Cover Letter

Applicant:

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Recommendation Letter Writer:

Steven Grenadier
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STEVEN GRENADIER
William F. Sharpe Professor
of Financial Economics

March 27, 2014

Brett Maranjian
National Bureau of Economic Research
1050 Massachusetts Avenue
Cambridge, MA 02138, US

Letter of Recommendation for Zhe Wang

I would like to enthusiastically recommend that you admit Zhe Wang into the NBER Entrepreneurship Research Boot Camp. If fortunate enough to be selected, Zhe would be my third student to participate in this program. My two previous students, Andrey Malenko and Will Cong, benefited greatly from the camp.

Zhe is a second-year finance doctoral student at Stanford. Zhe has done very well in her courses in the finance Ph.D. program, which is a very challenging program. She is simply a terrific student. Along the way, she has been actively conducting research, including an excellent first year summer paper.

There is no doubt that Zhe wishes to focus her research on entrepreneurship issues. All of her work thus far has been in this area. Her current work is attempting to isolate the determinants of VC firm size using a clever networking model. I should say that this work is quite preliminary, but does appear promising. Her first year summer paper looked at dynamic learning and the concomitant lemons problem, with an application to VC

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financing. This paper showed very mature research tendencies, in particular how she endogenized learning in the face of future adverse selection costs. This turns out to be of a similar flavor to the work of Berkeley student Victoria Vanasco, whose paper looks at a similar model in the context of asset-backed securities.

Zhe is seriously interested in entrepreneurial finance. This was her initial interest when she arrived at Stanford, and remains her interest today. While she clearly has the tools for theoretical research in this area, she would greatly benefit from your boot camp in terms of learning about applications and existing research in the area.

In summary, Zhe is a serious and exceptional student of finance. She would be a perfect candidate for inclusion into your program. Should you have any questions regarding Zhe's application, please contact me either at (650)-725-0706 or via email at sgren@stanford.edu.

Warmest regards,



Steven Grenadier

ZHE WANG

Stanford Graduate School of Business
Program of Ph. D. in Finance
zhewang5@stanford.edu

EDUCATION

Ph.D., Finance (Expected), Stanford Graduate School of Business	2012-present
M.A., Economics, Peking University, China	2009-2012
B.A., Mathematical Economics and Finance, Wuhan University, China	2005-2009
B.A., Mathematics and Applied Mathematics, Wuhan University, China	2005-2009

RESEARCH INTEREST

Entrepreneurial Finance, Economics of Information

HONORS AND AWARDS

Ernest T. Hinshaw, Jr. and Nell Hinshaw Fellowship, 2012
The Cha Family Fund for the Cha Scholars, 2012
The Hank McKinnell PhD Fellowship Fund, 2012
Lloyd H. Saunders III Fellowship, 2013
MBA Class of 1956 Fellowship, 2013
Special Miscellaneous Fellowship, 2013
William Herbert and Winifred N. Carr Fellowship, 2013
First-Rank Scholarship, Peking University, 2010
Excellent Undergraduate Thesis, Hubei Province, 2009
First-Rank Scholarship, Wuhan University, 2007 & 2008
Second Prize, the National English Contest for College Students, 2007 & 2008
Provincial Outstanding Student, Hubei Ministry of Education, 2008
National Scholarship, Ministry of Education, 2008
Semi-Finalist and Head of Team at Ivey/Coca-Cola China Case Competition, Richard Ivey School of Business, the University of Western Ontario, 2007
Outstanding Student, Wuhan University, 2007
Semi-Finalist of "Star of Outlook" National English Talent Competition, 2003
First Prize in the National English Competition, 2002

RESEARCH EXPERIENCE

Work in Progress about Entrepreneurial Finance

"Optimal Venture Capital Firm Size and Network Formation", with Victor Westrupp, 2014
– Empirically identifies key determinants of VC firm size
– Applies network formation methodology to model equilibrium VC firm size

"Optimal Venture Capital Firm Size and Efficient Referrals", 2014
–Investigates optimal VC firm size that minimizes mismatching problem due to insufficient referrals.

