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Education

IAE Business School, Universidad Austral, Argentina 03/2012-10/2016
Ph.D. (*Summa Cum Laude)*
Dissertation: *"Essays on the role of Networks in Entrepreneurial Finance"*

References

Prof. Virginia Sarria Allende *(Principal Advisor)* IAE Business School. vsarria@iae.edu.ar. +54 (230) 448-1453	Prof. Roberto Vassolo *(PhD. Program Director)* IAE Business School rvassolo@iae.edu.ar. +54 (230) 448-1081	Prof. Javier García Sanchez *(Defense Comitee)* IAE Business School jgsanchez@iae.edu.ar. +54 (230) 448-1081

Universidad Torcuato Di Tella, *Argentina* *2004-2008*
Master in Economics
Universidad Torcuato Di Tella, *Argentina* *2000-2003*
B.A. in Economics, Minor in Political Sciences, Thesis Mention

Research Fields and Interests

Financial Economics: Entrepreneurial Finance
Economic, Social and Financial Networks
Computational Sciences: Methods for Collection and Analysis of Large Scale Data
Econometrics: Causal inference methods and strategies, Program evaluation
(Secondary) Economic Development, Urban Economics: Informality in Housing Markets

Academic Positions / Affiliations

Adjunct Professor - Facultad de Ciencias Empresariales- Universidad Austral	*2015–present*
Invited Lecturer - School of Government. - Universidad Torcuato Di Tella	*2007-present*
Invited Lecturer - Universidad EAN- Colombia	*2015*
Invited Lecturer - IAE Business School	*2014*
Associate Researcher - Center for Housing and Urban Policy – School of Government	*2007–present*
Research and Teaching Assistant - Universidad Torcuato Di Tella – Argentina	*2004-2005*

Doctoral Studies Research Papers

"The Added-Value of Network Connections in Entrepreneurial Finance". *Revise and Resubmit. Journal of Business Venturing (July, 2016).*

Entrepreneurs are usually exhorted to attract the best networked investors. We revise the importance of this advice by estimating the effects of investors' networks in the performance of entrepreneurial ventures. We show that this estimation is biased when other relevant connections are not considered such as those established by founders and advisors. To address this problem, we use two original sources of web-based data, resulting in a network of nearly 1 million connections. We conclude that connections add a relative value depending on existent connections. Also that show evidence of decreasing returns to connections when they are above a certain threshold.

"Matching in Entrepreneurial Finance Networks" *Submitted for publication. (May, 2016)*

We empirically explore the importance of networks in the match formation of startups and investors. Using a massive network of connections from the entrepreneurial finance setting in California, we estimate a matching model were network distance can both determine the value of a prospective match as well as moderate observable complementarities. We find that distance drives matching value and moderates preferences for experience and education. While we corroborate that there is significant sorting along this preferences in realized matches, our results indicate that connections can potentially outweigh them, emphasizing the role of networks in alleviating matching frictions in these markets.

"Random Network Formation in Entrepreneurial Finance: A Simple Model and Evidence" *Submitted for publication. (August, 2016).*

We study the structural properties of a network of startups and investors, using original data from the entrepreneurial finance setting in California. We also propose, and calibrate a two-mode random network formation model. We show that an essential mechanism of the entrepreneurial finance setting: the tendency of investor to invite each other to deals, is able to account for observed properties, including the heavy-tailed distribution in the degree distribution of investors, average distance, diameter, and clustering. This is achieved without assuming preferential attachment, or any other particular preferences for matching between investors and startups. We discuss implications for market efficiency.

Research Grants

*2015, 2016-2017, **Universidad Austral**. "Entrepreneurial Finance and Web-Based Social Networks: An interdisciplinary research Project" joint with Professors Sarria Allende, Robiolo, and Dams*

*2009-2011 **Lincoln Institute of Land Policy**, **Washington DC** "Land Use Regulation, its Determinants, and the Relationship with Households' Residential Tenure Condition" With Prof. Cynthia Goytia*

