March 30, 2019

Dear NBER Entrepreneurship Research Boot Camp Committee,

I am writing to apply for the 2019 NBER Entrepreneurship Research Boot Camp. I am a Finance Ph.D. student at the University of Michigan Ross School of Business. I expect to complete my degree in May of 2022.

My research interest is to understand the effect of information technology progress on corporate dynamics. Specifically, I am interested to estimate how a benign spiral between data accumulation and productivity boost together affect market concentration and firm innovation decision. I plan to build a structural estimation linking productivity recovered from supply function, a data proxy, and market concentration at the industry level or market share at the firm level to get a formal estimation. While I wish to work on this project in the summer, there is no guarantee that such methods would work out. I need more exposure to literature linking innovation, firm productivity and market structure. Thus, I am looking forward to gaining further exposure to these topics in the summer Entrepreneurship camp.

Attached you will find my curriculum vitae and research statement. Letters in support of my application will be sent separately. You should expect letters from Prof. Toni Whited. Please contact me if you need any further information. Thank you for your consideration.

Sincerely,

Yuan Shi
Finance Department, Ross School of Business
University of Michigan
701 Tappan Ave
Ann Arbor, Michigan 48109
(847) 454-4022 (cell)
shyuan@umich.com

# YUAN SHI

701 Tappan Ave, Ann Arbor, Michigan 48105
(+1)847-454-4022 ⋄ shyuan@umich.com

## EDUCATION

**University of Michigan, Ross School of Business** *August 2017 - Present*
PhD in Finance
**Tsinghua University, School of Economics and Management** *July 2012 - June 2016*
Bachelor of Economics and Finance

## PROJECTS

**Does Algorithmic Trading Affect Corporate Decision Through an Information Channel?**
The booming algorithmic trading in corporate securities has been suggested to affect the price informativeness through different channels and over the different horizon. The real question, whether it has real implication on the corporate decision, is unclear. Using market order history as proxy for algorithmic trading behavior, I found that firms targeted more by algorithmic trading have stock market price better predicting future earnings for up to 5 years (price of capital market is more informative) and have firm investment following more tightly with stock market price (manager learn from capital market).

## RESEARCH EXPERIENCE

**Research assistant to Professor Toni Whited (University of Michigan)** *2017 - 2018*
Replicated and analyzed empirical result for *the interest sensitivity of corporate cash* and *Testing trade-off theory of capital structure using costly rebalancings*
**Research assistant to Professor Carola Frydman (Northwestern University)** *2016 - 2017*
Research project: *Effects of the introduction of securities ratings in the early twentieth century*
Cleaned and compiled historical data including Poors institution holding of securities, Moodys rating of security, NYSE security trading record and bid-ask quotation
Conducted data analysis and discussed empirical methodology, including proposing identification strategy of ex-ante information asymmetry, modeling information shock based on ex-ante firm financial status and ex-post rating result, identifying control groups, and creating a proper measurement of treatment results like market liquidity

## CLASS LIST

Please see attached transcript.

# Statement of Purpose

Yuan Shi

March 30, 2019

I am interested in the question of how information technology progress affects corporate dynamics. Specifically, I am interested in its effect through 2 channels: (1) productivity channel (current project and a major motivation for the summer camp) and (2) financial market channel (past project and minor motivation).

## 1 Productivity channel

The 21st century has witnessed a rise of superstar firms with higher productivity, profitability, and innovation. Together with the increase in market concentration is the shift of firm investment to intangible asset investment, and a shift of superstar companies to technology and data-intensive industries. I would like to interpret these phenomena as a result of an increase in big data activity. Farboodi, Mihet, Philippon, and Veldkamp (2019) have proposed a benign spiral between data and economic activity that we typically observe in large, data and technologic intensive companies: (1) data is a result of economic activity and (2) larger database increase productivity and thus facilitate economic activity. These features give rise to a high fixed cost, diminishing marginal cost production function, which naturally leads to an increase in market power. Multiple interesting questions could arise from this simple notion of data-productivity feedback loop: (1) Could I quantify the average and marginal effect of data on productivities and productivity on data? (2) What is the optimal investment in data technology that firms should adopt to boost this data-productivity feedback loop? (3) How is the answer to (1) and (2) affected by market structure and how will the answer to (1) and (2) in turn affect the market structure? These questions are intellectually interesting and have rich policy implications.

