

Summer 2017

# Political clout of government bondholders: how government bondholders expect and affect states' conflictual behaviors

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## Recommended Citation

Lee, Kyu Young. "Political clout of government bondholders: how government bondholders expect and affect states' conflictual behaviors." PhD (Doctor of Philosophy) thesis, University of Iowa, 2017.  
<https://doi.org/10.17077/etd.mtaguz1k>

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POLITICAL CLOUT OF GOVERNMENT BONDHOLDERS:  
HOW GOVERNMENT BONDHOLDERS EXPECT AND AFFECT STATES'  
CONFLICTUAL BEHAVIORS

by

Kyu Young Lee

A thesis submitted in partial fulfillment  
of the requirements for the Doctor of Philosophy  
degree in Political Science in the  
Graduate College of  
The University of Iowa

August 2017

Thesis Supervisor: Associate Professor Brian H. Lai

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Graduate College  
The University of Iowa  
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CERTIFICATE OF APPROVAL

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PH.D. THESIS

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This is to certify that the Ph.D. thesis of

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has been approved by the Examining Committee for  
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Quan Li

To my parents, Andy, and Elliot

“I used to think that if there was reincarnation, I wanted to come back as the president or  
the pope.  
But now I want to be the bond market: you can intimidate everyone.”

Clinton political strategist, James Carville, 1995

## ACKNOWLEDGEMENTS

A number of people have supported me in various ways without whom I would have never reached this point. I first want to express my appreciation to my family. My parents and brother trusted and encouraged me throughout my whole life, especially when I chose to take a different path of life in my late 20s and flew to study in the U.S. My husband, Andy, whom I was destined to meet here in Iowa and who always treasures me, provided me with more than enough relief and support, allowing me to keep focused on what matters to me. My little boy, Elliot, stood out as a big challenge during the last process of writing my dissertation; in turn, without him, I would have never gotten it done in time.

I would have never completed my project or gotten a job without my advisor, Brian Lai. Thanks to him, I could pass through difficult times in the middle of my graduate years and achieve a much improved performance. His brilliant perspectives and keen comments always pushed me harder and made me want to be a better researcher. I thank my committee members, including Sara Mitchell, Fred Boehmke, Art Durnev, and Quan Li, for their invaluable support and advice.

Lastly, I would like to thank my old friends living in Korea, Australia and in the U.S., who were always on my side and cheered me up during the entire process, and my new friends, Jihye, Joonseok, Hyewon, and Jinah, whom I met in Iowa and who became my second family. Thanks to them, I was not lonely, and life here was full of joy and laughter. At the end of this long journey, fortunately and thankfully, I ended up having a doctoral degree, a new family, and true friends of life. I am blessed and I thank God for everything that happened to me here in Iowa.

## ABSTRACT

How do government bond markets expect and affect states' conflictual behaviors?

Many assume that interstate disputes harm states' credit; however, existing research on finance have sparingly investigated specifically through what channel international disputes disturb government bondholders and the extent of the effect. On the contrary, although government bonds have been used as primary means for states to finance disputes, most empirical studies on conflicts have not factored in the financial costs of disputes. My study delves into the questions of what role government bondholders play in international disputes, and how they constrain or give leeway to states' conflictual behaviors. My study seeks to propose detailed criteria that rational bondholders use when they evaluate states' credit risks when facing interstate disputes and to provide an overview of how government bonds could be an instrument of market power for the purpose of state security.

I analyze my theory of how government bondholders react to international disputes, by using a dataset of Militarized Interstate Dispute (MID) incidents and government bond yields of 25 countries, including 18 developed and 7 developing countries, for 1971—2010. My results of panel regressions show that investors do not always react negatively when they observe their bond issuer engaged in an international dispute. Instead, they evaluate the actual risk that the interstate dispute would impose on their bond investments, conditional on how likely a dispute is to escalate to war and the predicted outcome of potential war in case the parties in dispute go into war. Investors are prudent enough to show more sensitive reactions to major clashes than minor quibbles among states. Further, bondholders withdraw their investments only when they expect

their bond issuer's defeat in potential war or when they have difficulties predicting the outcomes of disputes. Moreover, states' economic development status conditions bondholders' risk assessments in the sense that investors have biased perceptions of the (in)capabilities of developing countries' governments to deal with potential credit risks associated with international disputes. Bondholders respond more negatively to the interstate disputes in which developing countries are the parties than developed countries are, even though the disputes themselves have objectively similar prospects of escalation to war.

Next, I investigate how states' borrowing as well as their interest rates lead to different outcomes of disputes in two ways: whether a dispute is likely to escalate into war and if not who will be winner of the dispute. While the amount of debt has contradictory effects on a state's waging conflict, augmenting its win probability on the one hand, but increasing the burden of debt service, on the other hand, the level of borrowing costs contributes only to financial pressure on a state's economy. My results of binomial and multinomial logistic regressions on MIDs and interest rates of 56 countries for 1816–2007 show that high interest rates suppress the likelihood of escalation to war as well as a state's win probability in a dispute. On the contrary, states try to avoid developing into war as far as the amount of debt is bearable, but once it exceeds a certain level, states turn more aggressive and prefer escalating to war over staying in the bargaining process.

## PUBLIC ABSTRACT

How do international disputes affect and are affected by the holders of government bonds? Many assume that financial markets typically respond to international conflicts negatively. I first examine the specific channel through which international disputes disturb government bond markets and the extent of the effect. My statistical results report that investors do not always show negative reactions when they observe their bond issuer engaged in an international dispute. Instead, bondholders are prudent enough to differentiate major clashes from minor quibbles among states and are more easily shaken by the fear of uncertainty when they invest in developing countries than in developed countries. Next, considering that government bonds have been used as primary means for states to finance conflict, I investigate what specific role government bondholders play in states' conflict escalation or termination behaviors. High interest rates are expected to contribute to heavy financial pressure on states by raising their costs of conflict and lead to an unfavorable conflict outcomes eventually. My statistical results show that once states start a militarized dispute, high interest rate of a state lowers the likelihood of the state escalating the dispute to war as well as the state's win probability in the dispute. I analyze international disputes and interest rates of more than 25 countries, including both 18 developed and 7 developing ones, for 1816–2010.

## TABLE OF CONTENTS

LIST OF TABLES .....	x
LIST OF FIGURES .....	xi
CHAPTER 1: INTRODUCTION.....	1
CHAPTER 2: LITERATURE REVIEW .....	6
2.1. Overview .....	6
2.2. The effect of interstate conflict on the economy.....	6
2.3. The determinants of government bonds .....	17
2.4. The role of economic resources in conflict issues (Determinants of conflict escalation and outcomes) .....	22
2.5. The relationship between conflict and economic indicators (summary).....	25
CHAPTER 3: THEORY.....	26
3.1. Overview .....	26
3.2. What is the yield of government bond and why is it significant?.....	26
3.3. How governments and investors interact with each other sequentially .....	28
3.4. Market responses to different types of conflict signals.....	33
3.5. The debt-finance model (the revised bargaining model).....	38
3.6. The differences between developed and developing countries .....	42
CHAPTER 4: THE EFFECT OF INTERSTATE DISPUTES ON GOVERNMENT BONDS .....	49
4.1. Introduction and review of the theory .....	49
4.2. Cases, unit of analysis, and methods.....	51
4.3. Data analyses.....	59
4.4. Summary, conclusion, and implications .....	64
CHAPTER 5: THE EFFECT OF GOVERNMENT BONDS ON CRISIS TERMINATION.....	69
5.1. Introduction and review of the theory .....	69
5.2. Cases, unit of analysis, and methods.....	72
5.3. Data analysis part I: the likelihood of conflict escalation .....	75
5.4. Data analysis part II: the outcomes of disputes.....	77
5.5. Summary, conclusion, and implications .....	79
CHAPTER 6: THE CONDITIONAL EFFECTS OF STATES' ECONOMIC DEVELOPMENT STATUS.....	86

6.1. Introduction and review of the theory ..... 86  
6.2. Cases, unit of analysis, and methods..... 88  
6.3. Data analyses..... 89  
6.4. Summary, conclusion, and implications ..... 93  
CHAPTER 7: CONCLUSION ..... 97  
APPENDIX..... 101  
REFERENCES ..... 102

## LIST OF TABLES

Table 1: The Effect of the Onset of Disputes .....	66
Table 2: The Effect of Hostility of Conflict Actions .....	67
Table 3: The Effect of the Onset of High-cost vs. Low-cost Disputes .....	68
Table 4: The Effect of Borrowing Costs and Gross Debt on the Likelihood of Conflict Escalation.....	81
Table 5: The Effect of Borrowing Costs and Gross Debt on Conflict Outcomes.....	84
Table 6: The Effect of the Onset of High-cost vs. Low-cost Disputes .....	95
Table 7: The Effect of Hostility of Conflict Actions across Developed and Developing Countries .....	96

## LIST OF FIGURES

Figure 1: Action-Reaction between Bondholders and Governments .....	48
Figure 2: Predicted Probabilities of War Outbreak Varying Interest Rates.....	82
Figure 3: Predicted Probabilities of War Outbreak Varying Gross Debt .....	82
Figure 4: Marginal Effect of Interest Rates on the Likelihood of War Varying Gross Debt .....	83
Figure 5: Predicted Probabilities of Victory and Defeat Varying Interest Rates.....	85
Figure 6: Predicted Probabilities of Victory and Defeat Varying Gross Debt .....	85

## CHAPTER 1: INTRODUCTION

“If the fiscal and monetary authorities won't regulate the economy, the bond investors will. The economy will be run by vigilantes in the bond market.”

- Ed Yardeni, 1983

Financial markets are an explicit channel through which governments and investors directly interact with each other. Financial instruments, such as bonds or stocks, are not only a major part of individuals' investment portfolios but also the primary tools of states to procure financial resources to manage national economies and implement government policies. Investors want to maximize their returns, and governments want to attract as much money as they can. The compromise between these two forces is realized as the price of securities traded on financial markets.

The most notable aspect of this interaction occurs when investors' economic interests clash with governments' political purposes or when states make efforts to manipulate or intervene in private market forces. States' conflict-related issues highlight this aspect most. States need to maintain the stability of financial markets and capital flows when preparing for or waging conflict more than any times. On the other hand, states' conflict decisions make investors hesitant to put money in the states due to the fear of uncertainty and possible losses on investments. In conflict situations, contradicting interests between states and investors are accentuated.

My research centers on this interaction in particular focusing on the lens of government bond markets. On the basis of rational expectations and bargaining theory, I first examine how investments in sovereign bonds are affected by international disputes and the risk of war. Second, I investigate how bond investors' behaviors affect the way

states terminate their crises as well as the outcomes. Third, I explore how the bond holdings by private and public investors make a difference in the two aforementioned questions. I analyze the interstate disputes and values of government bonds of more than 30 countries, including both developed and developing countries, from 1823 to 2007 by employing panel regressions, binomial and multinomial logistic regressions.

Looking at the relationship between sovereign bond markets and governments' conflict activities is important mainly for two reasons. First, this relationship generally demonstrates the significant role of bondholders and finance in the extent of leeway that states have as to their conflict decisions. A collective influence of bond investors over governments' policy choices is not new, as the term, "bond vigilantes," coined by Ed Yardeni, describes. However, I highlight that the clout of bondholders is not limited to government's macroeconomic policy area; their security policies are also affected by the movements of bond investors. Bond markets have been an essential source of government funding since the beginning of modern financial markets, particularly when states have been involved in a conflict. However, bond owners also are strategic actors, actively adjusting their investment activities based on their assessments of the actual risk that a given conflict would incur. As a result, even though investors are not directly warring parties, they influence governments' conflict decisions by imposing financial pressure on states.

Second, while extant studies has been concentrated primarily on the domestic and international institutional factors affecting bond investments, my focus on the impact of international conflict provides a new policy implication. States that are more dependent on external borrowing through government bonds are less likely to be involved in

international conflicts in order to please investors. This implication contributes to both the existing international political economy (IPE) and conflict literature. From an IPE perspective, my study can be considered an extension of the disruption thesis on the basis of the commercial liberalism, highlighting that brisk international bond markets could lead to peace among states. On the other hand, I suggest that conflict studies take states' financial aspects into account when explaining states' war proneness or the likelihood of conflicts.

This project is divided into five main sections. In Chapter 2, in the first part, I review previous studies regarding arguably the disruptive effects of international conflict on the economy and the determinants of government bonds. In the next part, I look over the literature examining the role of finance in states' policies in conflict situations.

In Chapter 3, I develop a general theory about the way in which portfolio investors and states interact with each other. The crux of my theoretical framework is summarized as the sequential exchange of signals between states and investors. Investors evaluate the signals sent by states regarding their political stability and economic health, especially signals related to the likelihood of conflict and its consequences. The markets' assessment of states' signals is realized as yields of government bonds, or sovereign borrowing costs. In turn, sovereign borrowing costs affect states' bargaining range and their subsequent conflict decisions, which serve as new signals for investors in the next round. This framework depicts the reciprocal relations between government bondholders and states in both crisis (pre-war) and war phases.

In Chapter 4, I analyze the impact of interstate disputes on investments in government bonds, by using a dataset of Militarized Interstate Disputes (MIDs) and the

values of government bonds of 25 countries for 1971—2010. Bondholders do not necessarily show negative reactions to every international conflict, as the traditional disruption thesis claims, but the effect of conflict is conditional on bondholders' evaluations of the actual risk that conflict is expected to impose on their investments. The actual risk that investors perceive depends on how much international disputes heighten the prospect of war and the predicted outcome of potential war. Investors show more sensitive reactions to major clashes than minor quibbles among states and are more agitated when they predict their bond issuer's defeat or when they have difficulties predicting the outcome of disputes.

In Chapter 5, I examine the influence of sovereign borrowing costs on states' conflict escalation/termination decisions. More borrowed money raises a state's probability of taking an advantageous position in a crisis situation. On the contrary, borrowing itself is costly given the obligation of debt repayment, and further, considering that borrowing in credit markets is not free, higher interest rates contribute to heavier financial pressure on states. In this sense, based on my revised bargaining model, I theorize how states' borrowing as well as their credit costs lead to different crisis outcomes in two ways: whether a crisis is likely to escalate into war and if not who will be winner of the crisis. By employing binomial and multinomial logistic regression analyses, utilizing MIDs and debt information of 56 states for the period of 1816-2007, I show that high borrowing costs suppress the likelihood of war as well as a state's win probability in a crisis, while large amounts of debt make peaceful termination of crises difficult. However, only looking at the disputes that ended before developing into wars, states with heavier debt loads are less likely to win than lose the disputes.

In Chapter 6, I analyze my theory of the conditional effects of types of governments on how investors respond to international crises by using a dataset of MID events and the values of government bonds of 28 developed countries and 7 developing countries for 1971—2010. Even the same severe interstate disputes are perceived more harmful to investors' bondholding due to their subjective perceptions of credit risk of developing countries compared to developed countries' one. My results of panel regressions confirm that bondholders' risk assessments are conditional on the economic development status of their bond issuer. Investors are easily shaken by the fear of uncertainty when they invest in developing countries and show negative reactions to states' conflictual behaviors more swiftly and to a larger extent.

Ultimately, my study can be seen as one of the first systematic efforts to show the multifaceted interactions between bondholders and governments in conflict situations. I construct a time-series cross-sectional dataset that covers a broader sample of countries and a wider range of time periods than used in previous studies and compile MID *incident*-level data which have utilized by existing studies sparingly. On the basis of my dataset, the theoretical framework and analyses presented in subsequent chapters are the initial step to my goal of research to suggest a concrete mechanism for how portfolio investments and governments influence each other around security issues.

## CHAPTER 2: LITERATURE REVIEW

### 2.1. Overview

In this chapter, I will give an overview of previous studies on the relationship between economic indicators and international conflict. First, I summarize the effect of interstate conflict on the economy, more specifically, on trade and other financial instruments. Next, I focus on political and economic determinants of values of government bonds. Lastly, I go over the determinants of conflict escalation and outcomes to take a look at the role of economic resources in conflict issues.

### 2.2. The effect of interstate conflict on the economy

Why should we care about when and how interstate conflicts influence sovereign borrowing costs? Beyond a variety of factors that have been mentioned to affect states' creditworthiness, my attention to interstate disputes or states' hostile actions against another originates from the broader context of the disruption thesis. While many studies discuss the disruptive effect of international conflict on trade or foreign direct investment on the basis of commercial liberalism, few analyses focusing on the portfolio investment have asked the same question, despite financial markets typically responding to international conflicts negatively. In this sense, my analysis of the impact of international disputes on government bond markets contributes to the existing disruption argument by shedding light on bondholders' risk assessments of conflict.

First, I review accumulated research on the effect of war on bilateral trade, which was the major approach in the context of the effect of war on economy. Next, I outline a growing literature examining the impact of international conflicts (including war) on financial instruments (stocks, bonds, and currencies), mostly done in the field of

economics. Third, I go over the extant studies on the determinants of government bonds, including those focusing on the bondholders' responses to international conflicts.

### 2.2.1. The effect of interstate conflicts on trade

Empirical findings as to the effect of war on trade are divided into two categories. On the one hand, many studies provide evidence for the argument that politically confrontational relationship between states has a negative impact on trade in general (Bergeijk 1994; Gowa and Mansfield 1993; Mansfield 1994; Mansfield and Bronson 1997a, 1997b; Pollins 1989a, 1989b). For example, Mansfield (1994) shows that during the great power war periods trade decreased as a whole at the systemic level, although it did not necessarily do between the two warring parties. As to the specific causal mechanisms, Pollins (1989a, 1989b) pays attention to rational importers who care about not only economic factors, such as price and quantity, but also diplomatic relationship between two trading countries in order to avoid risks brought about by exporters in adversary nations. Besides, switching the focus from private agents to states or governments, in order to prevent enemies from exploiting the gains from trade for building up armaments, states are willing to allow economic activities only among allies or friends. Because of these relative gains concerns (Grieco 1988, 1990) or negative security externalities which Gowa (1994) points to, governments are reluctant to liberalize trade with enemies. From the standpoint of either private agents or governments, there is little incentive for forming a trading relationship with adversaries, which ends up with the conclusion that trade among belligerents tends to decrease, even

though the samples are mostly restricted to alliances or commercial patterns of major powers (Gowa 1994; Gowa and Mansfield 1993; Mansfield and Bronson 1997b).<sup>1</sup>

The same results come from studies from liberalists, especially from commercial liberalists as well. They maintain that in order for the core argument of commercial liberalism or capitalist peace that trade promotes peace to hold, the premise that war disrupts trade should hold as well based on a supply and demand model as to bilateral trade and countries' opportunity costs of forgone trade (Anderton and Carter 2001a). Anderton and Carter (2001a, 2001b, 2003) provide supportive evidence for the disruption thesis, applying an interrupted time-series model to 14 major power and 13 non-major power dyads based on the basic liberalist idea that restricting trade associated with war is detrimental to the overall welfare of a country. They find that in 12 of the major power dyads, war significantly reduced trade, and nine of the non-major power dyads yield statistically significant estimates for the disruption thesis (Anderton and Carter 2001a, 2001b, 2003).<sup>2</sup> Glick and Taylor (2010) take account of both lagged and contemporaneous effects of war on trade and expand the samples to even politically irrelevant cases, after pointing out the methodological weaknesses of extant time-series

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<sup>1</sup> Mansfield and Bronson (1997a) extend the samples to minor powers and find that including minor powers does not make a big difference in terms of results; alliances between minor powers or major-minor power led to increase in bilateral trade flows, as well.

<sup>2</sup> As to these Anderton and Carter's results, Barbieri and Levy (2003) claim that only seven out of 14 major power dyads and six out of 13 non-major power dyads support the disruption thesis. This disagreement over the number of cases results from the fact that Barbieri and Levy counted for the negative coefficients for war level (that is, the disruption thesis holds only if the outbreak of war itself negatively affected trade flows), whereas Anderton and Carter included either the coefficient for war level or that for war trend in accounting for the disruption thesis (that is, even if the outbreak of war does not significantly reduced trade flows, if trade flows decreased during the war period, then the disruption thesis holds).

studies. Their analyses support that wars had a damaging and persistent effect not only on trade between belligerents but also for neutral countries (Glick and Taylor 2010).