Teaching Experience

Adjunt Professor, Universidad Austral	
Microeconomics II *(undergraduate)*	2015-present
Economics of Markets *(undergraduate)*	2015-present
Invited Lecturer, Universidad Torcuato Di Tella	
Introduction to Econometrics Using Stata *(Masters)*	2011-present
Econometrics 2: Causality Identification and Program Evaluation *(Masters)*	2012- present
Thesis Workshop – *(Masters)*	2007-2009, 2016
Invited Lecturer, *Universidad EAN- Colombia* Economics of Markets	2015
Invited Lecturer, IAE Business School, Universidad Austral	
Introductory Econometrics *(graduate)*	2013
Quantitative Methods for Decision Making *(MBA)*	2013

Short Courses	**Universitat Pompeu Fabra – IE Instituto de Investigación y Educación Económica** Statistical Techniques and Impact Evaluation of Public Policies	2016
	IAE-NAVES National Entrepreneurship Competition Entrepreneurial Finance *(Salta, Santa Fe, Cordoba, Misiones, Tucumán, Neuquén- Argentina)*	2015-2016
	Universidad de Buenos Aires Topics in Business Cycles (Masters)	2006-2007
as Teaching Assistant	**Universidad Torcuato Di Tella** Business Cycle Theory (*Masters*) Prof. Finn Kydland	2003, 2006
	International Macroeconomics (*Masters*); Prof. Andrés Neumeyer.;	2004
	Macroeconomics (*Undergraduate*) 2005; Microeconomics (*Undergraduate*); Economics & Law (*Undergraduate*)	
	Mathematics: Admission's course. (Underg.)	2002-2004

Publications

Journals

2016. Corporate Credit Spreads and the Sovereign Ceiling in Latin America. With Martin Grandes and Demian Panigo. *Emerging Markets Finance and Trade.* Forthcoming

2010. "On the Estimation of the Cost of Equity in Latin America". With Martin Grandes and Demian Panigo. *Emerging Markets Review 11 (2010) 373–389*.

Book Chapters

2012. "Public-private cooperation for gas provision in poor neighbourhoods of Buenos Aires: institutional framework and impacts", with Cynthia Goytia and Pablo Sanguinetti. In Latin American Urban Development into the Twenty First Century: Towards a Renewed Perspective on the City. Edited by Dennis Rodgers, Jo Beall, and Ravi Kanbu. Palgrave Macmillan

2010. "Securities Markets Regulations and Evaluations of the Degree of Implementation" In Capital Markets in the Southern Cone of Latin America: Convergence to International Standards and Integration. Ed. Alberto R. Musalem, 79-120, Buenos Aires: Prentice Hall.

Working Papers Series

2015. The CIPUV Residential Land Use Regulatory Index: A Measure of the Local Regulatory Environment for Land and Housing Markets in Argentina's Municipalities ***Lincoln Institute of Land Policy WP15CG2*** With Cynthia Goytia, Guadalupe Dorna, Jonathan Cohen

2014. "International Road Improvement and Socioeconomic Effects: An Impact Evaluation of the Western Europe-Western China Corridor Project in Kazakhstan. Proposed Methodology and Baseline Data Report". With Diego Bondorevsky. ***World Bank Working Paper - ECA Region***

2014. "An Empirical Analysis of Land Use Regulation Determinants" ***CIPUV – Universidad Di Tella Working Paper***

2013. "Zoning and Land Cover Metrics for Municipalities in Argentina (1990-2001)" With Cynthia Goytia. ***Lincoln Institute of Land Policy Working Paper WP13CG1***

2012. "An Exploratory Study of Entrepreneurial Ventures in Argentina, their Financing and First Years´ Growth", With Laura Mastroscello, Fernando Valli, and Rodrigo Segovia, ***Development Bank of Latin America*** **CAF Working Paper N°2012/10**

2012. "Private Pension Systems: Cross-Country Investment Performance", With Alberto R. Musalem, ***Social Protection and Labor Discussion Paper N°1214. World Bank.***

2012. "Distrito Tecnológico de la Ciudad de Buenos Aires: Estimación de Impacto en el Mercado Inmobiliario (2007-2011)" With Cynthia Goytia.

