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**Fields of Concentration:**

Financial Economics  
Macroeconomics  
Economic Theory

**Desired Teaching:**

Financial Economics  
Macroeconomics  
General Equilibrium Theory  
Game Theory

**Comprehensive Examinations Completed:**

2015 (Oral): Financial Economics, Economic Theory  
2013 (Written): Microeconomics, Macroeconomics

**Dissertation Title:** *Essays on Debt, Collateral, and Networks*

**Committee:**

Professor John Geanakoplos  
Professor Andrew Metrick  
Professor Zhen Huo

**Expected Completion Date:** May 2019

**Degrees:**

Ph.D., Economics, Yale University, 2019 (expected)  
M.Phil., Economics, Yale University, 2015  
M.A., Economics, Yale University, 2015  
B.A. (*summa cum laude*), Economics, Seoul National University, 2011.

**Fellowships, Honors and Awards:**

Office of Financial Research PhD Symposium on Financial Stability Research (finalist), 2018  
Hall-Mercer Fellowship, 2017-2018  
Richard J. Bernhard Fellowship, 2013-2017  
Cowles Foundation Fellowship, Yale University, 2012-2014  
University Doctoral Fellowship, Yale University, 2012-2014  
Graduate Fellowship, Korea Foundation for Advanced Studies, 2012-2017  
Academic Excellence Full Scholarship, Seoul National University, 2011-2012  
Teaching and Research Fellowship, Seoul National University, 2011-2012  
Undergraduate Student Scholarship, Korea Foundation for Advanced Studies, 2008-2011  
Undergraduate Academic Excellence Scholarship, Seoul National University, 2008  
Excellent Paper Award, Seoul National University, 2010  
Grand Prize Paper Award, Korea Deposit Insurance Corporation, 2009  
Best Soldier of Korean Augmentation to the U.S. Army Award, U.S. Army, 2007  
Army Commendation Medal, U.S. Army, 2007  
Army Achievement Medal, U.S. Army, 2006

**Teaching Experience (as Teaching Assistant):**

*Yale University:*

Firms, Markets and Competition (undergraduate, instructor: E. Chalioti), Fall 2017  
Financial Theory (undergraduate, instructor: J. Geanakoplos), Spring 2017  
Intermediate Macroeconomics (undergraduate, instructor: W. Nordhaus), Fall 2016  
Intermediate Microeconomics (undergraduate, instructor: L. Samuelson), Fall 2015  
Mathematical Economics: Game Theory (undergraduate, instructor: J. Hörner), Spring 2015  
Game Theory (undergraduate, instructor: Z. Neeman), Fall 2014

*Seoul National University:*

Statistics for Economists (graduate, instructor: Y.-J. Whang), Spring 2012  
Econometrics (undergraduate, instructor: Y.-J. Whang), Fall 2011

**Research and Work Experience:**

Research Assistant to Professor Yoon-Jae Whang, Seoul National University, 2011-2012  
Training Room NCO, A 1-15 FA, 2ID, 8th U.S. Army, KATUSA, 2005-2007

**Working Papers:**

“Collateralized Debt Networks with Lender Default”, (October 2018), *Job Market Paper*

“Network of Full-Recourse Contracts with Collateral”, (September 2018)

“Factor Decomposition Analysis on Household Earnings Inequality in the U.S.” with Inkwan Chung, (October 2018)

**Work In Progress:**

“Reputation and Matching with Risk Choice: Theory and Estimation of Venture Capital Market” with Y.J. Jeff Qiu and Olav Sorenson, (September 2018)

“Optimality of Collateralized Debt Contracts”, (December 2017)

**Seminar and Conference Presentations:**

2018: Office of Financial Research PhD Symposium on Financial Stability Research

**Referee Service:**

*American Economic Journal: Microeconomics*

**Languages:**

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**References:**

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**Dissertation Abstract**

**Chapter 1: Collateralized Debt Networks with Lender Default [Job Market Paper]**

This paper studies how initial shocks propagate through a network of counterparties in a collateralized debt market, and how counterparties borrow and lend when they account for this contagion channel. This work is motivated in part by the great financial crisis. The collapse in prices of subprime mortgages in 2007 had a direct effect on many financial institutions, but this was exacerbated by the resulting bankruptcy of Lehman Brothers in 2008 which spread the initial losses to Lehman’s counterparties. In particular, Lehman’s defaults on its *lender* obligations to return collateral also caused a significant loss. I propose a general equilibrium model with collateral featuring endogenous leverage and endogenous network formation to study this lender default problem.