On the other hand, a decent amount of studies show statistically insignificant effects of war on trade (Barbieri and Levy 1999, 2001, 2003; Bliss and Russett 1998; Morrow et al. 1998, 1999). After pointing out that there are plentiful historical cases where belligerents kept trading during the war time, Barbieri and Levy (1999, 2001, 2003) analyze seven dyads that are not included in cases of great power war by employing an interrupted time-series model. After all, the authors find that war does not significantly reduce bilateral trade between the warring countries for all but one dyad (Barbieri and Levy 1999, 2001, 2003). They admit that it is not fair to generalize their results because of the small sample size, however, they do contest that their six cases that showed insignificant effect of war on trade are not falsified even if Anderton and Carter (2001a, 2001b, 2003) provide more favorable evidence for the disruption thesis in general based on more extended samples (Barbieri and Levy 2003). While mainly focusing on how democracy affect bilateral trade level, Bliss and Russett (1998) briefly touch the effect of militarized disputes on trade as well; when their first dataset comprised of 28 yearly observations from 1962 to 1989 is used, only 10 years show statistically significant results, and only 7 out of 17 years in their second dataset ranging from 1973 to 1989 turn out meaningful. Consequently, the disruption thesis holds, at most, only in certain years or in certain dyads, according to these authors.

Furthermore, Morrow (1999) argues that even though there is an obvious connection between political relations between two countries and their bilateral trade flows, militarized disputes are not directly correlated with trade flows because private

agents already reduce economic activities when they notice their own country has poor relations with the trading partners' country and thereby believe that these poor relations might be escalated to a militarized dispute. In other words, since trade flows between the two disputants would be lessened even before the actual militarized dispute, there would be no significant effect of war itself on bilateral trade. Empirical analyses on 42 major powers dyads that have 71 yearly observations conducted by Morrow et al. (1998, 1999) show that the coefficient for militarized interstate disputes is not statistically significant in explaining trade flows. The authors conclude that "the anticipation of conflict prevents trade from growing more than the realization of conflict leads to its disruption" (Morrow et al. 1998, 659)

In the effort to reconciling extant mixed empirical findings, Li and Sacko (2002) elaborate their theoretical framework inspired by Morrow's argument (1999) by adopting the rational expectation framework and splitting the effects of war into two categories: *ex ante* effect and *ex post* effect. They delineate the idea that an interstate dispute can unfavorably affect trade even ahead of its occurrence when firms estimate risks and negative returns in anticipation of war; this is called "*ex ante* effect on expectations" (Li and Sacko 2002, 13). In addition, since there are limitations for firms to forecast exact amount of risks associated with the conflict in advance, after it occurs, firms re-evaluate costs and benefits related to it, and reassess their future expectations of profits, which is realized as an increase or decrease in trade *ex post*. Furthermore, the authors do not restrict conflict-related risks which firms consider to the occurrence of a conflict itself, but take its severity and duration into account as well. As a result, their main thesis is that "the onset, duration, and severity of a conflict affect the expectations and behavior of the

trading firms both *ex ante* and *ex post*” (Li and Sacko 2002, 13). Their empirical findings show that unexpected onset of interstate conflicts has a significantly bigger effect on trade *ex post*; in contrast, expected onset of conflicts does not affect bilateral trade flows or has only a marginal effect (Li and Sacko 2002). These results fit moderately with the authors’ theoretical prediction that “the less unexpected dispute should be uncorrelated to trade because of the *ex ante* effect of expectations. However, the more unexpected dispute should have a statistically significant negative effect on trade” (Li and Sacko 2002, 17).

#### 2.2.2. The impact of international conflicts on financial instruments (stocks, bonds, exchange rates, etc.)

Previous research using trade level as a dependent variable is of useful reference for probing the relationship between interstate wars and financial markets in the sense that trade flow is one of the economic indicators that reflect market participants’ expectations. However, as seen in Li and Sacko’s (2002) causal mechanism of how trade level is affected by international conflicts, government and responses of financial markets play an important intervening role in traders’ forming their expectations of future risk and prospects. This implies that trade and interstate conflicts are not as directly related with each other as financial markets and conflicts are; in other words, financial markets are more sensitive and directly linked to people’s anticipation of upcoming wars and their actual realization. Therefore, financial indicators are seen better measures to test *ex ante* and *ex post* effect of interstate disputes. In their analysis on the effect of international political events on stock markets, Schneider and Troeger (2006) point out this aspect as “trade relationships can, for instance, not be reversed as easily as capital investments.

The “stickiness” of trade consequently biases examinations in favor of the null hypothesis [the disruption thesis]” (626).

A set of research focuses on the effects of *war risk* on financial indicators (i.e. pre-war periods). Holsti and North (1966) depict fluctuations in the average daily value for 20 stocks and bonds of eight European countries along with moving patterns of perceived hostility as to the pre-crisis ahead of World War I. While prices of securities of two neutral countries, Sweden and Switzerland, were quite stable, those of prospective belligerents plummeted along with increasing tensions during July 1914 (Holsti and North 1966, 178-82). This analysis can be seen as a preliminary study that pays attention to the role of stock prices as a leading indicator of general war, in the sense that it shows not the official declaration of war but people’s perception of international tensions before war had a strong effect on fluctuations in stock prices. Rigobon and Sack (2005) analyze how the risk of war with Iraq between January 2003 and March 2003 affected US financial markets by employing a heteroskedasticity-based estimation technique. The authors find that the so-called *war risk* factor, into which war-related news are translated, explains significantly the variances of financial variables, such as Treasury yields, corporate yield spreads, stock prices, exchange rates; specifically, their results indicate that over the period leading up to the outbreak of war, increases in war risk were followed by a fall in two-year and ten-year Treasury yields, S&P 500 indices, the exchange rates of the dollar and a rise in oil prices (Rigobon and Sack 2005).

As to this Iraq War in 2003, three other studies use so-called “Saddam contract” or “Saddam Securities” traded on an online betting exchange as an estimate of market’s prediction of the probability of Hussein’s fall and moreover, the probability of war

against Iraq (Amihud and Wohl 2004; Leigh et al. 2003; Wolfers and Zitzewitz 2009). The authors examine the relationship between the fluctuations of Saddam Securities and movements of other financial indicators, such as stock returns, oil prices, and exchange rates in order to see how the risk of war or people's expectation of war affect financial indicators. First, Leigh et al. (2003) and Wolfers and Zitzewitz (2009) analyze the prices for the Saddam Securities between the period of 2002 September and 2003 February ahead of the occurrence of war, and show that increase in this future's price, which can be interpreted as the augmenting prospect of war, was associated with an increase in oil prices and a decline in US equity values (S&P 500) by conducting event studies analyses. The authors construe this result as that the increasing war risk can be linked to people's expectation of future economic costs, which converts to a negative impact on values of equities (Leigh et al. 2003). Second, Amihud and Wohl (2004) report similar results on the pre-war period samples, negative signs of coefficients for US equity values and positive ones for oil prices. However, they point out that the increasing likelihood of war was not necessarily seen detrimental for US economy, since toppling Hussein meant getting rid of future terror risks and guaranteeing more stable and larger amount of oil supply. Therefore, their coefficients are mostly found statistically insignificant, because, the authors argue, the negative and positive effect of the likelihood of war on stock and oil prices might be offset (Amihud and Wohl 2004).

Another set of studies probe the *ex post* effect of war events on financial indicators (i.e., after the onset of war). First of all, with regard to exchange rates, the analysis on the daily prices of Greenback by Willard et al. (1996) paved the recent path for using the currency as an indicator of people's sentiments towards war events. The

authors regress the exchange rate between Greenbacks and gold on its own 12 lags, moving 100-day window throughout the US Civil war in order to see which events affected the US currency in the long term (i.e. turning points or structural breaks) by looking at the amount of change in Greenback prices (Willard et al. 1996). Their basic idea is that a big change in the market prices of Greenback in gold after a certain war event indicates that its future cost would be substantively greater or smaller than what they have expected in terms of the prospects for redemption and the likelihood of Union victory (Willard et al. 1996). Expanding Willard et al.'s perspective, Hall (2004) finds that the currency values of five belligerents (Britain, France, Italy, Germany and Austro-Hungary) fell against Swiss franc during the World War I despite their governments' interventions in an attempt to maintain the exchange rates and that the strength of the currencies of the Allied and the Central Powers changed in opposite directions in response to military news. Particularly, the author applies two factor models, in which both a common trend and a common factor are argued to have affected the fluctuations of exchange rates; not only the former, which is the money stocks (money growth rates), an economic determinant of the exchange rates, but also the latter, a non-economic component, which is interpreted as an indicator of contemporaries' expectations of when and how the war would end, was found to have influenced five countries' currency values (Hall 2004).

Next, many studies have concentrated on reactions of stock markets to war events. Russett and Hanson (1975) examine stock market fluctuations against escalatory and conciliatory events in the Indochina war as well as in the Korean war. The net change in Dow Jones industrial average is regressed on the occurrence (or nonoccurrence) of 93

Vietnam war events, and most of conciliatory acts were found to be significantly associated with increase in stock prices, whereas escalatory ones were not related to a clear nor significant pattern of stock movements (Russett and Hanson 1975, 162-63). On the other hand, in case of the Korean War, none of conciliatory acts of either the US side or communist side did not cause a systematic stock market response. Only the escalatory acts of the communist side showed a negative relationship with Dow Jones average (Russett and Hanson 1975, 170). Chappell and Eldridge (2000) find market inefficiency during the war period (i.e. non-random walk pattern), specifically focusing on the UK Financial Times 30 stock index during the World War II; it increased steadily after the war broke out, followed by a steep decrease since around February 1940 until late June 1940, and then gradually increased again until the end of the war. The authors suggest a tentative explanation of this moving pattern as a reflection of people's frustration resulting from losses in the early war period and then their regaining hope since the second half of 1940 (Chappell and Eldridge 2000, 491).

About more recent wars, Amihud and Wohl (2004) analyze the prices of Saddam contract not only before the war but also during the war; unlike the mixed interpretation of the effect of this pre-war future's price on US equity values, once the war against Iraq broke out, the increase in Saddam contract's price obviously meant people's expectation of US' quick winning the war. As a result, during the war period, a rise in the price of Saddam securities was associated with strong and statistically significant increase in the US stock prices, fall in oil prices, and strong US dollar against the Euro (Amihud and Wohl 2004). Based on a rational expectation framework, Schneider and Troeger (2006) examine the reaction of three major stock markets (Dow Jones, FTSE, and CAC) to

international militarized conflicts in three regions during the period from 1990 to 2000 (Iraq vs. US-led alliance, Israel vs. Palestine, civil wars in ex-Yugoslavia), using the GARCH(1,1) model. The authors find that the severity of conflicts and the extent to which people could anticipate confrontational and cooperative events affected the aggregate value of stock markets; in general, in line with the disruption thesis, confrontational events negatively affected stock markets, although during the Gulf war, the Dow Jones Index showed so-called war-rallies (i.e. positive movement), while cooperative events displayed a positive effect on the values of FTSE and CAC (Schneider and Troeger 2006). Besides the mean effect of positive and negative events, the authors additionally find that conflictive episodes had a much stronger impact on volatility of stock markets than cooperative ones in all three wars (Schneider and Troeger 2006).

In a broader sense, Guidolin and La Ferrara (2010) examine the effect of conflict onset on financial indicators, including stock indices (MSCI stock indices for the World, the US, UK, France and Japan), exchange rates, and prices of standardized commodities, during the period of 1974-2004 by employing event study approach. The authors point out that despite “the degree of heterogeneity among conflicts and the fact that a number of them may have been anticipated” the onset of conflicts yields significant market reactions, “which in general cannot be simply justified by mere chance” (682). Specifically, their analyses on a sample of 101 inter- and intra-state conflicts report that first, stock markets tend to react positively to conflict onset rather than negatively, especially the US stock market; second, interstate conflicts have a stronger influence on asset markets than intrastate ones; and third, conflicts in Asia and the Middle East have the most powerful impact (Guidolin and La Ferrara 2010).

On the other hand, a few studies have paid attention to reactions of financial markets to terrorist attacks, instead of war events, in a similar sense. Chen and Siems (2004) assess the size and duration of responses of the US capital market (Dow Jones Industrial Average) to historical terrorist attacks and military invasions since 1915, and then the reactions of world indices specifically to Iraq's invasion of Kuwait in 1990 and 9/11 terrorist attack in 2001 by conducting the event study methodology. 12 out of 14 events yield negative abnormal returns in the US market, and 7 events among them show statistical significance at a 95% confidence level. In response to the 9/11 attack, all 33 stock market indices report statistically significant negative abnormal returns, so do 13 markets out of 18 following Iraqi invasion of Kuwait. The same methodology is applied in Abadie and Gardeazabal's case study (2003) on the market value of a sample of Basque and non-Basque firms following terrorist conflicts; their results show that when truce was believed credible, the firms yielded positive abnormal performances, while negative returns when the cease-fire was about to end. As another case study, the impacts of the Madrid and London bomb attacks in the middle of 2000s are examined by Kollias et al. (2011); like the results of the previous study, overall, negative abnormal returns were observed, and there was a stronger impact on Spanish markets than on London markets. To sum up, the *ex post* effect of terrorism is found negative on national and global capital markets, in general.

### 2.3. The determinants of government bonds

In this section, I will focus specifically on government bonds among financial indicators and outline the factors that previous studies have mentioned as the determinants of values of government bonds. A government bond is a debt security issued

by a national government and floated on secondary markets. Since the prices of government bonds reflect the overall riskiness of the issuing state (i.e., a risk premium), if a change in the information set causes an update of the state's expected future risk premiums, then investors make a change in their behaviors, leading bond prices to move accordingly. For example, if new information tells investors that the risk related to an investment in a certain government bond is deemed to be rising, bond prices are likely to decrease due to investors' sell-off. Therefore, the manner in which such new-to-market information is perceived by investors determines their expectations of the government's future risk premiums. In other words, the values of government bonds are a function of investors' *subjective* perceptions of a country's *objective* risk factors.

Specifically, what kind of information interests investors and in which ways do they tap into it to assess the credit risk of sovereign bonds? Credit risk premiums consist of default, inflation and currency risks, the former of which most interests bondholders. The likelihood of default by borrowers is determined by a country's ability to pay off its debt and its willingness to honor its debt obligation (Gray 2013). A country's ability to service its debt is closely affected by its macroeconomic indicators or performances, such as budget expenditure, current account balance, capital account balance, default history, external debt practices, inflation rate, GDP growth rates (or the nominal GDP), and debt per capita (or the debt-to-GDP ratio) (e.g., Flandreau and Zumer 2009; Hilscher and Nosbusch 2004; Mauro et al. 2007; Min 1998; Mosley 2000, 2003; Rowland 2004; Rowland and Torres 2004).<sup>3</sup>

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<sup>3</sup> The determinants of sovereign borrowing costs are considerably similar to what credit rating agencies (CRAs) consider. CRAs assess states' overall credit risk, which is basically the same as the interest of bondholders. Further, credit ratings affect investors' perceptions of investment risk

However, these economic figures are not all investors want to garner; they “are constantly on the lookout for signals of a government’s willingness to repay its debt” (Gray 2013, 21). Although concrete economic indicators have been released to investors since the mid-19<sup>th</sup> century, non-economic factors such as domestic and international institutions, political regime type, and a state’s membership of regional economic organizations have also long been primary data sources from which investors make inferences about whether a country will meet its debt obligation on time (e.g., Alquist and Chabot 2011; Archer et al. 2007; Bordo and Rockoff 1996; Dincecco 2009; Ferguson and Schularick 2006; Flandreau and Zumer 2009; Gray 2013; Gray and Hicks 2014; Obstfeld and Taylor 2003; Poast 2015; Schultz and Weingast 2003; Sobel 2002; Stasavage 2007). Indeed, a number of factors positively influence a country’s reputation in terms of its willingness to keep its payment schedule, including a state being a democracy or having been a British colony, the existence of a central bank, a state’s adoption of the Gold Standard, and the quality of other members in the international organization to which a state belongs.

Besides default risk, investors measure inflation and currency risks to assess the credit risk of government bonds, since inflation and currency depreciation lower the real values of bond returns as well as the principal. In particular, investors consider inflation and currency risks when they purchase the government bonds of developed democracies or states that have high credit ratings (Anderson et al. 1996, 1-2; Mosley 2000, 2003),

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in government bonds, especially in developing countries (Archer et al. 2007; Cantor and Packer 1996). The literature on sovereign credit ratings mention election cycle, GDP per capita, external debt, level of economic development, default history, real growth rate, inflation rate, and trade openness as explanatory variables (Afonso 2003; Archer et al. 2007; Block and Vaaler 2004; Cantor and Packer 1996; Vaaler et al. 2005).

since these countries are least likely to default on their debts. However, if the level of inflation or nominal exchange rates disturbs the economy, the rate of return for government bonds may be lower than investors' expectations.

In addition to economic and institutional factors, previous studies have focused on political events as a major determinant of investors' assessments of sovereign credit costs. Since the early 19<sup>th</sup> century, "news about [political events has been] . . . more regularly available to market actors than detailed economic information" through the media such as newspapers and telegraph agencies (Ferguson 2006, 78). Indeed, investors these days still consider national political events to be important when they allocate assets; bond investors pay attention to the size of leftist governments and the timing of elections in a country (Block and Vaaler 2004; Mosley 2000, 2003; Vaaler et al. 2005).

Among different kinds of political events, in particular, foreign disputes or international conflicts are special interest to investors (Dincecco 2009; Ferguson 2006; Kirshner 2007; Mauro et al. 2007; Sussman and Yafeh 2000). The financial community, including bondholders, is inclined to be especially averse to interstate war because of its macroeconomic consequences (Kirshner 2007).<sup>4</sup> Investors believe "war almost always results in inflation and the erosion of monetary discipline, gyrations in real interests (with negative real rates common as inflation outpaces nominal increases), exchange rate depreciation and instability, interruptions in international financial flows, and huge

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<sup>4</sup> Brooks (2013) argues that in recent days, markets' aversion to war is more reinforced because of economic globalization: "At least among the advanced states, I posit there are no longer any economic actors who will be favorable toward war and who will lobby the government with this preference. All of the identified mechanisms that previously contributed to such lobbying in these states have been swept away with the end of colonialism and the rise of economic globalization" (867).

increases in government spending, partly offset by increased taxes but typically resulting in unbalanced budgets facilitated by expanding government debt and monetization (printing more money to pay the bills)” (Kirshner 2007, 2).

Even in the mid-19<sup>th</sup> century, investors paid careful attention to “any war” that “would disrupt trade and hence lower tax revenues for all governments” and “direct involvement in war” that “would increase a state’s expenditure as well as reducing its tax revenues, leading to substantial new borrowings” (Ferguson 2006, 79). Sussman and Yafeh’s (2000) analysis of Japanese government bonds traded in London between 1870 and 1914 and Bueno de Mesquita’s (1990, 41-6) examination of the money market discount rate<sup>5</sup> between 1863 and 1868 are good examples representing the abhorrence of finance to war.<sup>6</sup>

What about lower level (less hostile) of conflicts than interstate wars? Since war heightens default, inflation, and currency risks, which harm overall macroeconomic stability, and more specifically, the values of government bonds, investors would not favor any level of international conflict that appears to be a harbinger of war. In this sense, previous studies have analyzed the impact of pre-war disputes on financial markets, finding that most pre-war conflicts related to World War II show statistically

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<sup>5</sup> The money market discount rate is the interest rate for short-term market securities and technically not the same as the yield of long-term government bonds (sovereign borrowing cost). However, both are measures of investors’ evaluations of a state’s economy in financial markets: “[A] rising discount rate for a nation’s money reflects a broad base of declining confidence in that nation,” and so does the yield of government bonds (Bueno De Mesquita 1990, 42).