2012 "Evolution and Determinants of Private Investment in Argentina" (1900-2005), with Demian Panigo and Emilio Depetris

2011 "Public programs of Financing and Support of SMEs in Argentina: Impact evaluation using Matching, Regression and PSM (2004-2009)" ***Center for Financial Stability WP N°41***

2010 "Credit Requests and Access to Financing of SMEs in Argentina." ***Development Bank of Latin America (CAF)- Working Paper 2010/08.***

2010. "Land Regulation in the Urban Agglomerates of Argentina and its Relationship with Households' Residential Tenure Condition". With Cynthia Goytia. ***Lincoln Institute of Land Policy Working Paper WP10CC1.***

2009. "Liberia: Financial Sector Diagnostic. Main Issues and Suggested Development Strategy". With Alberto R Musalem. **The World Bank.**

2008. "The Cost of Capital in Latin America", ***Center for Financial Stability Policy Note N° 8.***

2008. "Investment Financing Structure of Listed Companies in Argentina (1994-2004)", With Demian Panigo y María Luisa Streb, ***Center for Financial Stability Working Paper Nº 21***.

2007. "The Cost of Corporate Bond Financing in Latin America. A Structural Approach", Co-authored with Martin Grandes (AUP) and Demian Panigo (PSE-Ecole Normale Supérieure), ***Center for Financial Stability Working Paper. Nº20***.

2007. "The Cost of Equity Beyond CAPM: Evidence from Latin American Stocks (1986-2004)". With Martin Grandes and Demian Panigo. ***Center for Financial Stability Working Paper. N°16-2007***.

Other

2009. El Distrito Tecnológico en la Ciudad de Buenos Aires. With Cynthia Goytia , Pablo Sanguinetti and Fernando Alvarez de Celis. 2009. Buenos Aires: Gobierno de la Ciudad de Buenos Aires.

2007. "Intergenerational Transfers, the Pension System and Fertility decisions", with Juan Marcos Wlasiuk. Manuscript 2007.

2004. "Industrial Productivity and International Trade in Argentina", with Agustin Lanne and Bernabé Lopez Martin. Mention, Department of Economics, Universidad Torcuato Di Tella.

Professional Experience

2016 Consultant Gobierno de la Ciudad de Buenos Aires- *Impact evaluation of Entrepreneurship programs*

2015 Consultant World Bank*. Impact Evaluation of Western Europe-Western China Corridor Project in Kazakhstan. Follow up SW Road Project. With Diego Bondervsky*

2015 Consultant. Development Bank of Latin America (CAF*). Evaluación de Impacto de una Inversión en Infraestructura Eléctrica en las Pequeñas y Medianas Empresas Industriales: La Interconexión de Comahue - Cuyo (Argentina). Con Diego Bondervsky e Ignacio Bruera*

2012 ***Consultant, Gobierno de la Ciudad de Buenos Aires*** "Impacts of a Technology District" With Cynthia Goytia

2009-2010 ***Consultant - Development Bank of Latin America (CAF)*** *Buenos Aires, Argentina*
Jan-July 2010 Access to Financing of SMEs in Argentina
Jun-Sept 2009 Local development plans and strategies.

Jan-Jun 2009 ***Consultant, The World Bank,*** *Monrovia, Liberia*
Participant in a mission that prepared a roadmap for the development of the Financial Sector in Liberia. Worked closely with the Central Bank, and other financial sector institutions (e.g.., microfinance institutions)

2009 ***Consultant, Gobierno de la Ciudad de Buenos Aires*** *"El Distrito Tecnológico en la Ciudad de Buenos Aires" With Cynthia Goytia*

Honors, Scholarships and Fellowships

* PhD Summa Cum Laude. IAE Business School
* National Scientific and Technical Research Council (Consejo Nacional de Investigaciones Científicas y Técnicas CONICET) Ph.D. Type II Scholarship (2014-16)
* IAE PhD Program Fellowship (2012-2015)
* Conference Fellowship LACEA. 2005 and 2008
* Mention Honors Thesis ""Industrial Productivity and International Trade in Argentina" Universidad Torcuato Di Tella (2003)
* Fellowship U Di Tella (2000-2003)