Based on my current knowledge, however, the empirical estimating of such stories can be complicated. Neither data nor firm productivity is immediately observable. Productivity might be recovered from quantity and cost(from supply function), and data might be proxied by web visit count. A structural estimation linking recovered productivity, data proxy, and market concentration at the industry level or market share at the firm level might be helpful. I plan to work on these methods this summer, but there is no guarantee that such methods would work out. I need more exposure to literature linking innovation, firm productivity and market structure. Thus I am looking forward to gaining further exposure to these topics in the summer Entrepreneurship camp.

# 2 Financial market channel

The financial market serves as a platform of information aggregation and exchange. The fast rise in information processing capacity, specifically, algorithmic-based trading (AT) strategies (the trading strategies that use automatic computer algorithms to make trading decisions, submit and manage orders) enhance price discovery in the market. I am interested in the real effect of algorithmic trading induced price discovery, specifically relevant here is feedback channel: by more efficiently aggregating private information from market participants, we should expect firm managers able to learn more accurate private information from the market and thus optimally behaving managers have their investment decisions following more the stock market price. As a first approach to this question, I empirically tested these predictions. Using market order history as proxy for algorithmic trading behavior, I found that firms targeted more by algorithmic trading have stock market price better predicting future earnings for up to 5 years (price of capital market is more informative) and have firm investment following more tightly with stock market price (manager learn from capital market).

Although my first approach has suggested a data correlation pattern that is consistent with the theory of AT improving a firm's security price informativeness at secondary market and affecting firm investment decisions, such study is imperfect in the sense that it only suggests correlation, not causation, because algorithmic based investor's focusing on firm is endogenously correlated with firm characteristics. To further the study on this topic, either a cleaner empirical setting or a more developed model with a testable correlation is necessary. In addition, I would like to examine a new channel: the market price conveys information about profitability in the firm's innovation market. This idea is in light of Guo, Prez-Castrillo, and Toldr-Simats (2018) where they find secondary market analysts better evaluate firm innovation through across-firm acquisition than within-firm R&D. It would be interesting to examine how improvement in financial market informativeness affects firms' innovation-decision. Such analysis requires a good understanding of firm innovation behavior, and it will be especially important to discuss the other confoundings. Further exposure to the literature of the determination of the firm innovation pattern will help me in this prospect.

Towards this end, I would appreciate it if I could attend the NBER Entrepreneurship boot camp. Its extensive cover of frontier topics in firm innovation would help me better approach the question that I am interested, and also give me inspiration of the research agenda under my broad research interests topic of technologic progress and firm dynamics.

# THE UNIVERSITY OF MICHIGAN – ANN ARBOR

**Unofficial Transcript - Not an Official Transcript**

Shi,Yuan
UM ID: 79169506 UIC: 3719777860
Uniqname: SHYUAN


Date: Mar 17, 2019

Citizen: Non-Resident Alien
Visa: F1

Shi,Yuan (847) 454-4022
1746 McIntyre Drive
Ann Arbor, MI 48105
United States

| **Fall 2017** | | **Rackham** | **Grade** | **Hours** | **MSH** | **CTP** | **MHP** |
|---|---|---|---|---|---|---|---|
| ECON | 600 | Math-Economists | A | 2.00 | 2.00 | 2.00 | 8.00 |
| ECON | 601 | Microecon Theory I | A+ | 1.50 | 1.50 | 1.50 | 6.45 |
| ECON | 603 | Microecon Theory III | A+ | 1.50 | 1.50 | 1.50 | 6.45 |
| ECON | 671 | Econometric Anlys I | A- | 3.00 | 3.00 | 3.00 | 11.10 |
| FIN | 855 | Inv Dec Symmet | B+ | 3.00 | 3.00 | 3.00 | 9.90 |
| **Term Total** | | **GPA: 3.809** | | **11.00** | **11.00** | **11.00** | **41.90** |
| **Cumulative Total** | | **GPA: 3.809** | | | **11.00** | **11.00** | **41.90** |