<sup>6</sup> The former study shows that most institutional changes during this Meiji period, such as the promulgation of the Meiji Constitution of 1889, did not affect Japanese borrowing costs significantly, whereas the Russo–Japanese war had a strong impact on them. The latter reports that the beginning of the Second Schleswig-Holstein War and the Seven Weeks’ War in 1864 and 1866, respectively corresponded with a large jump in market discount rates.

significant structural break-points in the values of the government bonds of their sample countries (Frey and Kucher 2000; Waldenström and Frey 2008).<sup>7</sup> Holsti and North (1966) depict fluctuations in the average daily value of 20 stocks and bonds of eight European countries against markets' perceived hostility as to the pre-disputes ahead of World War I. While the prices of the securities of two neutral countries, namely Sweden and Switzerland, were stable, those of prospective belligerents plummeted in tandem with increasing tensions in July 1914 (Holsti and North 1966, 178-82). Kirshner (2007) describes how much pre-war events disturbed the financial community, providing a detailed illustration of cases including the Spanish-American War, Falklands War, etc. Discovering peak dates and changes in the yields of bonds of five great powers, Ferguson (2006) shows the difference in the effect of pre-war disputes and interstate wars on the London bond market between 1881 and 1914 and those between 1843 and 1880. These analyses imply that not only the official onset of war but also investors' perceptions of international tension ahead of war strongly influence fluctuations in bond prices.

#### 2.4. The role of economic resources in conflict issues (Determinants of conflict escalation and outcomes)

The traditional "war chest" proposition captures the role of economic resources in conflict. Despite disaccord among scholars with the existence of cyclical trends in global economy or power transition at the system level, several previous studies have commonly pointed out that economic resources are essential for military capabilities, which can be linked to a state's conflict-proneness or major power status (Blainey 1988; Boehmer

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<sup>7</sup> Frey and Kucher (2000) analyze the monthly prices of German, French, Swiss, Belgian, and Austrian government bonds traded on the Swiss bourse between December 1933 and to December 1948. Waldenström and Frey (2008) assess the government bond yields of four Nordic countries (Finland, Sweden, Denmark, Norway) between January 1938 and December 1940.

2010; Doran and Parsons 1980; Gilpin 1981; Goldstein 1988; Kennedy 1989; Kondratieff 1979; Organski and Kugler 1981; Pollins and Schweller 1999). In other words, countries with full treasuries are said to desire to expand their power in the international arena and likely to be entangled in militarized disputes.

However, studies specifically focusing on states' financing measures do not date back so far (Carter and Palmer 2016; Rasler and Thompson 1985; Schultz and Weingast 2003). Increased demand for revenue in preparation for or during war leads states to put efforts to mix a variety of financing strategies. As far as a state does not choose plunder or expropriation, scholars point to three major means to finance war: monetization, raising taxes, and borrowing. According to Cappella (2012), states weigh up costs and benefits of each strategy in order to finance war in a politically least costly and economically most efficient way. Monetization is economically the fastest way for states to collect revenue but is followed by inflation, incurring a decrease in citizens' purchasing power, and thus, likely to result in economic instability and political repercussion. Taxation enables states not to be constrained by debts and interest payments, in return for putting heavy burden on their own people's shoulders and aggravating distributional consequences (e.g. Rasler and Thompson 1985).

In general, borrowing has advantages over these two aforementioned financing measures. It facilitates tax-smoothing policies, and thereby distorts national economy less and lowers citizens' social and economic burden. In addition, by borrowing, states can raise revenue in a relatively shorter time (Schultz and Weingast 2003; Shea 2014). In other words, economic and political costs of high inflation and heavy tax rates make states turn their eyes to borrowing; via borrowing they can finance war relatively more

efficiently without sacrificing political stability and economic growth. In this context, in the burgeoning literature, scholars have investigated how states' borrowing or their credit in international markets influences their conflict activities (e.g., DiGiuseppe 2015; DiGiuseppe et al. 2012; Shea 2014; Shea 2016). According to the up-to-date findings, a state's borrowing cost seems to have effects on its probability of conflict initiation, alliance formation, change in military expenditure, and the likelihood of military regimes becoming targets (Allen and DiGiuseppe 2013; DiGiuseppe 2015; Shea 2016).

Yet, scholars have sparingly paid attention to how sovereign borrowing and its terms affect the conflict termination stage. Extant research has mostly concentrated on the relationship between credit costs and war outcomes, reporting that cheaper borrowing costs are associated with states' higher win probabilities. The advantages of cheap credit stand out particularly in large and long-lived wars where a considerable amount of military expenditure is constantly required in order for states to survive or win wars (Schultz and Weingast 2003). This has developed into a so-called "democratic advantage" argument, maintaining that democracies are more likely to win wars due to their abilities to have access to inexpensive credit than autocracies (Lake 1992; Schultz and Weingast 2003). Further, most recent studies have examined the conditional effect of political regime types on the relationship between states' credit costs and war outcomes more in depth (DiGiuseppe and Shea 2015; Shea 2014). However, *before* a crisis escalates into war, how sovereign borrowing and its costs influence a bargaining process between disputants and the way they terminate a crisis is little delineated in the existing literature. In other words, focus of previous research has been fixed on *wars*, not including international disputes that have not developed into war. In this context, my

study seeks to reveal that sovereign borrowing and its costs play an important role in the pre-war stage as well, in particular, in states' decisions about whether or not to escalate a crisis into war.

#### 2.5. The relationship between conflict and economic indicators (summary)

Putting all together, previous literature has tried to link conflict and economic indicators in various ways. On the one hand, economic indicators have been affected by international conflict; however, on the other hand, they have played a role of predictors of international conflict. In the following chapters, I show how values of government bonds, in particular, expect and affect interstate disputes.

## CHAPTER 3: THEORY

### 3.1. Overview

In this chapter, I lay out my theory on how the values of government bonds and interstate disputes are related with each other. First, I give a brief introduction to the yield of government bond and explain its significance. Second, I show a general picture of how governments and investors interact with each other sequentially through the financial markets. Third, I go into details of the first part of my theory, how government bondholders respond to different types of conflict signals and next I move on to the second part of my theory, the revised bargaining model. Lastly, I lay out a preliminary theory of how investors evaluate government bonds of developed and developing countries differently in the face of interstate disputes.

### 3.2. What is the yield of government bond and why is it significant?

A government bond is a debt security issued by a national government and floated on secondary markets. It is comprised of face value (i.e. par value), coupon rate, maturity date, etc., corresponding to principal, interest rate, and term of loans, respectively. For market participants to invest money in government bonds means the issuer government borrowing the amount of the face value from bondholders and in turn, giving coupon (face value multiplied by coupon rate) to them regularly, usually twice a year, until the maturity date. Say, state A issued a 10-year government bond, with a face value of 100 at a 5 percent coupon rate. Then, a bondholder can get 5 every year during the next 10 years, and when the bond reaches maturity, government is supposed to pay 100 back to the bondholder, unless it defaults.

However, bonds are not always traded at par; like other products, the trading price of government bond is determined by the forces of supply and demand in the secondary market. Even if a face value of state A's 10-year government bond is \$100, if those who want to sell it outnumber those who want to buy it in the market, then its market price goes down, say, to \$80. The reason that investors care about whether their bond is traded above or below its par value is because this determines the amount of return on their bond investment, which is *the yield of a bond*. The bond yield is the amount of coupon divided by the current market price of a bond ( $Bond\ Yield = \frac{Coupon\ amount}{Market\ Price\ of\ a\ Bond}$ ); therefore, the price of a bond and its yield have an inverse relationship. If a bond is traded at par, its yield is the same as the coupon rate; however, in the example case, the bond yield becomes approximately 6.25 percent, higher than the coupon rate. That the yield of a government bond is increasing indicates that something negative about the government made its bond less attractive to investors. The high yields always come with more risk.

Even though a number of studies analyzed reactions of stock markets in response to international disputes, a government bond is a good measure of people's expectations. First, the issuer of government bonds is a national government, essentially the target that securities-holders care about when they evaluate investment risk and values. This means that interests of bondholders are concentrated on the financial stability and performances of a national government. In terms of interstate conflicts, a victory/defeat or even simple engagement of a state is directly related to its debt condition, which can be translated right into the values of government bonds. Therefore, examining government bonds is an obvious way to keep track of people's expectations and their evaluation of a state's economy in relation to interstate conflicts.

Second, given that bond issuance by government has been one of the primary means to finance war (e.g. Cappella 2012), values of government bonds tend to fluctuate with different phases of conflicts more than any other political events. When a state goes to war, it is likely to be under a large deficit, finding itself in a situation where the external way to borrow money becomes critical given that internal funding via taxation has a clear limit. Therefore, the value of government bonds tends to change sensitively along the country's performance in times of conflicts because it is closely connected to the probability of government servicing its debt, specifically the likelihood of default and currency depreciation. Also, traders of government bonds tend to be risk-averse, which means that the fluctuations of bond prices are not likely to be random and affected only by serious political factors such as international conflicts. In this sense, in order to find how financial markets interact with interstate conflicts, government bonds seem to be a good indicator, directly reflecting people's expectations and evaluation of a state's performances related to interstate conflicts.

### 3.3. How governments and investors interact with each other sequentially

Investors' main concern is positive future returns of their assets, which are discounted to the present, reflecting their riskiness (a risk premium). The current price of an asset is mainly characterized by the *expected* future return by investors. On the basis of the theory of rational expectations, the so-called *rational* investors form an expectation of future prices of assets and trade their securities accordingly in the secondary market in ways to maximize their profits. These Muth's agents (Lucas 1972; Muth 1961) are said to be able to make full use of available information as to market conditions and investment risks to reduce systematic errors in matching their subjective prediction of

market indicators to their objective future distribution in an uncertain world (Krause 2000, 286; Sheffrin 1996, 1-11). Based on this layout, Guidolin and La Ferrara (2010) provide a generic pricing formula of an asset:

$$P_t = \sum_{j=1}^H \frac{E_t[C_{t+j}]}{\prod_{j=1}^H (1 + r^f + E_t[\pi_{t+j}])}$$

where  $E_t[\cdot]$  designates the expectation operator conditional on  $\zeta_t$ , the information set available at any given time  $t$ ,  $C_{t+j}$  denotes the future cash flow, which means coupon if an asset is government bond,  $\pi_{t+j}$  is the future risk premium imposed on the asset,  $r^f$  is the riskless interest rate, and  $H$  is the investment horizon. A new piece of news may cause a change in investors' information set  $\zeta_t$  (i.e. from  $\zeta_{t-1}$  to  $\zeta_t$ ) that will affect their expectations of future cash flows or risk premia, leading to a change in the price of asset (i.e. from  $P_{t-1}$  to  $P_t$ ) (Guidolin and La Ferrara 2010, 637).

Considering that cash flows generated by the bonds (i.e., coupons) are *fixed* over time, a change in the bond prices (or the yield) occurs when a change in the information set causes an update of the bond's *expected* future risk premiums. For example, if new information tells investors that the risk related to an investment in a certain government bond is deemed to be rising, bond prices are likely to decrease due to investors' sell-off. Therefore, the manner in which such new-to-market information is perceived by investors determines their expectations of the government's future risk premiums. In other words, the values of government bonds are a function of investors' *subjective* perceptions of a country's *objective* risk factors.

When we switch the viewpoint from investors to states, the factors that are enumerated in the previous chapter as determinants of the government bonds can be seen

as the signals that governments send to international financial markets on their sovereign debt costs. Given the discussion on the signals that market participants take into consideration in investing, it is obvious that every state wants to signal its economic and political stability. Since the value of government bonds reflects markets' evaluation of states' credit risk, they have incentives to send market-friendly signals to improve their borrowing terms. How states and sovereign debt markets have reciprocal effects on each other can be theorized more in detail, based on the causal mechanism that Mosley (2000, 739-40; 2003, 14-6) lays down about the relationship between international financial markets and national governments (or government policies).

<Figure 1> depicts the action-reaction cycle between states and financial markets around government bond yields. This is not a strategic game between the two parties but an illustration of how they interact each other sequentially. My theoretical explanation consists of two parts. The first action-reaction part is that states send signals on their economic and political conditions to market actors and these investors interpret and evaluate states' signals. As a result, investors' reactions to various signals related to a country's credit risk are realized as a particular value of its government bonds. In other words, the yield of government bonds corresponds with market participants' assessments of a country's credit risk.

Once the bond yield is set on the markets, the second part comes next; it is about how the bond yields function as financial market pressure on governments and whether they change their policies or actions accordingly. Given capital mobility, a state's status in the international markets, its capability to mix up different kinds of revenue collecting measures, and the relationship with its allies, the level of government bonds is considered

either a strong (irresistible) or weak (negligible) market pressure by a state. In general, if the yield of government bonds is set higher than a state used to experience, it is likely to be perceived as a strong market pressure, since the state shoulders more burden in collecting government revenue and thereby having more difficulties in employing certain socioeconomic policies. Hence, depending on the magnitude of financial market pressure, governments either try to adjust their policies or change their actions in the direction of improving their credit risks, or maintain its policies/actions in exchange for paying high market prices. These responses of states to the financial market pressure serve as new signals to the sovereign debt markets in the next round.

To sum up, in the first round, the values of government bonds, as the market participants' interpretation of states' signals, work as financial pressure to states' decisions on certain socioeconomic policies or actions, which flow in the sovereign debt markets as new signals states are sending in the second round. The advantage of this iterative model is that both investors and states continually update their beliefs about each other.

Specifically, how is this framework applied to conflict-related context? Say, state A mobilized troops and transported military supplies to the frontlines against state B. In this situation, based on the framework I delineated, government bondholders interpret this A's action as a signal that two states are at imminent risk of war. Also, let's assume investors assess that state A is more likely to win, based on the other signals markets have received. Then, according to their evaluation of state B's heightened credit risk, market participants start to sell off government bonds of state B, resulting in an increase in its yield of bonds.

The high yield places state B under pressure, in the sense that high external borrowing cost constrains state B's finance. If state B does not have any available option to collect revenue for future war expenditure, its high yield is perceived as a strong market pressure. This has a significant influence on state B's decision on whether to go to war. Referring to the bargaining model, this strong market pressure opens up a broader bargaining range between both states, since state B's expected cost of war has increased. As a result, the high yield of state B discourages it to take a further step towards war and make it try to persuade state A to sit at the negotiation table. State B's effort to terminate its dispute with state A is perceived as a new signal by the international investors; this time, the signal that state B has sent may relieve investors' concern about the risk of war and lead to decrease in state B's yield of bonds. As such, states' signals regarding conflict engagement, escalation and termination affect the value of government bonds via market actors' assessment, which in turn, have an effect on states' further actions by causing changes in their finances and bargaining range.

Based on this theoretical sketch, in the remainder of this section, the two parts of my theoretical framework will be discussed more in detail, respectively. First, I outline how the yields of government bonds vary according to states' different pre-war signals. Second, I theorize how states' conflict escalation or termination actions are affected by sovereign borrowing costs. Third, I explain investors' different reactions to conflict signals depending on their holdings of developed or developing countries' government bonds.

### 3.4. Market responses to different types of conflict signals

Although we expect an interstate dispute to be harmful for government bondholders, the concrete mechanism through which investors perceive international disputes in the process of their risk assessment is uncertain. I theorize that the effect of international disputes on government bond markets is likely to be conditional on how investors evaluate the actual risk that interstate disputes would impose on their investments. In particular, additional to macroeconomic and institutional factors, an international dispute is seen as dangerous for their investment if bondholders believe that the probability of escalation to war is high. Further, in case in which bondholders view high prospect of war, their prediction of the outcome of war changes investors' perceptions of the actual risk accompanied by interstate disputes.

#### 3.4.1. The likelihood of escalation to war

In the face of international disputes, investors assess whether such disputes would endanger their investments in government bonds. If an interstate crisis is expected to exacerbate a state's default, inflation, or currency risk substantially in the future, then bondholders would show negative reactions. Then, based on what information would investors judge whether a dispute is likely to be costly for their investments and for the overall national economy? Given investors' fear of the disruptive effect of war, the first factor to consider is how likely a crisis is to develop into war. For investors to evaluate the likelihood of escalation to war, they need information on the economic costs a state is willing to absorb in such a crisis.

Based on this information, investors classify interstate disputes into high-cost and low-cost ones. A high-cost dispute heightens the prospect of war significantly in that it

leads to high physical costs for the state. In the face of high-cost disputes, investors are likely to believe that their investments and the state's credit are in danger and, as a result, show negative reactions. On the contrary, a low-cost dispute has a low probability of escalating into all-out war in the sense that it entails low economic costs for states. Therefore, investors are less concerned about experiencing low-cost disputes.

From investors' perspectives, whether a dispute is perceived as high or low cost depends on the economic investment that a state is initially willing to put into the crisis. When a dispute starts with a state's costly action in a fiscal sense, investors tend to predict that war will materialize sooner or later. In line with Fearon's (1997) explanation of *sunk-cost signals*, the economic costs that the state has paid in the first place reflect its resolve and increase its expected value for fighting against quitting.<sup>8</sup> Therefore, investors pay attention to states' costly conflict-starting actions because the economic costs that states have burdened serve as a credible signal to investors, indicating states' willingness to escalate the dispute into an actual war. In addition, the actual fiscal spending associated with the start of a dispute can undermine the state's coffers, raising the possibility of the state reneging on its debt obligation. On the contrary, when a conflict-starting action is inexpensive for a state, it is insufficient for investors to ensure that this dispute will be actualized into war, even if it can exacerbate tensions among states to some extent. Until the adversary challenges, for states that initiated a costless dispute, there is no reason to develop into war in an economic sense due to the absence of sunk costs. Moreover,

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<sup>8</sup> Previous studies present tying-hands signals or audience costs as another type of cost mechanism that ramps up the prospect of war (Fearon 1997). In this study, I focus only on the sunk cost mechanism, because it is more tangible to explain a state's real financial cost and to link it to investors' economic interests as well as states' credit risk. Not including the audience cost mechanism sets up a conservative test which would make it harder for my empirical analysis.

because the state's spending is not attached to the onset of this dispute, investors need not worry about the state's financial situation or its ability to repay its debt. In brief, the cost that a state has incurred in the initiation of a dispute hints at the economic costs that it is willing to absorb in the crisis, and for investors this is a useful clue about the state's willingness to escalate this crisis to war.

Based on their classification of the types of interstate disputes, investors determine their market behaviors. If investors predict that the state whose bonds they purchased is most likely to plunge into war, they start to sell off their government bonds. Seeing the state start a costly dispute makes investors reluctant to keep their bonds, because the state's commitment to becoming involved in a potential war seems strong and the state's economy has been and will be negatively affected by this dispute as well as the possibly upcoming war. According to the forces of supply and demand, investors' sell-off of government bonds will lead to a plunge in their prices, and in turn, a surge in the yield of government bonds or sovereign borrowing costs in markets.

Furthermore, bondholders' evaluations of the actual risk that interstate disputes would impose on their investment are not limited to conflict-start actions. In fact, not only the onset of an interstate dispute but also all kinds of dispute incidents, both states' conflict-initiating and escalating actions, are taken into consideration when investors assess the prospect of war. In a case where the first incident of a dispute started with a costless action but the disputants developed into a costlier incident within a month, investors would react to the second incident negatively since the probability of escalation to war has increased. Therefore, I hypothesize that investors not only care about the first incident of a dispute but also keep track of how it develops over time in order to exactly

evaluate the prospect of war. Investors' sell-off of government bonds would be accelerated as disputants are involved in costlier dispute incidents.

*H1-1: The onset of high-cost disputes is expected to increase the average bond yields of the parties in dispute.*

*H1-2: The onset of low-cost disputes is not expected to increase the average bond yields of the parties in dispute.*

*H2: The average bond yields of the parties in dispute are likely to rise as they are involved in more hostile dispute incidents.*

#### 3.4.2. The predicted outcome of potential war

Taking one step forward, investors' decisions to act on a high-cost dispute are conditional on their calculation of which state will be the winner, in the sense that the winner is little expected to experience negative economic repercussions from this dispute or a potential war following it. In other words, facing a high-cost dispute, bondholders do not always react to it negatively but their reactions additionally depend on their speculation about the outcome of a potential war. I assume two different cases related to investors' prediction of potential war outcomes.