Presentations in Conferences	2015 "Financiamiento de Startups y Networks. Un Proyecto Interdisciplinario" Jornadas de DataMining & Business Intelligence. Universidad Austral 2014 Research Methods in Land Policy. Lincoln Institute. (Buenos Aires, Argentina) 2011 Lincoln Institute Workshop (Montevideo, Uruguay) 2010 **Development Bank of Latin America** CAF Workshop – (Bogotá, Colombia) 2009 **United Nations University - Wider Conference**, "Beyond the Tipping Point: Latin American Development in an Urban World " (Buenos Aires, Argentina) 2009 Comments for the presentation of "Quality of Life", the report of the Interamerican Development Bank. (Buenos Aires, Argentina) 2008: Observatorio Pyme Annual Conference (Buenos Aires, Argentina) Annual Microcredit Conference Andares (Buenos Aires, Argentina) 13th LACEA meeting, (Rio de Janeiro, Brazil) Roundtable on Regulation, CEF (Buenos Aires) 2005: 10th LACEA meeting, Paris (Paris, France)
Languages	Spanish (Native), English (Fluent), French (Speaks reads and writes well)
Software Skills	• Experienced in programming in PYTHON and JAVA. Data structures, experienced in ORIENTDB (graphs-oriented database), Experienced in network analysis libraries and software, including SNAP. • Advanced programming knowledge in STATA, previous significant experience in MATLAB, and relevant experience in MATHEMATICA. • Relevant experience in ARCGIS (geographic information system).

RESEARCH PROPOSAL: "NETWORKS IN ENTREPRENEURIAL FINANCE"

NBER Post-Doctoral Fellowship in Entrepreneurship

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17th November 2016

Keywords: *entrepreneurial finance, economic and social networks, large-scale web data collection and analysis.*

Motivation

This research proposal lies in the growing area of *entrepreneurial finance*. This is a highly dynamic research area, in the intersection of finance and the economics of entrepreneurship and innovation, and which studies questions such as: How can finance address the needs of startups for financing? How can financial arrangements between entrepreneurs and investors be designed more efficiently? (Denis (2004))

In particular, there is a major dimension of entrepreneurial finance and (entrepreneurship more in general) that has been scarcely researched, which is related with the role of networks. Social, professional, and financial connections, and the resulting network structures, take a decisive role in many markets (Granovetter (1985), Jackson (2010)) , particularly entrepreneurial finance[1]. In these markets, connections among venture capitalists, angel investors, accelerators, founders, etc. are critical in defining what we understand by entrepreneurial ecosystems (Stangler and Bell-Masterson (2015)). Theoretically, networks serve to transmit information, diversify risks (Fafchamps and Gubert (2007)), take a decisive role in contagion mechanisms (Young (2006)), and altogether contribute in shaping the outcomes of markets. Nevertheless, and even despite the growing interest of the economic literature on networks[2], our understanding of the role of economic and social networks in the entrepreneurial finance setting remains only in the surface.

One of the main reasons why this major topic has not been more extensively explored, is the limited availability of data. Collecting data on social and professional networks is generally a hard task. Traditional research, typically based on the use of surveys, faced the limitations of such a methodology (Marsden (1990), Marsden (2005)). In the case of entrepreneurial finance, this problem adds to the complexity of collecting data of quite an ephemeral phenomenon such as entrepreneurial ventures. Besides some major advances exploiting the connections inferred from syndicates (Hochberg, Ljungqvist, and Lu (2007), Hochberg, Ljungqvist, and Vissing-Jørgensen (2014)), the richer and more complex structure of connections for entrepreneurial finance research has remained largely unexplored.

[1] The importance of the embebedness of markets in social networks can be traced to the economic sociology literature (Granovetter (1985), Polanyi and MacIver (1957)) There is an increasing literature on networks in economics (See Jackson (2010), Easley and Kleinberg (2010)) and finance (See Allen and Babus (2009))

[2] There are a number of examples studying for example, network structure in applications such as, buyer-supplier networks and production chains (Atalay et al. (2011), Oberfield (2012)), geography and international trade (Chaney (2014), Riccaboni and Schiavo (2014), risk aversion and social networks (Kovářík and van der Leij (2014)),

In my research I propose to take advantage of the opportunity that arises from recent technological advances. Recently available sources of data, such as specialized entrepreneurial finance online platforms and databases, entrepreneurs' virtual communities and related social media, constitute a valuable source of network data that can be exploited for empirical research. In spirit, my approach can be paired with a tendency of research projects that exploit the possibilities of large-scale data (Einav and Levin (2014), Cavallo and Rigobon (2016)).

