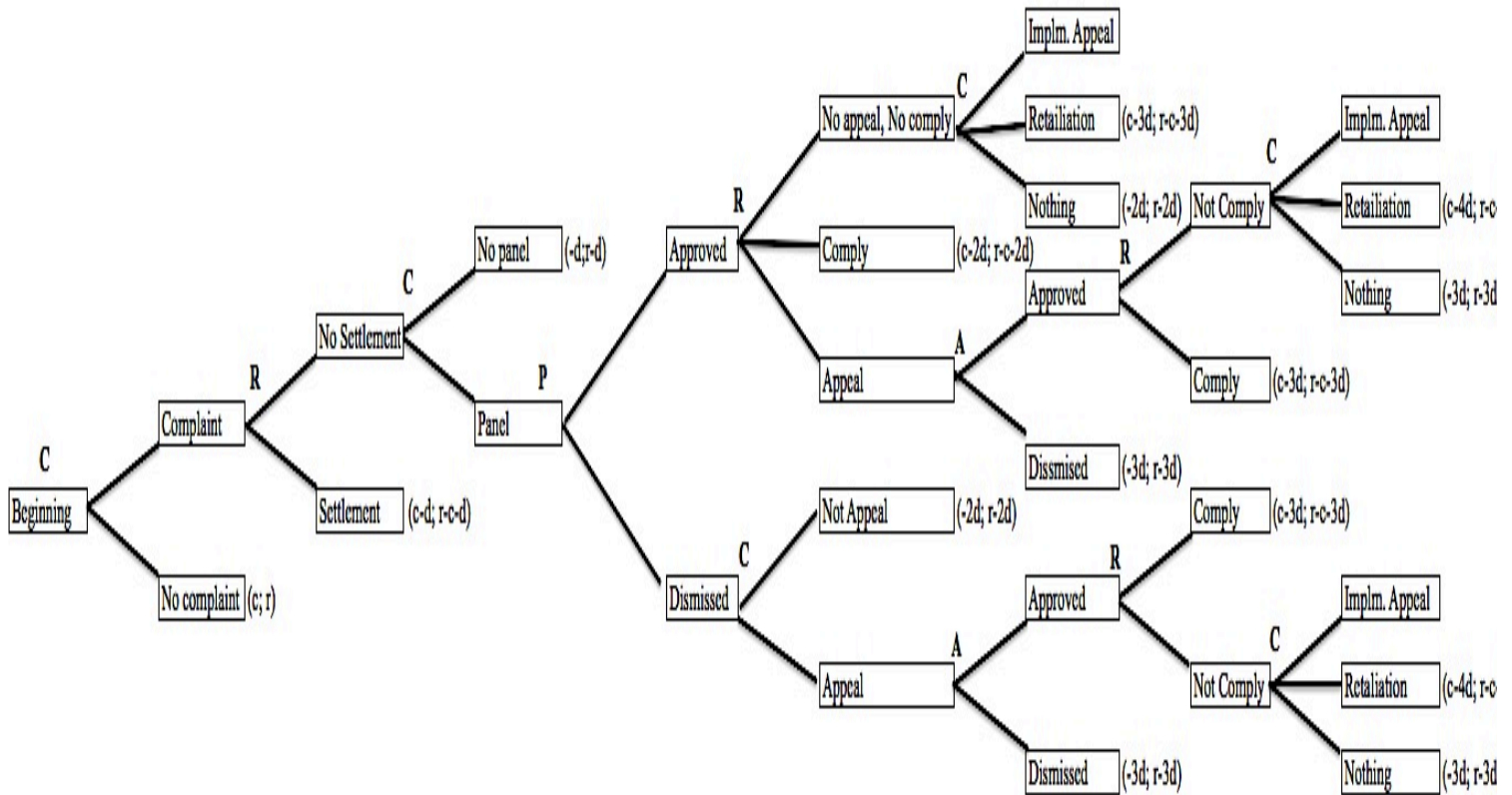
Table 12. Extended status of dispute cases

In consultation	1 37
Panel established, but not yet composed	1 8
Panel composed	1 6
Panel report under appeal	2
Report(s) adopted, no further action required	2 7
Report(s) adopted, with recommendation to bring measure(s) into conformity	2 5
Implementation notified by respondent	8 5
Mutually acceptable solution on implementation notified	2 1
Compliance proceeding ongoing	5
Compliance proceedings completed without finding of non-compliance	2
Compliance proceedings completed with finding(s) of non-compliance	5
Authorization to retaliate requested (including 22.6 arbitration)	4
Authorization to retaliate granted	5
Authority for panel lapsed	1 1
Settled or terminated (withdrawn, mutually agreed solution)	9 1
Total	4 54

Source: (WTO C, 2014)

Appendix D

Figure 6. Extensive game theory applied on the dispute settlement



Source: Own illustration, originally from Lannerberth 2008

C: is the complainant.

R: is the respondent.

P: is the Panel

A: is the Appellate Body

c: is the economic value that the complainant loses (cost) because of the different trade measures that the respondent has made.

r: is the economic value (revenue) that the respondent gains from the trade measurement committed to the complainant.

d: is the cost for being a part of the dispute process. This cost applies to both parts in the disputes.

n: is equal to the discount on *c* that can be negotiated by both the agents.