First, if investors predict there will be a clear winner in the upcoming war, I expect that the bond yields of the predicted winner will change marginally, whereas the yields of the predicted loser will rise significantly. Even if a state's engagement in war itself raises its credit risk, the high win probability mitigates investors' concerns about the likelihood of the state renegeing its debt obligation. Investors believe that the upcoming war is not so precarious for the expected winner because the benefit of war (including war indemnity) can exceed its military spending and economic disturbance war might

cause. Therefore, there is no desperate need for investors to sell off government bonds of the expected winner, regardless of a temporary negative influence of an upcoming war on the state's economy. On the other hand, in most cases, credit of the expected defeated state becomes in danger, since there is no way that this state can compensate its costs of war and extensive damage to its economy, which is likely to be followed by the state's default on its debt. As a result, to minimize their loss in investment, investors would throw off their bonds of the expected loser in advance, which will lead to a plunge in bond prices and a surge in bond yields.

In fact, in case of the Iraq War of 2003, Amihud and Wohl (2004) report that even if US stock prices fell down and the US dollar against the Euro was weakened, as the probability of the outbreak of war rose, these effects turned out to be statistically insignificant. Although this study is not directly about the US Treasury bonds, the underlying mechanism of how financial instruments react to international conflicts is not so different. Even if the American military actions towards Hussein regime heightened the risk of war and investors' concerns about the US economy, their overall beliefs on the high win probability of the US neutralized their worries. Therefore, the probability of the onset of war and US stock prices or exchange rates showed a weak negative relationship. This study accentuates investors' expectations of the outcome of international disputes determining their trading behaviors, when they perceive high risk of an upcoming war.

There could be a second case where the parties in dispute are too close to call from investors' perspectives. When conflict participants are approximately evenly matched, bondholders would have difficulties predicting a clear result of the upcoming war. In this case, investors would demand higher risk premiums on both sides explicitly,

since they predict that this dispute would head for a more protracted war and be more economically costly for each side, which is closely linked to an increase in both sides' default probabilities. As a result, markets are likely to show a significant rise in the government bond yields of both participants.

To sum up, when investors perceive the onset of a high-cost dispute that projects high risk of war, investors' bond trading behaviors vary depending on their prediction of the outcome of the expected war. First, if investors predict a clear outcome of the expected war, the bond yield of the predicted winner would rather stay stable, whereas the predicted loser's yield would increase significantly. Second, if the outcome of the expected war is ambiguous to investors because the two conflict participants are on an approximate par with each other, the bond yields of both sides would increase significantly.

*H3-1: The onset of high-cost disputes is not expected to increase the average bond yields of the party in dispute that is predicted to win potential war.*

*H3-2: The onset of high-cost disputes is expected to increase the average bond yields of the party in dispute that is predicted to lose potential war.*

*H3-3: The onset of high-cost disputes is expected to increase the average bond yields of the parties in dispute if they are predicted to draw in potential war.*

### 3.5. The debt-finance model (the revised bargaining model)

I lay out a general theory on how states' borrowing and their terms influence the likelihood of escalation to war as well as the outcomes of crises. In conflict studies, the bargaining model proposed by Fearon (1995) serves as a main tool to explain crisis situations between disputants. In the bargaining model, expected costs and benefits of war

as well as a state's win probability defines a bargaining range. Under the assumption that war is costly, states try to negotiate a settlement within a bargaining range from which both sides benefit over developing into war (Fearon 1995).

Slantchev (2012) proposes a formal model that combines Fearon's (1995) bargaining framework with sovereign borrowing as one of the war financing measures. Borrowed money is used to augment a state's military capabilities or mobilization capacity, which raises its win probability. On the other hand, considering that borrowed money is supposed to be repaid, it contributes to expected costs for states. In particular, Slantchev (2012) points out that a state must honor its debt obligation for certain if it reaches a settlement through bargaining, instead of going into war. This implies that a state's debt burden makes not only war but also peace (or bargaining) costly.<sup>9</sup> Further, in some cases, states' expected costs of peace even exceed their costs of war given the fact that historically states that lost wars tended to repudiate their debts (Slantchev 2012).<sup>10</sup>

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<sup>9</sup> There is no general consensus among scholars about how to define costs of war. The problem becomes more difficult when it comes to whether to include war finance measures in the expected costs of war. As Smith (2014) points out, "[I]f the war is debt financed, economists disagree about whether it is appropriate to include in the cost both the expenditure on the war and the interest on any debt incurred" (249). Assuming different war finance measures, including printing money, taxation, sell-off of foreign assets, "it is not clear that if a country chooses to borrow the cost is higher because of the debt interest when the adverse consequences of the other three methods of financing are not taken into account," in the sense that the inflationary effects, the contraction of citizens' consumption, or the loss of foreign assets are not counted in additional costs (Smith 2014, 249). Furthermore, "if one thinks that debt interest should be included, it is not clear how one should treat government default on repayment of the debt. Historically default on debt has been common after wars, particularly by losers" (Smith 2014, 249). Referring to Slantchev's approach, we can avoid this complexity by regarding the amount of borrowing and its interest as parts of costs associated with both peace and war, in the sense that a state must pay back regardless of reaching a negotiation or going to war.

<sup>10</sup> In his debt-finance bargaining model, Slantchev (2012) makes an assumption that in case disputants develop into war, a state always repudiates its debt if it loses the war. Because peace is not costless and the expected costs of debt service in the event of war are smaller than in the

As a result, adding the element of borrowing to the bargaining model changes its main proposition. In the Fearon's framework, the assumption of costly war and costless peace necessarily leads to the presence of a bargaining range. Hence, why rational states choose war over peace has been a long-standing puzzle. However, under the assumption of *costly peace* as well as costly war, it is possible for a bargaining range between states in dispute to disappear and the outbreak of war is not an anomaly that cannot be explained by states' rational choices (Slantchev 2012). To sum up, sovereign borrowing makes an important difference in accounting for states' conflict behaviors in a crisis situation, when added to the framework of the bargaining model.

I classify how a crisis ends into two types; either a crisis escalates into war or it terminates peacefully (through bargaining). First, I explain how sovereign borrowing costs affect both types of crisis termination at any given debt. Once a state is engaged in an interstate crisis, if its credit cost becomes more expensive in markets than it used to experience, the state is placed under heavier financial pressure, in the sense that its debt service becomes more costly. As a result, a rise in their interest rates discourages states to borrow money from markets, which reduces their available resources. Further, disputants expect even larger increases in their interest rates if they decide to go into war instead of terminating their crisis through bargaining because lenders will demand higher risk premium in the event of war. In other words, a rise in a state's interest rate raises its

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event of bargaining, in some cases, states in dispute deliberately go into war without suffering incomplete information, commitment problem, or indivisibility issue. However, I do not incorporate Slantchev's assumption in my explanation because states do not seem to consider renegeing on their debts at the beginning of a crisis. Even though states' default on their debts after losing wars occurred frequently throughout the history, states appear to regard their default as the *consequences* of war, rather than benefits of war (or costs of peace) that states take into account *before* they go into war.

expected costs of both war and bargaining; however, the expected cost of war would more than proportionally increase than the expected cost of bargaining. Hence, high interest rates make it difficult for states to take a further step towards war and rather expand the bargaining range between disputants. In summary, a state with a higher borrowing cost is likely to take a passive position in the bargaining process, which decreases both the likelihood of conflict escalation to war and its probability of winning a negotiation.

*H4-1: As a state's borrowing cost increases, the likelihood of conflict escalation to war is expected to decrease.*

*H4-2: As a state's borrowing cost increases, the probability of the state winning the crisis is expected to decrease.*

Second, while at any given debt sovereign borrowing costs serve only as financial burden to states, their debts have more complicated impacts. On the one hand, the amount of debt of a state can be an indicator of its available economic resources. Considering that a state is able to coerce its enemies into more concessions if it is backed by abundant resources, a state with higher debts can take a more aggressive position in the bargaining process. However, considering the obligation of debt servicing, more borrowing imposes heavier pressure of repayment on states, on the other hand. In particular, if states in dispute reach a settlement through bargaining, then there is no way they can renege on their debts. This means that peaceful negotiations are attractive to disputants only when the outcome of bargains or the negotiation payoffs of states exceed their debts that must be paid back. Therefore, the effect of borrowing on states' bargaining behaviors is expected to differ depending on their debt levels. In cases where bargaining payoffs are

strictly larger than war payoffs even considering the amount of debt to repay, states do not want to escalate their crises into wars. As a result, up to a certain level, states with larger amounts of debt are likely to be more passive in the bargaining process in order to prevent disputants from developing into war. In other words, the aspect of costs that is accompanied by borrowing is a more influencing factor than its aspect of benefits until debt is limited to an affordable level. Hence, states with heavier debts are less likely to win a crisis.

However, when the amounts of debt surpass beyond a certain level, which makes little difference between payoffs from bargaining and war, states have less incentive to sit at the negotiating table. Heavily indebted states are likely to push their minimal demands further in the process of negotiation, even risking the outbreak of war. Larger amounts of debt not only give states confidence in waging potential war but also raise the costs of debt servicing too much so that states gamble on victory in potential war instead of bargaining. As a result, the bargaining range between disputants is likely to shrink and the likelihood of conflict escalation to war increases.

*H5-1: The likelihood of conflict escalation to war is expected to increase when states in dispute are heavily indebted.*

*H5-2: As a state's debt increases, the probability of the state winning the crisis is expected to decrease.*

### 3.6. The differences between developed and developing countries

The economic development status of a state (i.e., bond issuer) makes differences in market responses to conflict signals. In addition to the prospect of war and predicted outcomes, investors consider whether a bond issuer is a developed or developing country

when they determine which crisis is likely to be costly for their investments as well as for the overall national economy. Even a low-cost dispute can harm investors holding government bonds issued by developing countries. This is attributed to investors' different perceptions of the actual credit risk of emerging economies despite their objective risk statistics.

In recent years, scholars have begun to examine how investors' perceptions of different types of governments affect markets' determination of states' risk premiums or the *peer effect* on sovereign borrowing costs (Brooks et al. 2015; Gray 2013; Gray and Hicks 2014). A variety of investors' classification of governments serves as a heuristic or cognitive shortcut when investors need to put excessive energy and time into garnering information about states' risk factors or when information is abundant (Brooks et al. 2015). For example, when investors faced new sovereign actors in the 1970s and 1980s, the easiest effort investors made was to bind these countries into one category, *emerging economies*, in contrast with developed economies, even before investigating the detailed specifics about risk factors. Based on this categorization, investors treated developed and developing countries differently by imposing high risk premiums on the latter, even if their macroeconomic fundamentals were similar (Mosley 2006).

In principle, investors should treat developing countries differently from developed countries in a way of putting developing countries under greater scrutiny. Because the creditworthiness of developing countries' governments can be hard to ascertain, investors need to garner a wide range of information (Mosley 2003) than the economic and political factors that are mentioned in the existing literature. Investors have little trust in governments of developing countries in terms of their willingness and ability

to uphold their debt obligations, because of their political incompetence or inconsistency about managing the economy, allocating funds, and securing budgets.<sup>11</sup> In this sense, Mosley (2003) argues that “investors will consider not only macropolicy indicators (e.g., inflation, deficits, and debt), but also supply-side policies, labor market regulation, and the composition of government spending” to enhance the accuracy of assessments of developing countries’ credit risk (35).

Although some research has focused on the specific determinants of developing countries’ sovereign borrowing costs (Archer et al. 2007; Min 1998; Mosley 2003; Nogués and Grandes 2001; Rowland 2004; Rowland and Torres 2004), collecting a wide range of information is time-consuming and demanding for individual investors; moreover, they are frequently frustrated by the poor quality<sup>12</sup> or unavailability of information<sup>13</sup> on developing countries (Aronovich 1999, 468; Friedman 1983). As such, it is reasonable and efficient to some extent for investors to rely on a broad typology of states rather than assess each country’s risk factors rigorously. Moreover, when investors have a lack of experience or knowledge, they have high incentives to follow the behavior

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<sup>11</sup> Mosley (2003) points out this aspect, noting “[I]nvestors assume that, no matter which political parties are in office in developed economies, governments will uphold their debt servicing obligations. But in emerging market economies, market participants often *do not* make this assumption. It is not unthinkable for a government to win domestic political favor by dealing harshly with foreign investors, or for political instability to generate a sovereign default” (115).

<sup>12</sup> “Investors often worry about the transparency, integrity, and timeliness of data released by emerging market government” (Mosley 2003, 39). As such, one way in which to overcome this information issue is to find the same information from different domestic and international sources (e.g., government branches, private sectors, international organizations), instead of counting solely on a government’s official statistics.

<sup>13</sup> Few developing states received bond ratings by CRAs before the 1990s. Archer et al. (2007) note that “[A]mong the fifty developing countries in our sample, only Venezuela was rated in the 1970s. In the 1980s, only nine countries in the sample received bond ratings. That number has increased almost six-fold over the past decade, suggesting the growing importance of CRAs in developing capital markets” (346).

of others (so-called “herd mentality”). What this implies is that even one investor’s irrational judgment about a country’s investment risk can spread easily and dominate markets. In reality, when investing in developing countries before the mid-1990s, the determination of these states’ borrowing costs was less guided by markets’ evaluations of objective risk statistics and often more by investors’ subjective perceptions of states’ credit risk.<sup>14</sup>

Among risk factors, political ones are more problematic for investors to deal with. The ambiguity of defining and quantifying relevant political variables leads investors to settle for a vague scope of information under the flag of “political context” or “political stability” (Archer et al. 2007).<sup>15</sup> This implies that bondholders presume that any trivial political event, which would be neglected in assessing a developed country’s credit risk, can exponentiate their investment risk of developing countries. Since many unobservable and unpredictable routes seem to be able to undermine the political landscape in developing countries, “even if general economic and political profiles [of both countries] are identical,” the same political event exerts different influences on developed and developing countries (Brooks et al. 2015, 588). As a result, in terms of political factors, markets’ perceptions of the actual risk heavily rely on the developed/developing country categorization.

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<sup>14</sup> Eichengreen and Mody (1998) report that even in the 1990s, “observed changes in [macroeconomic] fundamentals explain only a fraction of the spread compression ... in emerging markets” (3).

<sup>15</sup> Even CRAs, professional bond raters, are unable to reach consensus about specifically which political factors should be considered when assessing the sovereign credit risk of emerging economies, even though the raters all agree on the importance of political factors in their ratings (Archer et al. 2007, 357-58).

In this context, when investors perceive a developing country initiating an interstate dispute, even if its conflict-starting action is such low cost that the probability of this dispute being actualized into war is objectively low, they do not ignore this signal because even such a crisis can exacerbate tensions among states to some extent. Hence, both low- and high-cost disputes can easily disturb investors holding developing countries' government bonds by raising uncertainty. Moreover, once the fear of uncertainty prevails in financial markets when developing countries are engaged in an international dispute, the herd mentality is likely to capture investors, which inhibits them from reacting rationally based on their objective assessments of the macroeconomic fundamentals and consequences of the dispute. For instance, after the onset of the Russia–Ukraine conflict, the value of the Russian ruble plummeted despite Russia's abundant stack of foreign currency holdings. Therefore, I hypothesize that the effect of an international dispute is likely to differ depending on whether the bond issuer is a developed or developing country. I expect that even the onset of low-cost disputes would lead investors to sell off the government bonds issued by developing countries. In the same context, the effect of hostility of any type of conflict actions on developing countries' bond yields is expected to be greater than on developed countries' bond yields.

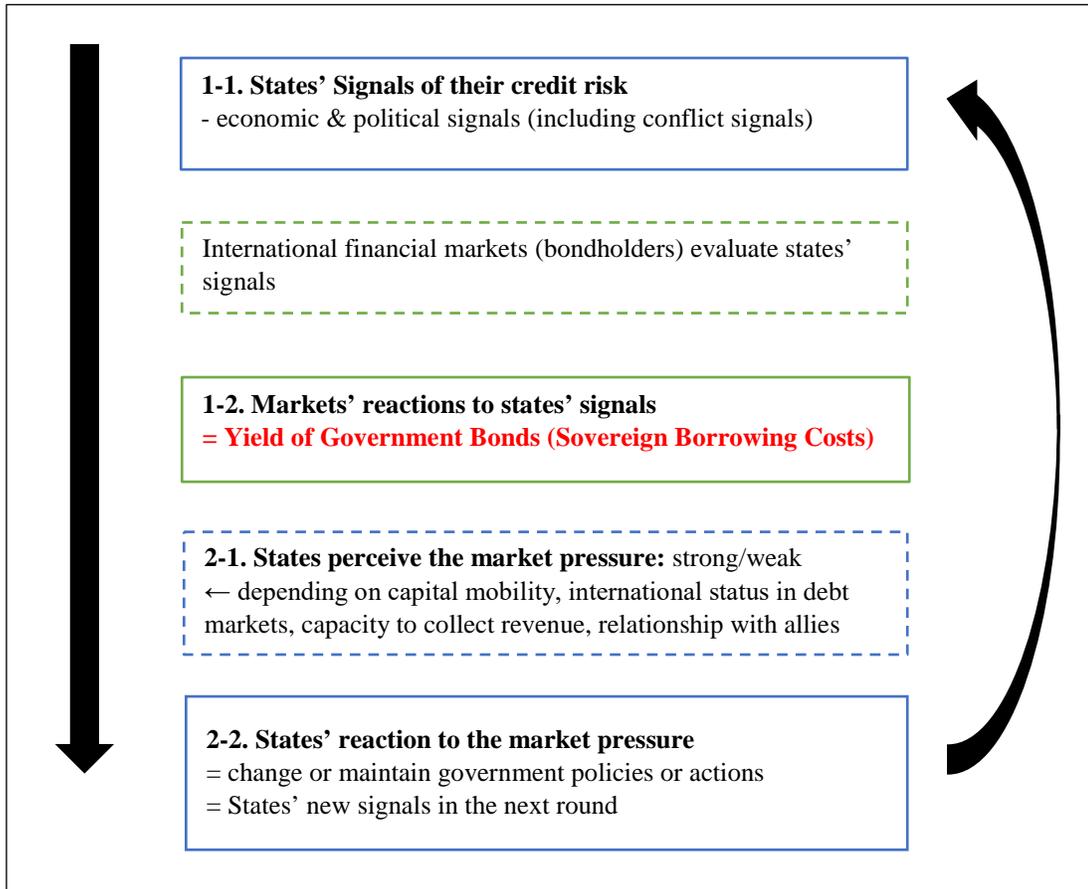
*H6-1: The onset of high-cost disputes is expected to increase the average bond yields regardless of whether the parties in dispute are developed or developing countries.*

*H6-2: The onset of low-cost disputes is not expected to increase the average bond yields if the parties in dispute are developed countries.*

*H6-3: The onset of low-cost disputes is expected to increase the average bond yields if the parties in dispute are developing countries.*

*H7: The effect of hostility of conflict actions on the average bond yields of the parties in dispute is likely to be greater when they are developing countries.*

Figure 1: Action-Reaction between Bondholders and Governments



## CHAPTER 4: THE EFFECT OF INTERSTATE DISPUTES ON GOVERNMENT BONDS

“As these fears have been stoked, whether it has been Russia and Ukraine or Israel and Hamas or Iraq, it seems to me that there's been a bigger reaction in the government bond markets of the most safe-viewed governments.”

- Rich Steinberg, a managing director and partner at HSW Advisors, 2014.

### 4.1. Introduction and review of the theory

It is commonly asserted that “cannon fire is bad for money.”<sup>16</sup> In this chapter, I probe whether the relationship between interstate conflicts and government bond market responses is indeed a simple inverse function as many regard. The way the price of government bonds changes on secondary markets shows an explicit channel through which states and investors directly interact with other, in the sense that the market value of government bonds reflects investors’ evaluations of the state’s economic health and political stability. Taking a closer look at this channel, I examine how and when international disputes affect the prices of government bonds along with bondholders’ investment behaviors in the markets.