"Herding in Venture Capitalists", term paper, 2014

–Studies the information transmission in VC industry

–Explores the possibility of herding and information cascades in VC industry

Working Papers

"Dynamic Optimal Learning and Adverse Selection", first year paper, 2013

–Considers the interaction between dynamic optimal learning and dynamic lemon market. I endogenize the extent of information asymmetry by modeling the optimal accumulation of private information over time.

–Can be applied to optimal exit problem in Venture Capital financing.

"Risk Management and Securitization", term paper, 2013

–Explores whether risk management controlled securitization activities by financial institutions before the 2007-2009 financial crisis.

"Asset Pricing and Aggregate Cash Outflow of Mutual Fund Industry", term paper, 2013

–Explores how aggregate cash outflow of Mutual Fund Industry affects stock pricing in the United States.

"Optimal Debt and Information Acquisition", MA Thesis, 2012

—Explores why Asset-Backed Security (ABS) investors relied heavily on credit ratings and rationally ignored that ABSs within the same rating are heterogeneous in how their payoffs correlate with the national housing markets.

"Fluctuation in Asset Price and the Financial Accelerator", BA Thesis (Economics), 2009

—Tries to incorporate price fluctuation of financial assets into the model of "Financial Accelerator" (Bernanke, Gertler, and Gilchrist 1999).

Invited Presentation

"Expectation and Financial Behavior", at Dongbei University of Finance and Economics, 2011

Short-Term Courses and Workshop

22nd Jerusalem Summer School in Economic Theory (on Financial Crises), Institute for Advanced Studies, Hebrew University of Jerusalem, 2011

"Macro, Money and Finance" by Professor Yuliy Sannikov, at Central University of Finance and Economics, 2011

"Corporate Finance" by Professor Yuliy Sannikov, Summer School of Renmin University, 2011

Workshop of Field Research on the Market Organization of High-Quality Agricultural Products, CCER, Peking University, 2010

"Auction Theory" by Professor Vijay Krishna, at Wuhan University, 2006

TEACHING AND WORKING EXPERIENCE

TA, Managerial Finance (Stanford GSB MBA)	Winter 2014
TA, Corporate Finance (Executive MBA)	Spring 2011
TA, Industrial Organization (Undergraduate)	Fall 2010
Intern in Zurich Insurance Company (Hong Kong)	Jan. 2008
Intern in Deutsche Bank China, Beijing Branch	Jan.-Mar. 2009

List of Ph D. Courses

Zhe Wang

Year	Course Name	Date of Enrollment
First Year	Financial Markets I	8/10/2012
	Microeconomic Analysis I	8/10/2012
	Econometric Methods I	8/10/2012
	Corporate Finance Theory	11/7/2012
	Empirical Corporate Finance	11/7/2012
	Microeconomic Analysis II	11/8/2012
	Econometric Methods II	11/8/2012
	Empirical Asset Pricing	2/21/2013
	Auctions, Bargaining, and Pricing	2/21/2013
	Econometric Methods III	2/21/2013
Second Year	Dynamic Asset Pricing Theory	7/30/2013
	Contracts, Information, and Incentives	12/24/2013
	Financial Markets II	10/22/2013
	Advanced Empirical Corporate Finance	10/22/2013

Application Essay

Zhe Wang

March 23, 2014

Innovation is the engine for economic growth. Among the financial intermediaries that fuel innovation, venture capital (VC) has always been an important player, and therefore serves as a starting point for research in entrepreneurial finance. I am primarily interested in the economy of scale in VC, particularly the determinants for optimal VC firm size.

There is considerable variation in VC firm size within VC industry. Moreover, according to Metrick and Yasuda (2010), the size distribution is highly skewed. In other words, there are a large number of small VC firms along with few big ones. To obtain some understandings of those characteristics of distribution, a natural question to ask is: what factors determine the size of a particular VC firm and hence the cross-sectional size variation?