Precisely, in a project I have started in 2013[3], in collaboration with software engineers and data-mining experts, we have developed tools for collecting and analyzing large amounts of network data from the Web, spanning financial and professional networks with hundred thousands of nodes and millions of edges. The dynamic (and high frequency) network data resulting from this project has already allowed other researchers to empirically explore related questions and a few papers have already been produced, besides my own.

In my own case, and as part of my PhD dissertation (See further details below), I have been able to study questions on the effects of networks on investment (and startups') performance (Pasquini and Robiolo (2015), on the role of networks in the matching of groups of investors and startups (Pasquini, Robiolo, and Sarria Allende (2016)), and to examine the processes of network formation and the implications into market efficiency (Pasquini and Sarria-Allende (2016)). While on the theoretical side, these papers build on the areas of *financial economics*, the *economics of networks* and *network theory*, on the empirical side, the project builds on advances in *computational data sciences, and the econometrics of large-scale data*.

As part of the research proposal for the NBER fellowship, I expect to continue and to potentiate this line of research. In the remainder of the proposal, I first briefly explain the methodology for data collection and network construction. Then I summarize some of the research papers in entrepreneurial finance that has been produced as part of my dissertation, which are currently in process of publication. Finally, I present some of the research objectives for the residence at the NBER.

Collecting Network Data from the Web-based Sources

As explained above, new sources of data form the Web, including entrepreneurial finance online platforms and online databases, entrepreneurs' virtual communities and related social media, constitute a valuable source from which network can be exploited for empirical research. These sources comprise online financing marketplaces such as Angellist, online databases such as Crunchbase, a number of news sites, jobs platforms such as Linkedin and other social media such as Twitter.

This new source of data has the benefit that is rich and vast in its amount. It requires, nonetheless, addressing a number of technological issues related with its collection, storage, ordering, manipulation, and analysis. Designing and implementing such task, requires specialized skills, and present many issues in the frontier of software engineering and database-data-mining knowledge.

[3] See more details in https://ricardopasquini.com/entrepreneurialnetworks/

Figure 1 below presents a brief schema representing the flow of information from data sources up to analysis libraries (existent or in development). In the center, it shows the names of the data collection applications that have already been developed, and are currently in production.

Figure 2 below shows an example schema of the types of network that are collected. The figure displays individuals (as blue nodes) and organizations (startups, and other organizations such as VC funds or accelerators, as red nodes), and edges connecting them with a letter indicating the type of financial or professional relationship individuals have. In our data, individuals take active roles in organizations as founders, investors, advisors, etc. These networks can be projected into networks of a single type of node as in the right panel in Figure 2. As an example of an actual visualization of the data, Figure 3 below presents a visualization of a portion of the real network of organizations in California for the year 2012.

This tools have already allowed collecting large amounts of network data, spanning financial and professional networks with hundred thousands of nodes and millions of edges. Currently, the entrepreneurial finance network has international coverage for the period 2011-2016 (i.e., is a *dynamic* network). The resulting has allowed the production of a number research papers, including the ones included in my PhD dissertation (see description in the next section), and other papers leaded by other researchers in the project.[4] The project has also allowed participants acquiring specific knowledge in this interdisciplinary area.[5]

Finally, and despite some intrinsic limitations[6], it is also worth mentioning that the resulting tools have also proved to be promising for monitoring entrepreneurial finance activity (and entrepreneurial activity more generally). This is also research in progress that could turn into an valuable contribution to the entrepreneurship field[7].

Dissertation Research

My dissertation proposes three essays on entrepreneurial finance, and share a dimension in common, which is that they examine the role of networks in these markets. My dissertation precisely makes the point that networks play a critical role in the functioning of entrepreneurial finance markets. Each chapter propose an exploration of a different dimensions of their importance.

[4] Including Dams, Carolina et al. (2016), Dams, Carolina et al. (2016), Pasquini and Robiolo (2016)

[5] Pasquini and Robiolo (2016) –in progress- is a discussion paper which proposes that new sources of data from specialized sites provide an opportunity for advances in empirical research in social sciences, and discusses the challenges for software design in order to address the requirements of web-based collections and analysis, by discussing the case of this project.