I theorize that when bondholders observe two states initiating an interstate dispute, their decision to sell government bonds is based on the extent to which they think such a dispute will put their bond holdings at risk. Specifically, two factors influence bondholders’ perceptions of investment risk. First, bondholders try to determine how likely this dispute will escalate into war, based on the assumption that investors abhor war because it raises the likelihood of their government bonds becoming a scrap of paper.

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<sup>16</sup> This remark capturing the aversion of finance to war was coined by French Premier Jean-Baptiste Villèle in 1827 (Ferguson 2006, 78; Kirshner 2007, 9).

I show that when investors see a rising prospect of war, they sell their government bonds, driving up the interest rates of the disputants significantly. Second, in addition to the prospect of war, bondholders' diverse reactions to interstate disputes depend on the predicted outcome of the probable war. My theory suggests that even if investors believe an interstate dispute seems to have a high probability of escalating to war, they feel unsettled only when defeat of their bond issuer in the dispute is expected or when the outcome of the dispute is difficult to predict, incurring a significant rise in the interest rate of the country. This analysis highlights that investors are savvy enough to assess which interstate dispute will do harm to their investments. As such, five hypotheses developed in the previous chapter.

*H1-1: The onset of high-cost disputes is expected to increase the average bond yields of the parties in dispute.*

*H1-2: The onset of low-cost disputes is not expected to increase the average bond yields of the parties in dispute.*

*H2: The average bond yields of the parties in dispute are likely to rise as they are involved in more hostile dispute incidents.*

*H3-1: The onset of high-cost disputes is not expected to increase the average bond yields of the party in dispute that is predicted to win potential war.*

*H3-2: The onset of high-cost disputes is expected to increase the average bond yields of the party in dispute that is predicted to lose potential war.*

*H3-3: The onset of high-cost disputes is expected to increase the average bond yields of the parties in dispute if they are predicted to draw in potential war.*

I analyze my theory of when investors sell government bonds by using a dataset of Militarized Interstate Disputes (MIDs) and the values of government bonds of 25 countries for 1971–2010. I present supportive evidence that investors are sufficiently sensible to distinguish minor quibbles from major clashes among states and behave differently in trading government bonds. The findings of my study thus reveal that MIDs change contemporaries’ risk assessments and show a generalizable pattern of sovereign borrowing costs at the beginning of a conflict. In addition, this study provides an empirical test for the “rationality” of government bondholders to determine their investment behaviors.

#### 4.2. Cases, unit of analysis, and methods

I examine the way investors perceive interstate disputes and how their evaluations exert an influence on the values of government bonds. The unit of analysis is the state-month at the monadic level and the total number of observations is 3207. My time-series cross-sectional dataset covers 25 countries for the period from 1971 to 2010.<sup>17</sup> The time period I choose is characterized as the era of financial globalization after investors started to turn their attention to emerging markets and governments’ reliance on capital markets began to grow (Mosley 2003, 249-303).<sup>18</sup>

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<sup>17</sup> The sample countries are Canada, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Japan, Malaysia, Morocco, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, and United Kingdom. In selecting these sample countries, data availability was my primary concern. Next, I considered major power status and regions to be important, so that the entire dataset had a less skewed distribution.

<sup>18</sup> Government bonds were not as freely used by emerging markets as by developed countries until the mid-1990s (Archer et al. 2007, 345; Eichengreen and Mody 1998; Mauro et al. 2007, 1). “The value of the bonds issued by developing countries rose from negligible levels in the 1980s (less than \$3.5 billion in 1989) to \$24 billion in 1992, more than \$50 billion per annum in 1993-

My dependent variable (*Interest Rate*) is the monthly yield of benchmark government bonds for each state (i.e., the long-term interest rate), drawn from the International Monetary Fund (IMF)'s International Financial Statistics (IFS).<sup>19</sup> The high yield of government bonds means that a state is burdened by the expensive credit resulting from investors' perceptions of the state's high risk.

My first independent variable is the occurrence of interstate disputes. The onset of MIDs (version 4.1) is used to measure this variable, available from the Correlates of War project website (Palmer et al. 2015). MIDs are "united historical cases of conflict in which the threat, display or use of military force short of war by one member state is explicitly directed towards the government, official representatives, official forces, property, or territory of another state." (Jones et al. 1996, 163). The onset of MIDs (*MID onset*) is a binary variable, coded one when a state is involved in a MID in a given month and zero otherwise. This variable is disaggregated into two types: high-cost and low-cost MIDs.<sup>20</sup>

To test my first two hypotheses, a dispute is classified into the high-cost MID category if it started with a state's costly action. Of the 18 types of actions, if a state's (or the enemy's) first action is more severe than blockade (action level 13), I consider it to be a costly conflict-starting action. Hence, high-cost MIDs began with a state's action including blockade, occupation of territory, seizure, attack, clash, declaration of war, or use of CBR weapons, which are all examples of the actual use of force accompanied by

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95, and unprecedented \$102 billion in 1996, and even higher levels in 1997" (Eichengreen and Mody 1998, 1).

<sup>19</sup> The unit of the yields of government bonds is percentage per annum. Data are drawn from the IMF's website (<http://data.imf.org/?sk=5DABAFF2-C5AD-4D27-A175-1253419C02D1>).

<sup>20</sup> In the Appendix, the counts of each type are recorded.

significant financial expenditure for a state. On the contrary, a state's costless starting actions are used to measure low-cost MID, including threat to blockade, occupy territory, declare war, or show of force, alert, or nuclear alert at the beginning of a dispute. As these starting actions are easy for states to exhibit at no cost, they are examples of a threat to use force or a display of force. To construct these measures, I utilized MID *incident*-level data (MID 2.1 escalatory event data and MID Incident level). The MID dataset has information only on the highest action a state conducted in a given dispute. However, my focus is the actual action level of the *first* incident of a MID, not the highest action during the entire dispute. Therefore, to supplement the action and hostility level of a given MID occurrence, I use the level of a state's initial conflict-starting action for each MID.<sup>21</sup>

My alternative independent variable is the most hostile conflict action per month (*Highest Action*). Whereas my first independent variable captures only the hostility of a state's initial conflict-starting action, the alternative independent variable records the most hostile action of any incident(s) that occurred in a given month, using the MID *incident*-level data. Hence, in a case where the first incident of a MID started with a costless action but the disputants developed into a costlier incident within a month, this

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<sup>21</sup> If a state is engaged in multiple MIDs, only the information about a dispute that started with the costliest action in a given month is recorded in the dataset. Since the data do not reflect *daily* changes in bond spreads, we do not know exactly to which incident, either the first or the highest incident in a given MID for each month, investors reacted. For now, I assume that investors evaluate the likelihood of escalation to war when they see the *first* incident of a MID, and thereby this is a conservative test which would make it harder for my empirical analysis. For example, if a MID started with a costless action but the disputants developed into costlier actions within a month, this MID is categorized as a low-cost MID according to my coding rule and would produce a more conservative result for my hypothesis (the onset of low-cost MIDs is unlikely to increase the yield of government bonds).

variables records the hostility of the second incident. Assuming investors not only care about the first incident of a MID but also keep track of how a MID develops over time in order to predict the prospect of war, this variable serves as a good measure of the dynamics of disputes.

To test my last three hypotheses, I needed to disaggregate high-cost MIDs into three different categories: high-cost MIDs in which a state is expected to win or lose, or high-cost MIDs the outcome of which is difficult to predict. To measure investors' predicted outcome of high-cost disputes, for simplicity, I assume that investors expect that more powerful state would win the dispute and that they compare material capabilities between disputants to decide who is more powerful. To compare capabilities between states, I first calculated a proportion of all disputants' Composite Index of National Capability (CINC) scores, based on the Correlates of War (COW) project's National Military Capabilities dataset (v 5.0). Next, I used 0.6 (60%) and 0.4 (40%) as a cut-point to differentiate between disputes in which there is a clear winner/loser and ones of which it is difficult to predict the outcome. If a state's material capabilities make up more than 60% [less than 40%] of the both sides' capabilities, I consider that it is straightforward for investors to predict the state would win [lose] the dispute, whereas in cases in which a state's capabilities make up in between 40% and 60% of both sides' capabilities, I presume the disputants' capabilities are too close for investors to form an expectation of the outcome.

In addition, to accurately see the effects of the onset of MIDs, I control for ongoing MIDs, which can be a confounding factor influencing movements in government bond yields. I create a dichotomous variable (*Ongoing MID*) coded one if a country

continues to have an ongoing MID in a given month and zero otherwise. Moreover, a dichotomous variable related to a state's MID history is included (*MID history*). This is coded one if MID(s) occurred in the past 12 months and zero otherwise. This factor is expected to have an increasing effect on the yields of government bonds, because it is likely that a state's recent involvement in international conflicts has jeopardized its economy and thereby raised its credit risk.

As other controls, macroeconomic fundamentals need to be considered. First, I include U.S. long-term interest rates (*Proxy interest rate*) as the proxy of the global interest rate (or the yield of a risk-free government bond). By having the 10-year Treasury yield as a global proxy, we can control for common factors such as global economic trends that influence interest rates in all sample countries, raising the accuracy of the country-specific estimation.

Second, I calculated and added values of inflation (*Inflation*) in the analyses, using IMF's Consumer Price Index (CPI) data.<sup>22</sup> Government bond yields are likely to increase in tandem with heightened inflation risk. In fact, most financial elites in OECD economies are primarily concerned about inflation rates regarding investment in government bonds, since these developed countries have a low probability of default (Mosley 2000, 2003). Market participants do not want their bond values to be inflated away. Therefore, high inflation rates would lead investors toward demanding a high risk premium, that is, high yields of government bonds.

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<sup>22</sup> Data are drawn from Data the IMF's website (<http://data.imf.org/?sk=5DABAFF2-C5AD-4D27-A175-1253419C02D1>).

Third, I control for states' exchange rates (*Exchange rate*), national currency per U.S. Dollar at the end of period. They are log-transformed as a measure for this variable, extracted from IMF's IFS data archive. Exchange rates influence bond spreads in two contrasting ways. On the one hand, currency depreciation raises the interest rate premium (reflecting currency risk) since long-term government bonds are mostly denominated in local currencies. On the other hand, currency depreciation increases exports, helping boost the current account balance, which can lower a state's credit risk.

Fourth, I control for a state's debt-to-GDP ratio (*Debt-to-GDP ratio*), using data from the IMF's Balance of Payments (BOP) database.<sup>23</sup> As a measure of a state's debt, I used IMF's data of portfolio investment liabilities, created by debt securities, including bonds, recorded in U.S. Dollars. Excessive debt compared with a state's revenue or GDP is worrisome to investors because of the high likelihood of default as well as inflation risks. Flandreau and Zumer (2009) use the debt *service* to revenue ratio as the corresponding measure in their pre-WWI analysis. However, as Ferguson and Schularick (2006) point out, because the debt service itself is endogenous to the interest rate, using the debt-to-GDP ratio would be a more reasonable choice. I take the logarithm of the measure to correct for its skewness.

Fifth, the current account balance as a percentage of GDP is included in the model (*Current account balance*). This indicator represents states' economic performances, and it is directly linked to availability of foreign currency and ability to service their debts (Ferguson and Schularick 2006; Mauro et al. 2007; Mosley 2000, 2003). Data are

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<sup>23</sup> Data are drawn from the IMF's website (<http://data.imf.org/?sk=7A51304B-6426-40C0-83DD-CA473CA1FD52>).

extracted from the IMF's BOP database. As the current account balance deteriorates, investors are likely to become more concerned about a state's credit risk.

Sixth, the government budget balance as a share of GDP (*Fiscal balance*) is included. As an indicator of a government's fiscal sustainability, a state's budget deficit makes investors anxious about the possibility of reneging on its existing public debt. Moreover, investors watch a government's budget balance carefully because an accumulation of public debt may incentivize governments to inflate away their nominal values (Mosley 2003). I take data from IMF's Government Finance Statistics (GFS) database.<sup>24</sup>

Seventh, I control for GDP growth (*GDP growth*). Economic growth and bond yields seem to have a positive relationship. When the economy is strong, the demand for money becomes higher, which is likely to drive up interest rates. Also, stronger economic growth is often associated with higher inflation, which is, in turn, likely to boost interest rates. I take data from IMF's IFS database. In addition, I include the size of a state's economy in the models, using log-transformed GDP (*GDP*). Values are taken from the World Bank's Global Financial Development Database (GFDD).<sup>25</sup> A country that has larger national output is more likely to be able to repay debts in a responsible manner, which is expected to lead to lower yields of government bonds.

Eighth, whether a country has experienced any economic crisis such as external debt, domestic debt, inflation, currency crisis, or stock crash (*Economic crises*) is

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<sup>24</sup> Data are drawn from the IMF's website (<http://data.imf.org/?sk=3C005430-5FDC-4A07-9474-64D64F1FB3DC>).

<sup>25</sup> Data are drawn from the World Bank's website (<http://data.worldbank.org/data-catalog/global-financial-development>).

controlled for. Data are taken from Reinhart and Rogoff's (2009) archive. This dichotomous variable is coded one if a state has suffered any economic crisis in a given year and zero otherwise, and lagged by one year. States enduring an economic crisis are likely to have higher yields of government bonds. This factor serves as an indicator of a state's incompetent economic management and unstable fiscal conditions, which raises the possibility of repetitive disputes in the future and thereby undermines its international reputation among investors.

Lastly, I include regime type (*Regime type*) as a political control. The "democratic advantage" argument has claimed that states' political regimes are the largest determinant of access to credit and the level of borrowing costs in financial markets. Specifically, democracies can borrow money at a cheaper rate because they send a credible signal to loaners that they will service their debt responsibly (Dincecco 2009; North and Weingast 1989; Schultz and Weingast 2003). However, as recent studies have demonstrated that there is little difference between the abilities of democracies and autocracies to borrow money, such a democratic advantage holds only under particular conditions (Archer et al. 2007; DiGiuseppe and Shea 2015; Saiegh 2005).<sup>26</sup> For these conflicting reports, I do not exclude this political variable in the first place. Regime type is measured by using the Polity IV project scores, ranging from -10 to 10 (Marshall and Jaggers), and lagged by one year. The higher the score is, the more democratic a state is considered to be.

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<sup>26</sup> Despite not finding an association between cheaper borrowing costs and democracies, Tomz (2007) shows a conditional relationship between democratic setting and states' debt repayment. On the contrary, several scholars pay attention to the aspect of credit access (entering international bond markets) rather than the terms on which states sell their bonds when exploring the democratic advantage (Beaulieu et al. 2012; Sobel 2002). They report that democracies have easier access to credit than autocracies.

Since my dataset has a time-series cross-sectional structure, the use of ordinary least squares is problematic. To deal with disturbances that are temporally and spatially correlated and heteroskedastic across panels, a generalized least squares approach is one option. However, according to Beck and Katz (1995), this method (or the feasible generalized least squares formula for standard errors) produces extreme underestimates of parameter variability. Therefore, I employ the Prais–Winsten regression with panel-corrected standard errors instead. I correct for first-order autocorrelation within panels, while the coefficient of the AR(1) process is set to be common to all panels.

In the era of financial globalization, every information related to economic indicators flows in the financial markets quite promptly and investors are able to reflect it in their evaluations of states' credit risk mostly immediately. However, we are not certain about whether the effect of the occurrence of MIDs is going to hit the markets as promptly as other economic indicators do. Hence, both contemporaneous and one-month lagged MID-related variables are included in the models. I assume that it might take time (approximately one month) for their effects to be realized as a change in the yields of government bonds through financial markets.

#### 4.3. Data analyses

<Table 1> presents the empirical results for the effect of international disputes on the interest rates on government bonds. Model 1 displays how the overall MID onset affects bond yields. The onset of a MID in the current month (*MID onset*) appears to increase the current yields of bonds by approximately 0.048% (i.e., 4.8 bps)<sup>27</sup> at a 95% confidence level, other things held constant. Considering that the average monthly difference in bond yields

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<sup>27</sup> 1 basis point (bps) is equal to 1/100th of 1%.

is -0.032% (3.2 bps), the increase incurred by the occurrence of an interstate dispute is more than 1.5 times larger than the change during normal times. This result confirms that investors abhor a state's involvement in an interstate dispute, resulting in their urge to sell bonds and thus a significant jump in the yields of government bonds in the financial markets. Considering that *Lagged MID onset* does not turn out to be significant, the information related to MID occurrence also flows in the markets quite promptly as other economic indicators. The existence of an ongoing MID in the previous and current months (*Ongoing MID, Lagged ongoing MID*) seems to be insignificant as well. This finding reflects the fact that investors are more agitated by the uncertainty and probable negative aftermath that a starting conflict may precipitate than by an actualized conflict that they already perceive and experience. The dread of the future or what is in the realm of speculation appears to shake up markets more harshly than the suffering of the present or what is in the realm of reality.

With regard to controls, investors seemed to take proxy interest rates, inflation, current account balance, and marginally exchange rates and fiscal balance into consideration when determining the interest rate premiums of countries. As expected, proxy interest rates have the largest effect on states' government bond yields (0.372%, 37.2bps); movements of the U.S. Treasury yields lead the interest rates on government bonds of other countries. Among economic indicators, inflation is what investors care about most, which goes well with results of previous studies (e.g., Mosley 2000, 2003). Investors tend to raise interest rate premiums by 0.024% (2.4bps) significantly in tandem with an increase in inflation. Next, as the current account balance improves, investors tend to lower interest rate premiums significantly by 0.011% (1.1bps) at a 95% confidence level,

since an increase in this indicator represents an improvement of states' economic performances, directly linked to greater availability of foreign currency and increased ability to service their debts. In addition, investors appear to be marginally sensitive to governments' fiscal balances. Also, the coefficient of exchange rates is statistically significant at a 99% confidence level, despite its trivial magnitude; a 10% currency depreciation increases the bond yields of countries by 0.0002%. This result confirms that investors seem to be concerned about currency risk to some extent.

On the basis of the results presented in <Table 1>, we can surmise that the onset of interstate disputes harms states' borrowing costs. Besides proxy interest rates, the occurrence of a MID appears to have the largest effect on government bond yields. Government bonds issued by a state that started an international crisis are not attractive to investors, and in order for the state to sell its bonds, it needs to raise its interest rate premium. However, we next take a closer look at these results by specifying what kinds of international disputes actually affect investors.

<Table 2> reports how hostility of conflict actions in a given month affects the yields of government bonds. Model 2 shows that as a state's conflict action gets more hostile by one unit, government bond yields increase significantly by 0.003% (0.3bps) at a 95% confidence level. That more severe conflict actions are associated with higher interest rates confirms my theory that investors determine risk premiums based on their evaluations of the actual risk that interstate disputes would impose on their investments. Since states' more hostile conflict actions seem to be an indicator of the heightened probability of escalation to war, which put higher risk on the investment, bondholders regard them more

dangerous and show negative reactions by selling their government bonds or imposing higher interest rate premiums.

<Table 3> has Models 3 and 4, reporting the effect of high-cost and low-cost disputes on governments' bond yields. In Model 3, the most pronounced result is that the bond yields are influenced by the different types of interstate disputes. High-cost disputes occurring in the current month appear to raise countries' interest rate premiums as expected, whereas low-cost disputes do not turn out to exert the same effect. When investors observe a serious conflict starting, which heightens the likelihood of interstate war, they become agitated and commence trading government bonds through markets. As a result, a costly onset of a dispute raises the bond yield of a country by 0.084% (8.4 bps) at a 95% confidence level, all else being equal. The result implies that investors become anxious about not all types of conflict-start actions; investors are sufficiently sensible to distinguish minor quibbles from major clashes among states and behave differently in trading government bonds.

Model 4 presents how bond yields are affected by predicted outcomes when investors perceive high-cost disputes. The results allows us to conclude that investors are savvy to make a difference in investment behaviors depending on their predictions of conflict outcomes. Investors seem to feel insecurity more when they expect their bond issuer's defeat at the beginning of a high-cost dispute or when they are not able to predict conflict outcomes.