The model has four main features. First, agents trade an asset that can be used as collateral in a competitive market. Price changes in the asset market affect each agent’s nominal wealth. Second, there is a network of collateralized borrowing and lending. Agents enter bilateral contracts specifying who their counterparties are. Agents buy the asset and use it as collateral to borrow cash because they disagree about the fair value of the asset. Third, the lender of a debt contract holds

the collateral and can reuse it to borrow money from someone else. Fourth, if the lender defaults on its obligations to return the collateral, the borrowers bear costs of recovering the collateral.

I show that in this model there are positive externalities from diversification due to endogenous leverage and network formation. Borrowers diversify their portfolios of lenders due to the possibility of counterparty defaults. However, lower counterparty risk comes at the cost of less favorable contracts. Because borrowers have to deal with lenders who are more pessimistic on the fair value of the asset, they can borrow less than they would have borrowed from one very optimistic lender. This diversification reduces not only individual counterparty risk but also systemic risk, by limiting the propagation of shocks and resulting price volatility. Because agents do not fully internalize these externalities, any decentralized equilibrium is constrained inefficient. The key externalities here, arising from the trade-off between counterparty risk and leverage, are absent in models with exogenous leverage or networks.

I use this framework to analyze the effect of the introduction of central clearing counterparty (CCP), which is one of the key elements of financial system reforms after the financial crisis in 2008. Agents still enter debt contracts bilaterally under the CCP, but the transaction goes through the CCP, which then covers any loss from counterparty default. I show that this loss coverage by CCP exacerbates the externality problems by eliminating individual agents' incentives to diversify.

## **Chapter 2: Network of Full-Recourse Contracts with Collateral**

Existing work on financial networks investigates the propagation of liquidity shocks through the counterparty channel. However, payment from a full-recourse collateralized debt contract depends not only on the cash balance of the borrower but also on the price of the collateral. This paper explores the implications of this additional channel of propagation. If the price of the collateral is greater than the face value of the debt, then the payment is always in full even if the borrower is under bankruptcy. However, if the price of the collateral is less than the face value of the debt, then the payment depends on both the price of the collateral and the cash balance of the borrower. I show that a complete network always has the minimum systemic risk regardless of the size of the shock. If the shock is small, then a complete network has the minimum systemic risk as in the models with only the counterparty channel. If the shock is large enough to make all the agents default in a complete network, then the same shock will also make any other network to crash since there always exists a contagion channel through collateral price. The existence of the price channel provides propagation links among all agents in the network, and even a network with two distinct components cannot contain propagation between the two components.

## **Chapter 3: Optimality of Collateralized Debt Contract**

This paper provides a rationale for the use of collateralized debt contracts in the short-term lending markets. In my model, the investor wants to buy an asset in a competitive market on a limited budget, but her valuation of the asset is private information. The dealer may lend money to the investor by offering menus of contracts. The investor can default at any time for an outside option. The main results show that the profit-maximizing mechanism for the dealer is separating contract in the form of collateralized debt. The investor commits the collateral with down payment, which is compensated later by the option value of repayment. The size of the down payment determines how much of such a contract can be traded, which adds another dimension to the mechanism design problem. Even

though the dealer can design a contract that has contingent payments and does not involve collateral, the optimal contract is a non-contingent payment contract with collateral which resembles European call options. This model explains why non-contingent contracts such as repurchase agreements or asset-backed commercial papers are prevalent in short-term lending markets.