[6] In terms of data limitations, we can mention the following: In first place, and since it is based on public information, the financial information collected includes the total amount of collected funds, the identify of investors, and information on exits, but typically do not include capitalization tables or similar data that could serve to construct VC firms' internal rates of return. Therefore, such a performance analysis would requires combining this data with other data from commercial sources (See Kaplan and Lerner (2015)). Second, in terms of representation, the data provides a better representation of the networks where the underlying platforms are most intensively used (e.g. California), therefore potential biases should be addressed with care.

[7] Since current research on entrepreneurship is based on the use of surveys, using technologies to monitor entrepreneurial activity is a promising area of research.

Figure 1: Map of Data Sources, Technologies and Apps Developed by 2016

The graph shows the main sources of data (specific web pages and complementary sources), the applications for collection and ordering and preparation of the data, and some of the technologies in use on which analysis libraries were developed.

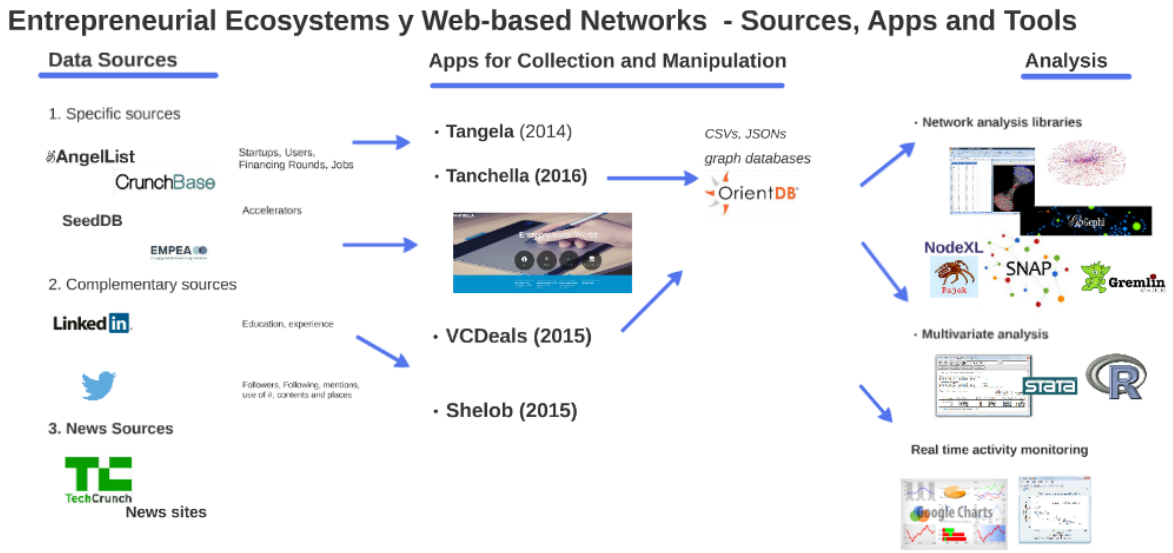


Figure 2: Network Representation of the Entrepreneurial Finance Setting

Network with two types of nodes, organizations (S_i) and individuals (j) (Edges denote roles: F: Founder, I: Investor, A: Advisor)