As I hypothesized, investors do not seem to worry about the occurrence of severe disputes when they expect their bond issuer's victory. The coefficients of expected-to-win cases, both current and one-month lagged cases, turn out to be insignificant even at 90%

confidence level. However, when a state is expected to lose a high-cost dispute that occurred last month, its current-month bond yield tends to rise by 0.214% (21.4bps) at a 95% confidence level. Considering that investors' prediction of the outcome is made at the very beginning of the conflict, investors do not seem to show immediate reactions to expected-to-lose cases since there is plenty of room for a change in their prediction as time goes by. Therefore, investors' sell-off of government bonds appears to be realized one month after a MID occurred. On the contrary, a significant and positive coefficient for the expected-to-tie cases shows up in the current month of a MID occurrence. Investors tend to raise interest rate premiums promptly by 0.175% (17.5bps) when they observe closely-matched states start to fight against each other. An immediate increase in bond yields in case of draw, relative to expected-to-lose cases, implies that markets abhor uncertainty more than anything. Again, the dread of the future or what is in the realm of speculation appears to shake up markets more harshly than the suffering of the present or what is in the realm of reality. Disputes between the states having similar capabilities are likely to bring greater uncertainty in the markets because of the probability of the disputes becoming prolonged and more destructive. In this sense, prompt reactions of investors to the onset of expected-to-tie cases accord with markets' rational thinking.

When a state initiates an interstate dispute with a costly action, investors who are holding the state's government bond become anxious about their investment. However, they start to sell their securities only when their bond issuer is expected lose the dispute or capabilities of the disputants are too close for investors to predict the outcome of the dispute. In these two cases, it is rational for investors to sell their government bonds before they lose all their investment in case this dispute develops into an actual war. One

interesting result is that investors make more prompt decisions to sell their government bonds when they have difficulties predicting who is going to win the dispute at first glance than when one party in dispute is obviously weaker than the other. Fear of uncertainty leads investors to withdraw their investment more quickly.

#### 4.4. Summary, conclusion, and implications

War is harmful to bondholders since it increases a state's default, inflation, and currency risks. Hence, the dread of a future war is expected to make bondholders agitated. However, the presented analyses show that investors do not always react negatively when they observe their bond issuer engaged in an international dispute. Instead, they assess the actual risk that the interstate dispute would impose on their bond investment. When evaluating how likely the dispute is to escalate to war, bondholders are sufficiently prudent to look at the economic cost that the state has invested in the onset of a dispute before they decide to sell their government bonds. Taking all kinds of conflict actions, including conflict-start ones, into consideration, investors' responses become more serious along with the hostility of MID incidents. Additionally, investors' risk perceptions depend on the predicted outcomes in case the parties in dispute go into war. Bondholders withdraw their investments when they perceive a high-cost dispute and expect their bond issuer's defeat in potential war or when they have difficulties predicting the outcomes of disputes.

My analyses shows the multifaceted layers of bondholders' responses to international disputes. In particular, against the background of rational expectations theory, I lay out specific criteria that rational bondholders use to evaluate states' credit risks when facing interstate disputes. The hostility of states' conflict-start or conflict-escalating actions

serves as a cue for the prospect of war to bondholders when they determine how much interstate disputes would harm their investment. Considering that some scholars, especially commercial liberalists, argue conflict has a negative influence on markets, whereas others find no significant effect, my study suggests an alternative theoretical framework in which both findings can be reconciled. The extent of uncertainty that bondholders feel at the outbreak of interstate disputes varies by different assessments of their danger.

My analyses thus offer an important policy implication to states. Since governments know that engagement in international conflict creates a bad impression with investors, resulting in rising interest rates, we can conclude that governments wish to enjoy cheap credit will try to keep away from foreign disputes in the first place. This new perspective contributes to existing conflict and IPE studies in the sense that the role of international bond investors may account for states' war proneness or the likelihood of conflict. In other words, by extending the disruption thesis, my result highlights that brisk international bond markets could lead to peace among states. In particular, states relying on external borrowing greatly would put more effort into maintaining peace to improve their creditworthiness. In this sense, since showing an actual commitment to peace is one way in which to change investors' risk perceptions, diversionary foreign policy would not be a viable option for countries that desire to be more integrated in international financial markets.

Table 1: The Effect of the Onset of Disputes

	Model 1
<i>MID onset</i>	0.048** (0.023)
<i>Lagged MID onset</i>	0.018 (0.027)
<i>Ongoing MID</i>	0.029 (0.029)
<i>Lagged ongoing MID</i>	-0.038 (0.029)
<i>Proxy interest rate</i>	0.372*** (0.022)
<i>MID history</i>	-0.008 (0.011)
<i>Inflation</i>	0.024*** (0.006)
<i>Exchange Rate (log)</i>	-0.005* (0.003)
<i>Debt-to-GDP ratio (log)</i>	-0.004 (0.006)
<i>Current account balance</i>	-0.011** (0.005)
<i>Fiscal balance</i>	0.003* (0.001)
<i>GDP growth</i>	-0.000 (0.002)
<i>GDP (log)</i>	-0.003 (0.007)
<i>Economic crises</i>	0.012 (0.011)
<i>Regime type</i>	-0.000 (0.002)
<i>Probability &gt; chi-sq.</i>	0.000
<i>Observations</i>	3207

\* Note: Dependent variable is the yield of long-term (10-year) government bonds (% per annum). The number of sample countries is 25. Numbers in parentheses are panel-corrected standard errors.

†p<0.10, \*\*p<0.05, \*\*\*p<0.01

Table 2: The Effect of Hostility of Conflict Actions

	Model 2
<i>Highest Action</i>	0.003** (0.001)
<i>Proxy interest rate</i>	0.370*** (0.022)
<i>MID history</i>	-0.012 (0.011)
<i>Inflation</i>	0.025*** (0.006)
<i>Exchange Rate (log)</i>	-0.005 (0.003)
<i>Debt-to-GDP ratio (log)</i>	-0.005 (0.006)
<i>Current account balance</i>	-0.010** (0.005)
<i>Fiscal balance</i>	0.002* (0.001)
<i>GDP growth</i>	-0.000 (0.002)
<i>GDP (log)</i>	-0.004 (0.007)
<i>Economic crises</i>	0.012 (0.011)
<i>Regime type</i>	0.000 (0.002)
<i>Probability &gt; chi-sq.</i>	0.000
<i>Observations</i>	3207

\* Note: Dependent variable is the yield of long-term (10-year) government bonds (% per annum). The number of sample countries is 25. Numbers in parentheses are panel-corrected standard errors.

†p<0.10, \*\*p<0.05, \*\*\*p<0.01

Table 3: The Effect of the Onset of High-cost vs. Low-cost Disputes

	Model 3	Model 4
<i>High-cost dispute onset</i>	0.084** (0.042)	
<i>Lagged high-cost dispute onset</i>	0.031 (0.027)	
<i>Low-cost dispute onset</i>	0.034 (0.041)	
<i>Lagged low-cost dispute onset</i>	0.008 (0.031)	
<i>High-cost dispute onset &amp; Expected to win</i>		-0.080 (0.053)
<i>Lagged high-cost dispute onset &amp; Expected to win</i>		0.083 (0.054)
<i>High-cost dispute onset &amp; Expected to lose</i>		-0.140 (0.093)
<i>Lagged high-cost dispute onset &amp; Expected to lose</i>		0.214** (0.086)
<i>High-cost dispute onset &amp; Expected to tie</i>		0.175** (0.074)
<i>Lagged high-cost dispute onset &amp; Expected to tie</i>		-0.087 (0.069)
<i>Ongoing MID</i>	0.030 (0.030)	0.030 (0.027)
<i>Lagged ongoing MID</i>	-0.039 (0.029)	0.013 (0.031)
<i>Probability &gt; chi-sq.</i>	0.000	
<i>Observations</i>	3207	

\* Note: Other control variables are left out in this table. Dependent variable is the yield of long-term (10-year) government bonds (% per annum). Predicted outcomes are calculated based on the proportion of CINC scores between disputants. I used 0.6 and 0.4 as cut-points for expected-to-win and expected-to-lose cases, respectively.<sup>28</sup> Numbers in parentheses are panel-corrected standard errors.

†p<0.10, \*\*p<0.05, \*\*\*p<0.01

<sup>28</sup> For robustness check, I tested for the proportion of CINC scores from 0.9 to 0.5 [0.1 to 0.5] for the expected-to-win [expected-to-lose] cases, varying by 0.05. There seem to be insufficient cases to produce statistical results when cut-points for expected-to-win [expected-to-lose] cases are greater [smaller] than 0.75 [0.25]. The significance of coefficients stayed the same across other cut-points.

## CHAPTER 5: THE EFFECT OF GOVERNMENT BONDS ON CRISIS TERMINATION

“To carry on war, three things are necessary: money, money, and yet more money.”  
- Raimondo Montecuccoli

### 5.1. Introduction and review of the theory

How do a state’s borrowing and its cost affect the way interstate crises terminate? It is commonly assumed that financial resources are essential for states to wage conflicts. We intuitively conjecture that if a state is short of money when it is engaged in a foreign crisis with another state, it would be more difficult for the state to survive in or lead the crisis in a successful way. Surprisingly, however, only a handful of conflict studies has delved into the question of the role of states’ financial resources in conflict situations, as Slantchev (2012) points out, “yet our theories of war are oddly divorced from financial consideration” (787). In this chapter, I examine the effects of sovereign borrowing and a state’s credit cost on how crises end. This chapter supplements political economic perspectives to previous conflict studies, by investigating the impact of a state’s finance on different types of crisis outcomes in a broader sense.

States rely on borrowing to a great extent in order to collect their revenues both in times of peace and conflict.<sup>29</sup> In particular, borrowing becomes more essential for states in times of conflict, since they need to raise military expenditure so as to augment their military capabilities. Increased need for military spending incurs high demand for money. Compared with other measures to increase states’ revenues, including taxation or

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<sup>29</sup> According to the statistics from the Bank for International Settlements, over the past 10 years, the ratio of debt to the total GDP of states has surged up to 220% especially in developed countries (Retrieved from <https://www.bis.org/statistics/secstats.htm?m=6|33|615>).

monetization (printing money), borrowing has relatively stronger political and economic advantages, in that it has less distorting effects on national economy, provokes less complaints of citizens, and fills up the demands for money in a more timely manner (Cappella 2012; Slantchev 2012). The large extent to which states rely on borrowing in conflict situations is well described in Cappella's (2012) finding reporting that 93% of all wars were financed through domestic or external borrowing. In this context, a state having easier access to credit markets is supposed to finance its conflict activities more easily than its enemy and lead a crisis to its advantage due to increased military capabilities.

However, sovereign borrowing is costly in the sense that a state has to repay its debt, although more money through borrowing raises its probability of taking an advantageous position in a crisis situation. In other words, the obligation of debt repayment makes states balance against excessive borrowing. Further, considering that borrowing in credit markets is not free, the burden that states have to shoulder increases depending on the level of interests. Given any amount of debt, it is more beneficial for a state to borrow money at cheaper rates so that it does not have to put a large amount of government budget into servicing its interest. Hence, states need to choose the optimal level of borrowing taking its cost into consideration.

In this study, referring to Slantchev's (2012) debt-finance bargaining model, I theorize how states' borrowing as well as their credit costs lead to different crisis outcomes in two ways: whether a crisis is likely to escalate into war and if not who will be winner of the crisis. My basic assumption is that the amount of debts of states and their borrowing costs change their calculations of war and peace (i.e., bargaining) payoffs

based on which a bargaining range is defined and states' conflict decisions are made. While the amount of debt has contradictory effects on a state's waging conflict, augmenting its win probability on the one hand, but increasing the burden of debt service, on the other hand, the level of borrowing costs only contributes to financial pressure on a state's economy. Therefore, the way a state's borrowing influences a bargaining range is different from the way sovereign borrowing costs do. High interest rates lead states to be situated in a passive position in the bargaining process. On the contrary, states try to avoid developing into war as far as the amount of debt is bearable, but once it exceeds a certain level, states turn more aggressive and prefer escalating to war over staying in the bargaining process. Four hypotheses are summarized below.

*H4-1: As a state's borrowing cost increases, the likelihood of conflict escalation to war is expected to decrease.*

*H4-2: As a state's borrowing cost increases, the probability of the state winning the crisis is expected to decrease.*

*H5-1: The likelihood of conflict escalation to war is expected to increase when states in dispute are heavily indebted.*

*H5-2: As a state's debt increases, the probability of the state winning the crisis is expected to decrease.*

I analyze my theory of how states' debt conditions affect crisis termination by using a dataset of Militarized Interstate Disputes (MIDs) and the values of government debts and sovereign borrowing costs of 56 countries for 1816–2007. I present supportive evidence that high borrowing costs suppress the likelihood of escalation to war as well as a state's win probability in a crisis, while large amounts of debt beyond an affordable

level push states to increase their minimal demands excessively in the bargaining process, which makes peaceful termination of crises more difficult. These findings shed light on the connection between a state's finance and conflict decisions.

## 5.2. Cases, unit of analysis, and methods

In analyzing the effect of states' debt loads and their interest rates on how crises end, I utilize MID dataset (v4.1), available via the Correlates of War project website (Palmer et al. 2015). The unit of analysis is a state in a given MID. In other words, if a MID has two participants (state A and B), two observations are included in my dataset. MIDs that occurred from 1816 to 2007 are covered but the disputes that are *short of war* are excluded.

My first dependent variable is the likelihood of war. It is a binary variable, coded one when a MID is escalated into war and zero otherwise based on the MID dataset's hostility information. My second dependent variable is the outcome in a given state-MID. The disputes that developed into war were excluded. The original dataset classified the outcomes into 9 different categories, but I recoded them as three major results: victory, defeat, and draw.

My first independent variable (*Interest Rate*) is borrowing costs of each state, which is measured as a state's long-term interest rate (i.e., yield of a state's benchmark government bond) of the first month of a dispute,<sup>30</sup> drawn from Global Financial Data. Higher interest rates indicate that states burden more expensive credit. My dataset retains information about 56 states' interest rates.<sup>31</sup> Next, my second independent variable is a

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<sup>30</sup> The unit of interest rates or yields of government bonds is percent per annum.

<sup>31</sup> My sample countries include Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Cuba, Czechoslovakia, Denmark, Egypt, El Salvador,

state's gross debt (*Gross Debt*), which is taken from IMF's Historical Public Debt Database (2010). It is log transformed to correct for skewness of the distribution. Third, I included an interaction term between my two independent variables. By this interaction term, I test whether higher interest rates are more burdensome to heavily-indebted states, leading them to go into war instead of staying in the bargaining process.

In addition, I calculated the difference between a state's interest rate of the first month and the previous month of a dispute (*Diff\_Interest*). This variable captures investors' evaluations of the consequences of a MID, considering that when lenders believe that a MID is expected to put their investments in danger, they impose high risk premium on the state in dispute. Therefore, a high value of this measure, meaning that a state's interest rate has changed much upon the onset of a MID, indicates that investors expect the dispute to become more harmful to the state. Therefore, a higher value of this variable is likely to be associated with higher likelihood of escalation to war and a state's lower win probability in a dispute.

For controls, I referred to existing literature on the likelihood of war and war outcomes to select several factors that are expected to affect crisis termination. First, capabilities of states (*Capabilities*) are measured by Composite Index of National Capability (CINC) scores, drawn from National Material Capabilities (v4.0) dataset (Singer et al. 1972; Singer 1988). A CINC score is created based on states' military expenditure and personnel, energy consumption, industrial production, and total and

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Estonia, Finland, France, Germany, Greece, Guatemala, Honduras, Hungary, India, Ireland, Italy, Jamaica, Japan, Luxembourg, Malaysia, Mexico, the Netherlands, New Zealand, Nicaragua, Norway, Pakistan, Paraguay, Peru, Poland, Portugal, Russia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Trinidad and Tobago, Turkey, the UK, Uruguay, the US, Venezuela, Yugoslavia, and Zimbabwe.

urban population. Hence, it captures a variety of material capabilities that could affect states' abilities to wage war. Similar to Shea's (2014) way of operationalization, I first calculated the monthly ratio of each state's CINC scores to the total of MID participants' scores throughout a given MID, and then averaged them into one measure. A state having a higher value of this variable indicates that it has exhibited stronger capabilities relative to its opponents in a MID.

Second, major power status (*Major power status*) is coded one when a country in a given year is a major power according to State System Membership (v2011) dataset, and zero otherwise (Correlates-of-War-Project 2011). Third, political regime types (*Regime*) are included in my models. This variable is measured by Polity IV project scores, ranging from -10 (autocracy) to 10 (democracy) (Marshall and Jaggers 2010). The fourth control is whether a country is an initiator in a given MID (*Initiator*). This is a dichotomous variable, coded as one when a state initiated a dispute and zero otherwise. Next, I control for the size of a state's economy using log-transformed GDP per capita (*GDPpc*). Values are taken from the Maddison Project's Historical GDP database (2013). Also, I include log-transformed values of trade (export + import) per capita (*Tradepc*), extracted from Banks and Wilson's (2011) Cross-National Time-Series (CNTS) data archive. Lastly, the number of alliances (*Alliances*), taken from ATOP (v3.0) dataset (Leeds et al. 2002) and the number of months of peace (*Peacemon*) to control for temporal dependence based on Beck et al.'s (1998) discussion are added to my models.

I employ binomial logistic regression method on my binary dependent variable, and multinomial logistic regression method on my categorical dependent variable. In my

second analysis, I set the category of defeat as a reference group. Therefore, I interpret the odds of a state winning or drawing in comparison to the odds of losing a MID.

### 5.3. Data analysis part I: the likelihood of conflict escalation

My result illustrates the effects of disputants' amounts of debt and level of sovereign borrowing costs on the likelihood of conflict escalation. <Table 4> presents binomial logistic regression result on the likelihood of conflict escalation. Model 5 provides a baseline model and Model 6 has an interaction term between states' borrowing costs and gross debt. Exponentiated coefficients are reported, which indicate odds ratios. In Model 5, the coefficient for *Interest Rate* indicates that we will see approximately 12% decrease in the odds of a crisis developing into war for a 1% increase in the state's long-term interest rate at a 90% confidence level. After adding an interaction term, the coefficient for *Interest Rate* indicates a significant decrease in the likelihood of conflict escalation along with an increase in interest rates at a 95% confidence level.

The predicted probability of war outbreak varying interest rates is depicted in <Figure 2>, other control variables being held at their mean (except *Initiator* and *Major Power Status* held to their median). As interest rates increase from 3% to 10% per annum, the likelihood of war decreases approximately from 0.11 to 0.04 at a 95% confidence level. This result corresponds with my theoretical prediction; higher costs of borrowing contribute to heavier burden for disputants to finance conflict, and as a result, suppress disputant's willingness to develop into war. This leads to an expansion of the bargaining range and a decrease in likelihood of war outbreak. However, an increase in interest rates above 10% does not make any statistical difference in the probability of conflict escalation to war. Considering that 10% interest rate is at the 80<sup>th</sup> percentile in my

dataset, this result indicates that the decreasing effect of sovereign borrowing costs on the likelihood of war does not hold when states' interest rates are excessively high. In other words, states burdening too heavy financial costs do not necessarily want to end their crises through negotiations; instead, they seem to be indifferent between going to war and reaching a peaceful settlement.

In Model 5, the coefficient for the gross amount of debt does not show statistical significance even at 90% confidence level. However, when an interaction term is added to the base model, an increase in the total amount of debt significantly raises the likelihood of conflict escalation, depicted in <Figure 3>. In particular, when log-transformed gross debt records over moderate level (23, that is, approximately 9.7 billion dollars),<sup>32</sup> heavier debt appears to be associated with higher probability of war outbreak. As log-transformed values of gross debt changes from 23 (9.7 billion dollars) to 29 (3.9 trillion dollars), the probability of conflict escalation increases approximately from 0.04 to 0.08. This result implies that disputants that already shoulder relatively heavier burden are more likely to escalate a crisis into war, whereas if they are lightly or lower-moderately indebted, the total amount of debt does not make any difference in the likelihood of war.