| **Winter 2018** | | **Rackham** | **Grade** | **Hours** | **MSH** | **CTP** | **MHP** |
|---|---|---|---|---|---|---|---|
| ECON | 602 | Microecon Theory II | A | 1.50 | 1.50 | 1.50 | 6.00 |
| ECON | 604 | Microecon Theory IV | A+ | 1.50 | 1.50 | 1.50 | 6.45 |
| ECON | 672 | Econometric Anl II | B+ | 3.00 | 3.00 | 3.00 | 9.90 |
| FIN | 873 | Structural Estimat | A- | 1.50 | 1.50 | 1.50 | 5.55 |
| FIN | 885 | Res Top in Finance | S | 1.50 | 0.00 | 1.50 | 0.00 |
| **Term Total** | | **GPA: 3.720** | | **9.00** | **7.50** | **9.00** | **27.90** |
| **Cumulative Total** | | **GPA: 3.772** | | | **18.50** | **20.00** | **69.80** |

| **Fall 2018** | | **Rackham** | **Grade** | **Hours** | **MSH** | **CTP** | **MHP** |
|---|---|---|---|---|---|---|---|
| ECON | 605 | Macroecon Theory I | A+ | 3.00 | 3.00 | 3.00 | 12.90 |
| ECON | 675 | Appl Microeconometrc | A | 3.00 | 3.00 | 3.00 | 12.00 |
| FIN | 865 | Asymmetric Info | A+ | 1.50 | 1.50 | 1.50 | 6.45 |
| FIN | 871 | Corporate Finance | A- | 1.50 | 1.50 | 1.50 | 5.55 |
| **Term Total** | | **GPA: 4.000** | | **9.00** | **9.00** | **9.00** | **36.90** |
| **Cumulative Total** | | **GPA: 3.880** | | | **27.50** | **29.00** | **106.70** |

| **Winter 2019** | | **Rackham** | **Grade** | **Hours** | **MSH** | **CTP** | **MHP** |
|---|---|---|---|---|---|---|---|
| Elections as of: 03/17/2019 | | | | | | | |
| BA | 830 | Teach'g Fundamentals | S | 0.50 | 0.00 | 0.50 | 0.00 |
| ECON | 632 | Ind Org & Pub Pol | | 3.00 | 0.00 | 0.00 | 0.00 |
| FIN | 872 | Continuous-Time Pln | A | 1.50 | 1.50 | 1.50 | 6.00 |
| FIN | 875 | Emprcl Methdlgy Fin | | 1.50 | 0.00 | 0.00 | 0.00 |
| FIN | 885 | Res Top in Finance | S | 1.50 | 0.00 | 1.50 | 0.00 |
| **Term Total** | | **GPA: 4.000** | | **8.00** | **1.50** | **3.50** | **6.00** |
| **Cumulative Total** | | **GPA: 3.886** | | | **29.00** | **32.50** | **112.70** |

| **Academic Statistics for Rackham** | | **MSH** | **CTP** | **MHP** |
|---|---|---|---|---|
| **Total to Date** | **GPA: 3.886** | **29.00** | **32.50** | **112.70** |

**Program Action History:** **Business Administration Doc**
04/10/2017 Matriculation
Business Administration PhD / Finance

**Academic Previous Experience**

Tsinghua University Tsinghua Yuan
Beijing 11 100084 China
Bachelor of Economics 07/01/2016

**End of Unofficial Transcript**

Toni M. Whited
Dale L. Dykema Professor of Business Administration
Stephen M. Ross School of Business
University of Michigan
701 Tappan Street
Ann Arbor, Michigan 48109-1234

MICHIGAN ROSS

March 29, 2019

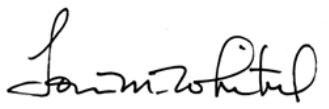
To whom it may concern:

I would like to offer a strong recommendation for Yuan Shi for the 2019 NBER Entrepreneurship Boot Camp. She is a second-year student in the finance PhD program at the University of Michigan. She has also worked as my RA for two year. She is an excellent RA and a great student. She has done well in all of her classes here at Michigan, including the challenging economics classes.

I think she is more interested in reduced-form work than structural work, so she needs exposure to more topics than we can offer in our PhD program. In this sense the boot camp would be great for her, as it would introduce her to material that we do not offer at all. I assure you that she would do all of the reading necessary for the boot camp, as her work ethic is excellent.

If you have any questions, please feel free to contact me.

Sincerely,



Toni M. Whited