Startup as nodes and edges defined in terms of having an individual in common

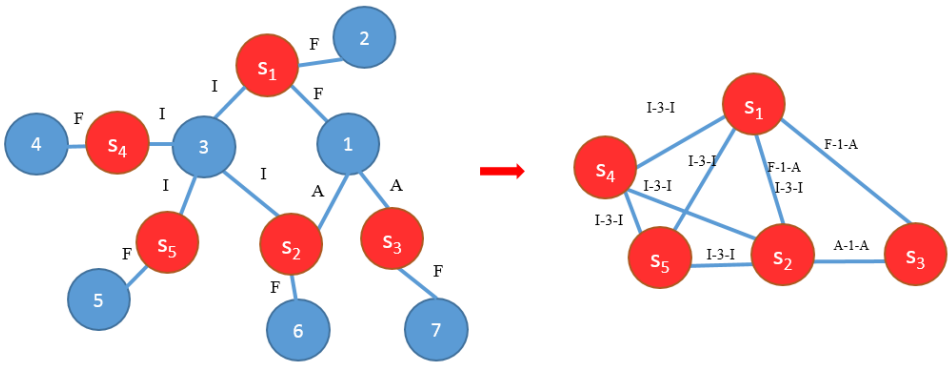
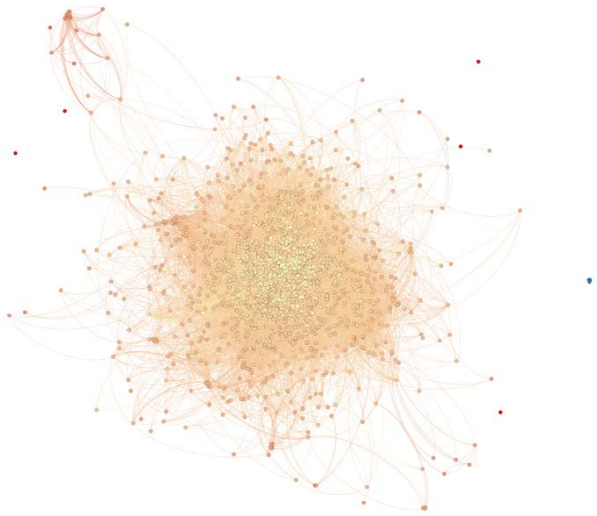


Figure 3: Visualization of the Empirical Network of Organizations. California, Connections until 2012



In the first paper entitled *"The Added-Value of Network Connections in Entrepreneurial Finance"*[8] we study networks effects in the performance of entrepreneurial ventures. In particular, the essay discusses how gaining centrality in a network of connections allows startups to increases their performance. Since one of the ways in which a startup can gain centrality in the network is by attracting investors, entrepreneurs are usually exhorted to attract the best networked investors (Hochberg, Ljungqvist, and Lu (2007), Hsu (2004)). The paper provides further insights into this advice by estimating the added-value of investors, in terms of the connections they bring to ventures. The paper also shows dimensions that are critical in this –econometric- estimation, such as the consideration for startups' connections, common connections among investors, and the decreasing returns to network centrality, and estimate their relative importance.

The second paper entitled *"Matching in Entrepreneurial Finance Networks"*[9] is concerned with another critical dimension of the functioning of entrepreneurial finance markets, which is the *matching* between startups and investors. A market where *matching* is relevant is a market where the two-sides of the transaction care for the selection of each other as the partner into a deal. In entrepreneurial finance markets, price and quantity -the implied valuation in this case- are not the only, not always the most relevant characteristics in a deal. The characteristics of the investors and startups matter to each other -, and which are the characteristics driving the match-, is a key question of research (Sørensen (2007), Bengtsson and Hsu (2010)). Moreover, the paper proposes that the network dimension plays an important role and moderates the observable complementarities driving matching. The essay proposes an innovative approach to disentangle the

[8] With Gabriela Robiolo. Available at: https://ssrn.com/abstract=2813652
[9] With Gabriela Robiolo and Virginia Sarria Allende. Available at: https://ssrn.com/abstract=2805726

characteristics driving matching, incorporates the network dimension, and provides estimates of important complementarities.

Finally, the third paper entitled *"Random Network Formation in Entrepreneurial Finance: A simple Model and Evidence"*[10] is concerned with the process of network formation in the entrepreneurial finance setting, and its consequences. The essay recognizes that individual connections resulting from matches determine a process by which a network structure emerges, with implications on the aggregate efficiency for the entire market (Jackson and Rogers (2007)). In order to further understand how this process unfolds, as well as in order to increase the understanding of matching theory, this paper proposes a two-mode random network formation model aimed to mimic the properties of an entrepreneurial finance network. In the proposed model some investors match startups at random, and some others find about investment opportunities by invitations from investors they are connected with. The paper shows that the model helps explaining features of the empirical network structure such as its degree distribution, average distance and diameter, and clustering.

Work in progress and Research Plan

Our data collection project allows advancing a number of research questions, for which we are now able to obtain empirical validation.