Furthermore, the marginal effect of states' borrowing costs on the likelihood of conflict escalation increases conditional on their total amount of debt, illustrated in <Figure 4>. The suppressing effect of interest rates on the likelihood of conflict escalation shows a flat U-shaped form as states' amounts of debt increase. In particular, unless a state's gross debt is too small or too large, the conditional effect of borrowing

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<sup>32</sup> 24 is the mean value of log-transformed gross debt (i.e., 26.5 billion dollars).

costs is statistically significant at a 95% confidence level. The marginal effect changes from -0.012 to -0.007 as log-transformed values of gross debt increase from 19 (180 million dollars) to 26 (195 billion dollars). This result implies that moderately-indebted states are likely to respond to an increase in their borrowing costs more sensitively than almost debt-free or heavily-indebted states.

With regard to controls, the coefficient of *Diff\_Interest* turns out to be positive and statistically significant at a 99% confidence level. Model 6 demonstrates approximately 134% increase in the odds of a conflict escalation to war for a 1% increase in the monthly difference in the borrowing costs upon the onset of a dispute. The larger monthly difference in the borrowing costs indicates investors' bigger concerns about the disputant's credit risk. Holding other variables constant, when facing higher increase in their borrowing costs at the beginning of a crisis, states are more likely to go into war instead of staying in the bargaining process, matching with investors' expectations.

Major power status and GDP per capita have significantly increasing effects on the likelihood of conflict escalation. The latter result goes well with the war chest hypothesis; the more resources a state has, the more it is likely to be entangled in war. On the contrary, trade per capita decreases the odds of conflict escalation approximately by 30%, in which the main argument of commercial liberalism (i.e., economic integration leads to peace) manifests well.

#### 5.4. Data analysis part II: the outcomes of disputes

My result illustrates the effects of disputants' amounts of debt and level of sovereign borrowing costs on the outcome of crises. <Table 5> shows the results of multinomial logit analyses. Disputes that developed into war were excluded from these

analyses. Exponentiated coefficients are reported, which are relative-risk ratios.

Coefficients with the value over 1 mean that increase in a variable by one unit raises the odds of an outcome interested relative to the reference group, whereas coefficients with the values below 1 should be interpreted in the opposite way. The outcome of defeat is set as the reference group.

The base model, Model 7 reports that a state with a more expensive credit cost is less likely to win than lose a dispute at a 95% confidence level. On the contrary, there seems no statistical difference in the odds of states' losing and drawing. In other words, a state's higher interest rate in the first month of a dispute depresses its win probability, but not necessarily raises the likelihood of draw. A state's total amount of debt works in the same way despite marginal statistical significance. A state carrying larger burden of debt is less likely to win than lose a dispute.

Once an interaction term between interest rates and gross debt is added to the base model, statistical significance of coefficients for independent variables disappears mostly. How each independent variable substantively affects predicted probabilities of victory and defeat of a state in dispute is illustrated in Figures 5 and 6. An increase in sovereign borrowing costs is associated with a state's lower win probability, since as states burden heavier financial costs, they tend to be more passive in the bargaining process to prevent conflict escalation. However, as interest rates exceed a certain level (approximately 9%), there appears to be no difference between winning and losing probabilities. Predicted probabilities of victory and defeat varying a state's gross debt show similar patterns. As a state's debt increases, its win probability decreases. Considering that only the disputes that were not escalated into war are analyzed in Models 7 and 8, states with larger

amounts of debt are likely to end disputes even by conceding more, because increase in gross debt raises states' expected costs of debt servicing. The interaction term in Model 8 does not play a meaningful role; the marginal effect of borrowing costs on the predicted probability of victory varies only by trivial amount across different levels of states' debt, which needs a more rigorous investigation in the future.

### 5.5. Summary, conclusion, and implications

This chapter highlights how a state's finance works in their conflict escalation as well as termination behaviors. Borrowed money can be either power or costs for states in dispute, while interest rates contribute only to financial burden. Therefore, high interest rates make it harder for states to procure money, associated with more concession in the bargaining process as well as less desire to escalate their crises into war. On the other hand, larger amounts of debt, exceeding a moderate level, lead states to increase their minimal demands further in the bargaining process, because there seems to be little difference between payoffs from war and negotiations. Therefore, a bargaining range becomes narrower and the likelihood of conflict escalation to war rises. However, only looking at the disputes that ended before developing into wars, the cases in which negotiation payoffs are larger than war payoffs, states with heavier debt loads are less likely to win than lose the disputes. In these cases, more borrowing is perceived higher costs in terms of debt servicing by states, which led to states' passive positions in the bargaining process.

My analyses provide a preliminary picture of the constricting role of sovereign borrowing costs and debts in international dispute situations. Even though previous studies have mentioned financial resources as one of the most important factors

influencing states' conflictual behaviors, rigorous theories or solid empirical analyses on this topic have little presented so far. My approach can be seen as the first step to directly theorize and analyze how sovereign borrowing costs contribute to financial pressure on a state by raising its (expected) costs of conflict and lead to restrict its further conflict decisions.

In the future research, first, different characteristics between MIDs and war should be examined more in depth. For instance, the duration of MIDs is likely to be shorter and thus it is possible that states might bear even higher interest rates in order to achieve a superior position in disputes. In other words, we need to consider various traits of MIDs that could change the effect of sovereign borrowing costs on states' behaviors in bargaining process. Second, other important factors that would mitigate the market-driven impact of a state's sovereign borrowing needs to be taken into account. For example, the presence of strong allies, especially in the Cold War period, is likely to limit the impact of sovereign borrowing costs; quite many interstate disputes that occurred between the 1950s and 1980s were financed or assisted by the U.S. and Soviet Union because they were considered as a proxy war between the two great powers. Economic assistance from other countries tends to be given outside of the financial markets, meaning that market principles are not necessarily applied to sovereign borrowers. In this sense, to examine the substantive effect of borrowing and its cost on crisis termination, we need to consider various political factors that are not captured in market price of borrowing.

Table 4: The Effect of Borrowing Costs and Gross Debt on the Likelihood of Conflict Escalation

	Model 5 (Base model)	Model 6 (with interaction term)
<i>Interest Rate</i>	0.881† (0.067)	0.186** (0.133)
<i>Gross Debt</i>	0.971 (0.055)	0.729** (0.105)
<i>Interest Rate X Gross Debt</i>		1.061** (0.028)
<i>Diff_Interest</i>	1.548** (0.299)	2.338*** (0.768)
<i>Capabilities</i>	0.424 (0.224)	0.406 (0.224)
<i>Major power status</i>	4.612*** (2.424)	6.996*** (4.471)
<i>Regime</i>	1.018 (0.038)	1.020 (0.040)
<i>Initiator</i>	0.464† (0.185)	0.451† (0.186)
<i>GDPpc</i>	2.426** (0.954)	2.715** (1.136)
<i>Tradeperc</i>	0.687** (0.114)	0.697** (0.113)
<i>Alliances</i>	0.937 (0.038)	0.901** (0.044)
<i>Peacemon</i>	1.004 (0.003)	1.005** (0.003)
<i>Observation</i>	977	977
<i>Log Likelihood</i>	-136.52	-132.70
<i>Probability &gt; chi-sq.</i>	0.0016	0.0003

\* Note: Dependent variable is the likelihood of war. Exponentiated coefficients are reported, which indicate odds ratios. Values of the first month of a dispute are measures of all the right-hand side variables. Numbers in parentheses are robust standard errors.

†p<0.10, \*\*p<0.05, \*\*\*p<0.01

Figure 2: Predicted Probabilities of War Outbreak Varying Interest Rates

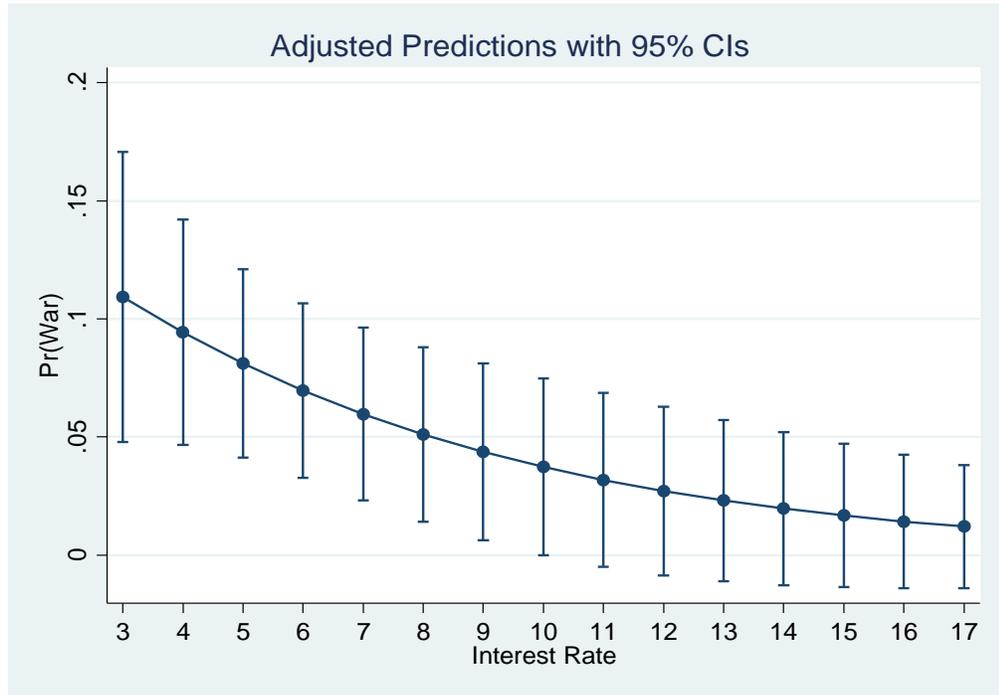


Figure 3: Predicted Probabilities of War Outbreak Varying Gross Debt

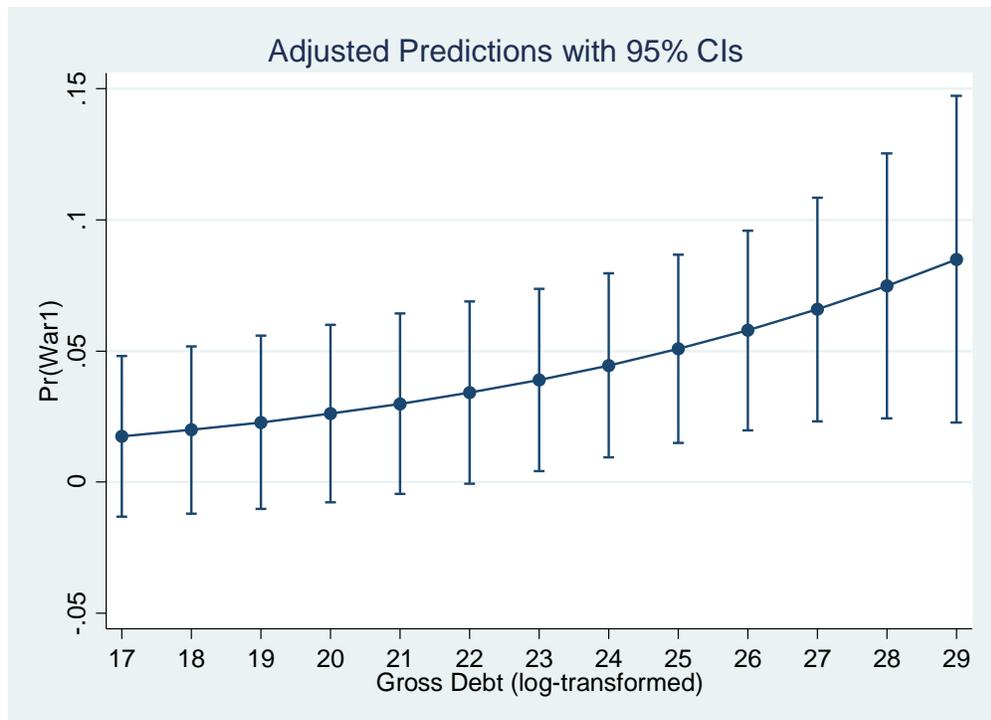


Figure 4: Marginal Effect of Interest Rates on the Likelihood of War Varying Gross Debt

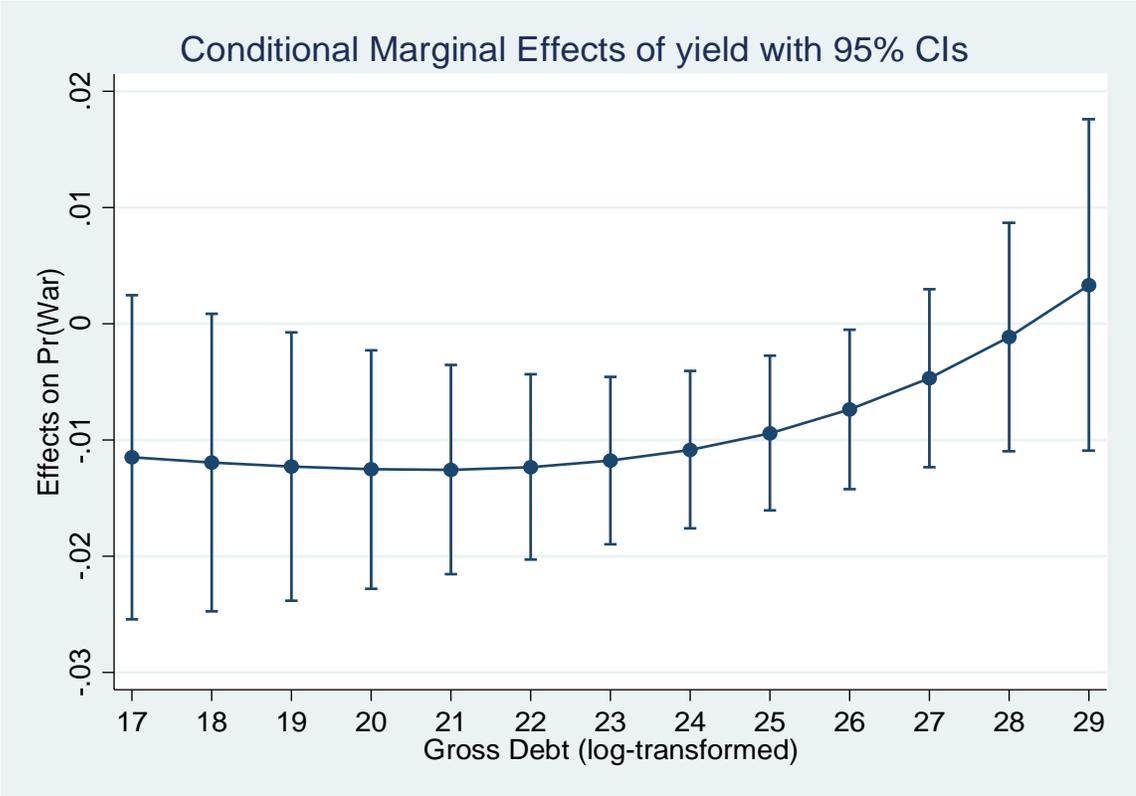


Table 5: The Effect of Borrowing Costs and Gross Debt on Conflict Outcomes

	Model 7 (Base model)	Model 8 (with interaction term)
<b>Victory</b>		
<i>Interest Rate</i>	0.883** (0.045)	0.831 (0.253)
<i>Gross Debt</i>	0.873† (0.061)	0.853† (0.082)
<i>Interest Rate X Gross Debt</i>		1.003 (0.012)
<b>Draw</b>		
<i>Interest Rate</i>	0.985 (0.041)	0.890 (0.127)
<i>Gross Debt</i>	1.017 (0.055)	0.984 (0.062)
<i>Interest Rate X Gross Debt</i>		1.004 (0.006)
<i>Observation</i>	820	820
<i>Log Likelihood</i>	-451.37	-451.19
<i>Probability &gt; chi-sq.</i>	0.0000	0.0000

\* Note: Dependent variable is conflict outcomes. Exponentiated coefficients are reported, which indicate relative-risk ratios. The reference category is the outcome of defeat. Values of the first month of a dispute are measures of all the right-hand side variables. Coefficients of controls are not reported. Numbers in parentheses are robust standard errors.

†p<0.10, \*\*p<0.05, \*\*\*p<0.01

Figure 5: Predicted Probabilities of Victory and Defeat Varying Interest Rates

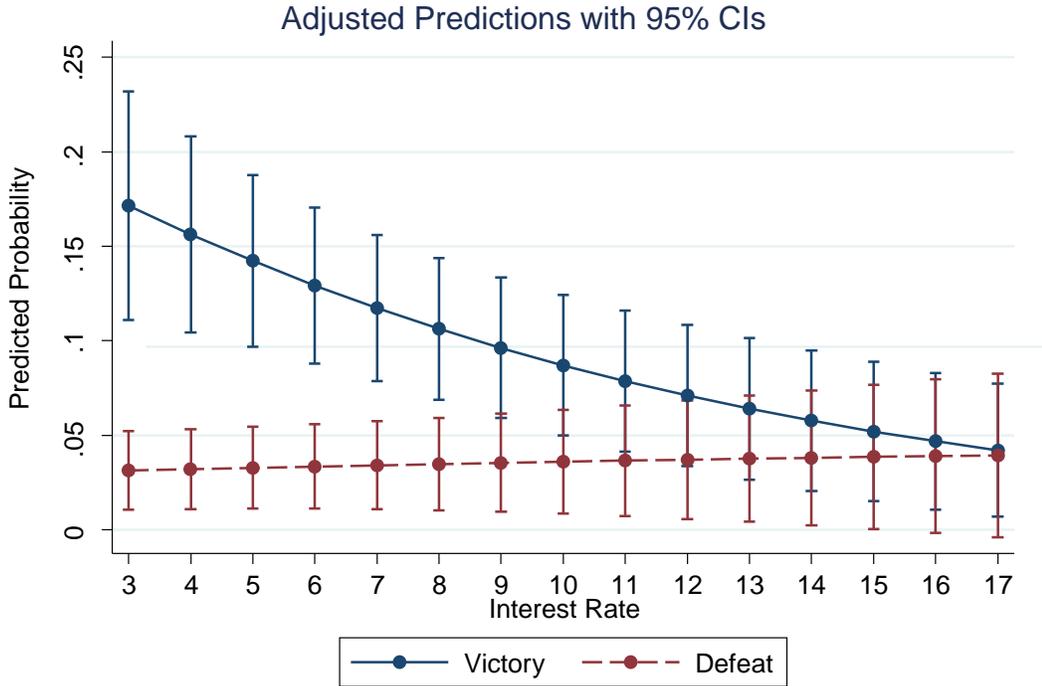
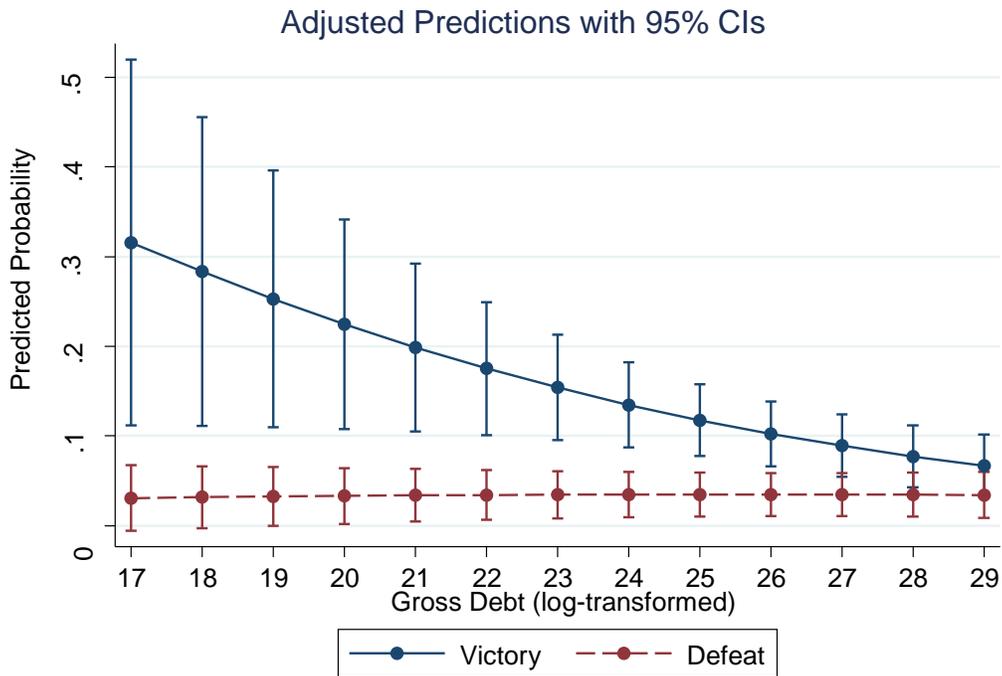


Figure 6: Predicted Probabilities of Victory and Defeat Varying Gross Debt



## CHAPTER 6: THE CONDITIONAL EFFECTS OF STATES' ECONOMIC DEVELOPMENT STATUS

### 6.1. Introduction and review of the theory

In this chapter, I probe whether there is a difference in bondholders' responses to states' conflict signals depending on the economic development status of states. When bondholders observe two states initiating an interstate dispute, their decision to sell government bonds is based on the extent to which they think such a dispute will put their bond holdings at risk. Bondholders' evaluations of investment risks related to interstate disputes could depend on whether the parties in dispute (issuers of government bonds) are developed or developing countries. Considering that investors tend to rate credit risk of developed countries systematically lower than that of developing countries in regard to macroeconomic indicators, I argue that bondholders would feel more concerned about their investment when developing countries, rather than developed ones, are involved in interstate disputes. Investors' apprehension about the capabilities of developing countries' governments to deal with potential credit risk associated with international disputes would lead more negative reactions in the markets, even though interstate disputes themselves might not objectively dangerous.