In a joint work with my colleague Victor Westrupp, we try to apply the methodology of network formation to determine the boundary of a VC firm. A network in VC, just like any other network, consist of nodes and links. In the specific VC settings, nodes are VC General Partners (GP). Any two nodes (GPs) can form either an intra-firm link (partnership), an inter-firm link (syndication), or no link at all. The key difference between intra- and inter-firm links is the extent of profit sharing. That is, intra-firm link usually permits full profit sharing on all projects invested, while inter-firm link allows for profit sharing only on the particular co-invested project. We define the boundary of a VC firm as the boundary of intra-firm links. Equipped with these definitions, the general idea of Coase (1937) implies that the GP's equilibrium choices over links determines the boundary of each firm, and thus the pattern of size distribution. In contrast to the incomplete contract approach with only a few players, our network approach features a model with many agents that provides a bird view on the pattern of VC firm sizes.

Starting from this framework, our first task is to identify specific economic forces that determine the cross-sectional variation of firm size. Possible candidates include GP ability, combination of specialty, and previous network among existing or potentially new GP's (entrepreneur, MBA, etc.). To capture the relative importance of the above factors, we need to empirically identify them. After that, we intend to build a theoretical model on network formation based on this framework.

In addition to variation of firm size within VC industry, a second way to analyze VC economics of scale is to compare VC with Buy-out industry. According to Kaplan and Schoars (2005), although similar to VC firms, Buy-out firms exhibit smaller extent of decreasing returns to scale than VC. Besides the mechanical argument that Buy-out firms focus on later stages which requires more fund, one may seek other reasons for this difference in firm size between VC and Buy-out firms.

I believe that an important ingredient is specialization. Some anecdotal facts suggest that most VC GPs specialize in a few particular fields that are cognitively connected. For example, many VC GPs specialize in fields in IT, but not in healthcare at the same time. However, Buy-out GPs

are much less specialized, since they can apply their quantitative finance skill to many industries. Therefore, specialty-mismatch between clients and GPs could potentially be a severe problem that reduces efficiency in VC industry more than in Buy-out industry.

Garicano and Santos (2004) suggests that insufficient referrals would result in mismatch in expertise industry. Consider for example a mediocre personal injury lawyer who receives a potentially highly profitable client. The lawyer realizes that, were she better qualified, she could obtain a substantially higher profit from the opportunity. The problem is that she is the only one who knows this and, absent any trade, she stands to obtain a considerable, but lower, profit from this client. Instead, she could refer the client to a better lawyer than herself. The obstacle to this transfer is that generally a contract cannot be made contingent on the actual quality of the case, since determining the value of the claim requires meeting the client, with a high risk that the client is lost to the original lawyer. As a result, the referring lawyer may try to refer only bad cases, and the market is prone to adverse selection and mismatch. Garicano and Santos suggest profit sharing as a remedy to align agent's incentive and alleviate the mismatching problem from adverse selection. However, this argument would recommend a one-stop-shop firm as the most efficient organization. If this is the only factor that determines firm size, then VC firms should be as large as possible to maximize sharing. However, this is not observed in reality, meaning that there must be some other economic forces at play.

I contend that there are non-pecuniary benefits which cannot be shared using profit sharing in partnership. For instance, the chance of being able to become a member of board of directors is one of the non-pecuniary benefits. This benefit adds value to personal reputation, which is too vague and too private to be shared in a contract. Because of this feature, private benefit is not well-shared in partnership. Case studies suggest that in very few situations can multiple GP's in the same firm sit on board of a portfolio company, but it is common for GPs from different VC firms to appear on the same board in a syndication. This is reasonable, since entrepreneurs in the portfolio companies are more willing to accept two GPs on board from different VC firms than from the same firm. That is, syndication between VC firms facilitates sharing of non-pecuniary benefit of sitting on board, although within-firm (partnership) aligns pecuniary benefit. Based on this observation, large VC firms might benefit from larger scale profit sharing to overcome adverse selection of referral on one hand, but might also suffer from the inability to create more non-pecuniary benefits that separate small firms can offer. The equilibrium firm size will then be determined by these two forces. By comparing VC to Buy-out firms where mismatching is not an issue, I may be able to explain the difference based on the framework.

Considering the above research agenda, this boot camp is a good match for me because not only the topics are closely related to my fields, but also the sessions are most informative for me. Specifically, the topics on organizations, innovations, clusters, and financing are most pertinent to my current research, and intensive knowledge about entrepreneurial economics will be a good complement to my VC financing background. I wish I could have the honor to enter the camp and learn from the top scholars in the field.