I theorize that when investors perceive a developing country initiating an interstate dispute, even if its conflict-starting action is such low cost that the probability of this dispute being actualized into war is objectively low, they do not ignore this signal because even such a crisis can exacerbate tensions among states to some extent. Hence, both low- and high-cost disputes can easily disturb investors holding developing countries' government bonds by raising uncertainty. Moreover, once the fear of

uncertainty prevails in financial markets when developing countries are engaged in an international dispute, the herd mentality is likely to capture investors, which inhibits them from reacting rationally based on their objective assessments of the macroeconomic fundamentals and consequences of the dispute. In the same context, the effect of hostility of any conflict action in a given month is likely to be greater on the yields of developing countries' government bonds than on the yields of developed countries' bonds. Therefore, I hypothesize that the effect of an international dispute is likely to differ depending on whether the bond issuer is a developed or developing country. As such, three hypotheses developed in chapter 3.

*H6-1: The onset of high-cost disputes is expected to increase the average bond yields regardless of whether the parties in dispute are developed or developing countries.*

*H6-2: The onset of low-cost disputes is not expected to increase the average bond yields if the parties in dispute are developed countries.*

*H6-3: The onset of low-cost disputes is expected to increase the average bond yields if the parties in dispute are developing countries.*

*H7: The effect of hostility of conflict actions on the average bond yields of the parties in dispute is likely to be greater when they are developing countries.*

I analyze my theory of when investors sell government bonds by using a dataset of Militarized Interstate Disputes (MIDs) and the values of government bonds of 18 developed and 7 developing countries for 1971–2010. My analyses report that the onset of severe interstate disputes lead investors to sell off the government bonds issued by developing countries more promptly and to a larger extent than the government bonds issued by developed countries. In addition, severe conflict actions, either conflict-start or

conflict-escalating ones, have more negative effects on the yields of developing countries' government bonds. This result highlights that investors' determination of the sovereign borrowing cost is affected not only by objective risk factors (e.g., prospect of war) but also by investors' subjective sentiments or perceptions of risk (e.g., trust in government).

## 6.2. Cases, unit of analysis, and methods

I examine the conditional effects of types of governments on the way investors perceive interstate disputes and how their evaluations exert an influence on the values of government bonds. My time-series cross-sectional dataset represents a broader sample of countries than used in previous studies.<sup>33</sup> I categorize my sample countries into developed and developing countries based on OECD membership.<sup>34</sup> The total number of observations is 2464 as to 18 developed countries and 743 as to 7 developing countries. This separation highlights the different kinds and magnitudes of factors affecting bond yields depending on a state's economic development status. The ways the dependent, independent, and control variables are coded and the method I employed are the same as ones described in chapter 4.

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<sup>33</sup> The OECD member countries are Canada, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Japan, the Netherlands, Norway, Poland, Portugal, South Korea, Spain, Sweden, Switzerland, and the United Kingdom. The non-OECD member countries are Malaysia, Morocco, Romania, Russia, Singapore, South Africa, and Thailand. In selecting these sample countries, data availability was my primary concern.

<sup>34</sup> I followed Mosley's practice; "Investors assign a high probability to the fact that OECD nations are of the good credit risk type" (Mosley 2003, 38).

### 6.3. Data analyses

<Table 6> presents my empirical results as to the effects of high-cost and low-cost disputes on governments' bond yields in the two categories of countries. Models 9 and 10 include developed and developing countries in their samples, respectively. Overall, there is a substantial distinction in the factors of which coefficients show statistical significance, including the main independent variables, across developed and developing countries.

The most pronounced point to note is that investors' reactions to the occurrence of high-cost MIDs are different when they are holding developed or developing countries' government bonds. High-cost disputes occurring in the previous month appear to raise current-month interest rates of developed countries, whereas the same kind of high-cost disputes provoke instant reactions of investors when developing countries are the parties in dispute. My results imply that the onset of high-cost disputes either in the current or in the previous month seems to disturb bondholders' investment both in developed and developing countries. When investors observe a serious conflict starting, which heightens the likelihood of interstate war, they become agitated and actually commence trading government bonds through markets. As a result, a costly onset of a dispute raises the bond yield of a developed state by 0.064% (6.4 bps) and the bond yield of a developing state by 0.263% (26.3bps), all else being equal.

Nevertheless, it seems that investors are typically less uncomfortable when developed countries, rather than developing countries, engage in interstate disputes because of developed countries' relatively stable economic policies and abundant financial resources. This can be confirmed not only by the magnitude of coefficients for *High-cost*

*dispute onset* but also by its statistical significance and investors' reaction timing. In case of developed countries, the positive coefficient of *Lagged high-cost dispute onset* is only statistically significant at a 90% confidence level, whereas that of *High-cost dispute onset* in case of developing countries is significant at a 95% confidence level. Due to their trust in developed countries' governments, investors tend to be more patient about these countries' involvement in interstate disputes and the possibility of their credit risk being aggravated. Therefore, investors' sell-off of government bonds appears to be realized one month after a MID occurs. Furthermore, the marginal statistical significance of the coefficient for *High-cost dispute onset* in case of developed countries implies that there seems to be a substantial variation among bondholders' reactions. Some risk-averse bondholders get concerned about the onset of high-cost disputes and sell their government bonds, as they cannot ensure that this dispute will not escalate into an actual war. However, others do not turn their back swiftly, believing that developed countries would not renege on their debt obligations. This variation among bondholders' reactions is explicitly reflected in the marginal statistical significance of the coefficient for *Lagged high-cost dispute onset*.

On the contrary, investors are more attentive to the occurrence of high-cost interstate disputes, when they hold developing countries' government bonds. A costly start of a conflict makes investors unsettled because of developing countries' poor management of the economy and comparatively scarce resources. Those who buy the government bonds of developing countries must be more sensitive to any influence that could raise investment risk. Therefore, the beginning of a dispute this month is associated with a prompt and significant increase in the bond yield of a developing country at a 95%

confidence level. On the other hand, low-cost disputes having started in the last or current month does not seem to boost the bond yields of either developed or developing countries unlike my hypotheses. In addition, the presence of an ongoing dispute is insignificant across both types of countries.

With regard to controls, <Table 6> demonstrates the difference in the factors that bondholders take into account when assessing investment risk across developed countries and developing countries. In the era of financial globalization, besides proxy interest rates (U.S. Treasury yield), investors seemed to take current account balance into consideration most when determining the interest rate premiums of developed countries. Investors already have trust in the political and economic stability of developed countries' governments. Therefore, as long as their current financial condition does not change dramatically, investors tend to hesitate to sell their government bonds. Based on the empirical results, unless the current account balance deteriorates, directly linked to government's ability to repay its debt, investors are not likely impose interest rate premiums of developed countries' government bonds. By contrast, inflation was the primary factor influencing investors besides proxy interest rates (U.S. Treasury yield) when discussing the credit risk of developing countries. Owing to more diverse or inconsistent execution of government-led policies in developing countries compared with the stable and predictable policymaking in developed countries and investors' mistrust in national statistics related to governments' reform performances,<sup>35</sup> investors need to have

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<sup>35</sup> In developing countries, the government's actual enforcement of a reform policy as opposed to its announcement is important to investors, as Archer and his colleagues (2007) mention: "[A] concern expressed by [bond] raters is whether the country will implement the economic reforms it proposes" (360).

a definitive way to assess these countries' credit risk, which seems to be inflation. As a developing country shows an increase in its inflation by 1%, its bond yield surges by 0.133% (13.3 bps). Investors worry about their bond values being inflated away by developing countries' governments.

Not as obviously as <Table 6> results, <Table 7> also gives a picture of different market responses to states' conflictual behaviors between bondholders of developed and developing countries' government bonds. As a developing state's conflict action becomes more hostile in a given month, investors tend to be concerned and sell their government bonds to some extent (statistically at a 90% confidence level). As a result, the yields of developing countries' government bonds increase by 0.008% (0.8bps) in tandem with a one-unit increase in hostility of a state's conflict action. On the other hand, an increase in hostility of developed countries' conflict action turns out to be insignificant. Considering <Table 6> results reporting that low-cost dispute onset has no effect on changes in government bond yields, it is understandable that the coefficients of *Highest Action* in Models 11 and 12 show only marginal or no statistical significance, since conflict actions include both costly and costless actions. Nevertheless, the implication of <Table 7> results is congruent with what we've drawn from <Table 6> results. Again, the results indicate that the uncertainty that interstate disputes is expected to incur is more worrisome to investors when they hold developing countries' government bonds. Bondholders feel different magnitude of uncertainty about interstate disputes depending on the economic development status of their bond issuer.

#### 6.4. Summary, conclusion, and implications

My analyses find that bondholders' risk assessments as to interstate disputes are conditional on the types of governments, whether disputants are developed or developing countries. Despite the similar prospect of escalation to war, high-cost disputes significantly exert a more negative influence on the bondholders who have invested in developing countries' government bonds because of investors' biased perceptions of credit risk in these countries. Investors' responses fall together in a way of pulling out their money when developing countries initiate interstate disputes. While the outbreak of a dispute also affects investors having developed countries' government bonds, the stability of these countries leads to a larger variance in bondholders' reactions.

Investors are sensitive to the uncertainty of the future than to an actualized danger they happen to face, especially in the case of developing countries, which are less exposed to investors in terms of which factors could aggravate the credit risks. Hence, the onset of an interstate dispute or even any type of conflict action, raises the uncertainty about the extent to which it might influence the economies in the conflict participants. We can surmise that investors are alert to the occurrence of a MID in both developed and developing countries but feel that international crises initiated by developing countries are more harmful than those by developed countries to the investment.

The findings of my study thus propose another criterion as to contemporaries' risk assessments. Their risk perceptions depend on the economic development status of their bond issuer. States' economic development status itself serves as a cue for investors' evaluations of credit risk related to international disputes, apart from objective expectations of their consequences. Interstate disputes can easily disturb investors

holding developing countries' government bonds by raising uncertainty. Furthermore, once the fear of uncertainty prevails in financial markets when developing countries are engaged in an international dispute, the herd mentality is likely to capture investors, which inhibits them from reacting rationally based on their objective risk assessments. In this sense, my conclusion paves the way for challenging "rationality" of bondholders and their investment behaviors, in particular in the face of states' conflictual behaviors.

Table 6: The Effect of the Onset of High-cost vs. Low-cost Disputes  
across Developed and Developing Countries

	Model 9: Developed countries	Model 10: Developing countries
<i>High-cost dispute onset</i>	-0.003 (0.034)	0.263** (0.118)
<i>Lagged high-cost dispute onset</i>	0.010 (0.022)	0.074 (0.112)
<i>Low-cost dispute onset</i>	0.064† (0.034)	-0.006 (0.124)
<i>Lagged low-cost dispute onset</i>	-0.008 (0.025)	0.083 (0.123)
<i>Ongoing MID</i>	0.022 (0.025)	0.061 (0.110)
<i>Lagged ongoing MID</i>	-0.031 (0.025)	-0.078 (0.108)
<i>MID history</i>	-0.012 (0.011)	0.031 (0.054)
<i>Proxy interest rate</i>	0.384*** (0.021)	0.336*** (0.065)
<i>Inflation</i>	0.005 (0.005)	0.133*** (0.028)
<i>Exchange Rate (log)</i>	-0.004 (0.003)	-0.039 (0.025)
<i>Debt-to-GDP ratio (log)</i>	-0.004 (0.008)	-0.011 (0.017)
<i>Current account balance</i>	-0.018*** (0.005)	-0.017 (0.011)
<i>Fiscal balance</i>	0.003** (0.001)	-0.010 (0.006)
<i>GDP growth</i>	0.002 (0.002)	-0.007† (0.004)
<i>GDP (log)</i>	-0.011† (0.006)	0.086** (0.042)
<i>Economic crises</i>	0.012 (0.010)	0.059 (0.037)
<i>Regime type</i>	-0.006 (0.015)	0.002 (0.006)
<i>Observations</i>	2464	743

\* Note: Dependent variable is the yield of long-term (10-year) government bonds (% per annum). The number of sample countries is 25 (18 developed and 7 developing countries). Numbers in parentheses are panel-corrected standard errors. †p<0.10, \*\*p<0.05, \*\*\*p<0.01

Table 7: The Effect of Hostility of Conflict Actions across Developed and Developing Countries

	Model 11 : Developed countries	Model 12 : Developing countries
<i>Highest Action</i>	0.000 (0.001)	0.008† (0.004)
<i>MID history</i>	-0.012 (0.010)	0.023 (0.048)
<i>Proxy interest rate</i>	0.385*** (0.021)	0.337*** (0.065)
<i>Inflation</i>	0.005 (0.005)	0.139*** (0.028)
<i>Exchange Rate (log)</i>	-0.004 (0.003)	-0.042† (0.024)
<i>Debt-to-GDP ratio (log)</i>	-0.005 (0.008)	-0.012 (0.017)
<i>Current account balance</i>	-0.019*** (0.005)	-0.014 (0.011)
<i>Fiscal balance</i>	0.003** (0.001)	-0.009 (0.006)
<i>GDP growth</i>	0.002 (0.002)	-0.007† (0.004)
<i>GDP (log)</i>	-0.012† (0.006)	0.078† (0.041)
<i>Economic crises</i>	0.011 (0.010)	0.052 (0.037)
<i>Regime type</i>	-0.005 (0.015)	0.003 (0.006)
<i>Probability &gt; chi-sq.</i>	0.000	0.000
<i>Observations</i>	2464	743

\* Note: Dependent variable is the yield of long-term (10-year) government bonds (% per annum). The number of sample countries for Models 11 and 12 is 18 and 7, respectively. Numbers in parentheses are panel-corrected standard errors.

†p<0.10, \*\*p<0.05, \*\*\*p<0.01

## CHAPTER 7: CONCLUSION

I first examined the specific channel through which international disputes disturb sovereign bond markets and the extent of the effect. My results of panel regressions show that investors do not always react negatively when they observe their bond issuer engaged in an international dispute. Instead, they assess the actual risk that the interstate dispute would impose on their bond investment. Bondholders' risk assessments are conditional on how likely a dispute is to escalate to war and the economic development status of their bond issuer. Investors show more sensitive reactions to major clashes than minor quibbles among states and are easily shaken by the fear of uncertainty when they invest in developing countries. Also, I investigated how a state's borrowing and its costs affect the way interstate disputes terminate. My binomial and multinomial logistic regression results show that high borrowing costs suppress the likelihood of war as well as a state's win probability in a crisis, while large amounts of debt make peaceful termination of crises difficult. However, only looking at the disputes that ended before developing into wars, states with heavier debt loads are less likely to win than lose the disputes.

My analyses thus offer important implications to states. First, I lay out specific criteria that bondholders use to evaluate states' credit risks when facing interstate disputes. According to my results, since governments know that engagement in international conflict creates a bad impression with investors, resulting in rising interest rates, we can conclude that governments affected by sovereign borrowing costs will try to be involved in foreign crises less often in the first place. States that wish to enjoy cheap credit are more likely to keep away from international conflicts. This new perspective

contributes to existing conflict and IPE studies in the sense that the role of international bond investors may account for states' war proneness or the likelihood of conflict. In other words, by extending the disruption thesis, my result highlights that brisk international bond markets could lead to peace among states. In particular, it is reasonable to think that developing countries would put more effort into maintaining peace to improve their creditworthiness. According to my analyses, conflict proneness is more likely to decrease among emerging economies than among developing ones. Since showing an actual commitment to peace is one way in which to change investors' risk perceptions, diversionary foreign policy would not be a viable option for developing countries open to international financial markets.

Second, my analyses shed light on the constricting role of sovereign borrowing costs and more broadly of financial markets in international conflict situations. Even though previous studies have mentioned financial resources as one of the most important factors influencing states' conflictual behaviors, rigorous theories or solid empirical analyses on this topic have little been presented so far. My approach can be seen as the first step to directly theorize and analyze how sovereign borrowing costs contribute to financial pressure on a state by raising its (expected) costs of conflict and lead to restrict its further conflict decisions. In this sense, my results imply that in the political realm, holding government bonds of other countries and manipulating their interest rates can serve as one of the crucial power resources of a country, which needs to be investigated further in the future. I provide a preliminary overview of how government bonds could be an instrument of coercive power for the purpose of state security.

I suggest two directions for future research. First, more rigorous analyses on developing countries need to be conducted to understand the relevant political factors that affect interest rate premiums or construct new measures that can account for the specific mechanisms of emerging markets. Both tasks should thus follow a careful examination of the unique characteristics of emerging markets. As Mosley (2003) states, “economic policy outcomes display more cross-national variation in emerging and frontier market nations than in developed nations” (122); therefore, it is difficult to capture this cross-national variability prevailing in developing countries by adopting only a few common economic factors. In particular, by considering the ambiguity of the “political context” or “political stability,” further investigation into the specifics of political factors is warranted. In this sense, micro-level research, supported by experiments, will provide a more detailed picture about an actual process in which investors assess sovereign credit risk in international conflict situations.

Second, analyses that compare different time periods would be valuable. My analysis is based on the assumption that financial markets consist of individuals whose actions are led solely by economic motives. However, since the mid-1990s, bond investment in emerging markets has grown dramatically and large institutions, banks, and even sovereigns that have political purposes for holding government bonds have made up a significant proportion of investors. On the contrary, in the 19<sup>th</sup> and early 20<sup>th</sup> centuries, the connection between international conflicts and government bonds was tighter in the sense that countries that often engaged in international conflicts mostly overlapped with those that had the ability to issue government bonds. In this sense, investigating the

different characteristics of each time period would make the analysis of the extent to which conflicts and bond markets affect each other richer and more compelling.

## APPENDIX

Table A1: Chapter 4 Counts of high-cost vs. low-cost disputes

High-cost disputes	Low-cost disputes	all MIDs	Ongoing MIDs
50	105	155	712
Expected-to-win: 29			
Expected-to-lose: 8			
Expected-to-tie: 13			

Table A2: Chapter 6 Counts of high-cost vs. low-cost disputes

	High-cost disputes	Low-cost disputes	all MIDs	Ongoing MIDs
Developed countries	36	87	133	574
Developing countries	14	18	32	138
Total	50	105	155	712

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