In a work in progress entitled *"Network Robustness and Performance of Entrepreneurial Finance Ecosystems"*[11] we are empirically examining the relationship between measures of network robustness – defined as the tolerance against failure- and the performance across entrepreneurial finance settings. Complex networks underlying entrepreneurial ecosystems are fundamental in understanding its performance and evolution (Ferrary and Granovetter (2009)). We argue that the functioning of these systems is subject to risks due to local failures (such as the bankruptcy of an investors and regular failures in the startup setting. The networks literature has suggested a number of systems display a surprising degree of tolerance against error (Albert, Hawoong Jeong & Albert-Laszlo´ Barabasi (2000), Bollobás and Riordan (2004). We are exploring the empirical validity of this ideas, namely that more robust entrepreneurial finance networks achieve better outcomes. Our unique dataset allows addressing this research question at the network level, by comparing the networks underlying several ecosystems (for instance, those in San Francisco, Seattle, Atlanta, Boulder, Austin).

In another work in progress entitled *"Entrepreneurial Finance Structural Holes"*[12] we are exploring the brokerage effects of investors who fill structural holes in the network (in the spirit of Burt (2009)) particularly those arising in ecosystems with limited access to upper level rounds. In such entrepreneurial finance markets, startups are forced to reach investors from other ecosystems in

[10] With Virginia Sarria Allende. Available at: https://ssrn.com/abstract=2822357

[11] With Virginia Sarria Allende

[12] With Carolina Dams and Virginia Sarria Allende

order to grow. This phenomenon is particularly important in ecosystems in emerging markets, where startups need to reach investors across-borders in order to close follow on series.

Future Research: Networks in Syndicates, Crowdfunding, Blockchain- based currencies and more

In the future I expect to continue addressing questions relevant for entrepreneurial finance and advancing the understanding of economic and social networks. Entrepreneurial finance is experience fast changes, due to the adoption of new technologies and models, including crowdfunding (Agrawal, Catalini, and Goldfarb (2011), Agrawal, Catalini, and Goldfarb (2011)), syndicates (Agrawal, Catalini, and Goldfarb (2016)), and "app coins" based on blockchain technologies. These innovations provide instances for new theoretical understanding and research. Here I mention two examples:

In first place, one of the main current trends in entrepreneurial finance is related with *online syndicates*. One of the dimensions that have been less studied is related with the role of networks in generating attention and contagion, particularly in syndicated investments. Enormous attention is given by backers to syndicate leaders, with possible consequences on network contagion in an event of failure. The effects of financial networks in contagion has not yet been examined, and this is a promising area of research.

Another area of research I expect to address is related with the use of "App Coins" and networks. Within a few months in 2016 an incipient number of startups started funding themselves by crowd-selling their own equity, in the form of cryptocurrencies, based on blockchain technology (KPMG (2016)).[13]. This is a model increasingly used by internet 2.0 applications (startups) that require a *network* of contributors in order to function (e.g., Facebook or Reddit). While this new financing mechanisms present themselves as promising new alternatives for entrepreneurial finance, little is still known about the incentives that emerge from these mechanisms. One characteristic of these financial mechanisms is that they are built specially for networked environments, where application components are interlinked. This is another area of promising opportunities for research on networks.

References

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Allen, Franklin, and Ana Babus, 2009, Networks in Finance, in Paul R. Kleindorfer and in Jerry Wind ed.: *The network challenge: strategy, profit, and risk in an interlinked world.* (Pearson Prentice Hall).

Atalay, Enghin, Ali Hortacsu, James Roberts, and Chad Syverson, 2011, Network structure of production, *Proceedings of the National Academy of Sciences* 108, 5199–5202.

[13]In just a few months more than 50 startups raised more $250 million. See https://medium.com/the-coinbase-blog/app-coins-and-the-dawn-of-the-decentralized-business-model-8b8c951e734f#.ey79hkwkk

Bengtsson, Ola, and David H. Hsu, 2010, How do venture capital partners match with startup founders?, *Available at SSRN 1568131*.

Bollobás, Béla, and Oliver Riordan, 2004, Robustness and vulnerability of scale-free random graphs, *Internet Mathematics* 1, 1–35.

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Recommendation Letter for RICARDO PASQUINI

To whom it might concern,

I am writing to share my view and knowledge about Ricardo Pasquini.

I met Ricardo when he was applying to the PhD program at IAE Business School, Universidad Austral. We discussed at that time about his and mine research interests, and as soon as we talked for some time, I knew it would be my pleasure to work with him.

Given that our PhD Program puts a lot of effort and focus on the advisor-student relationship, we met very frequently, even during Ricardo's course work, which he did with excellence.

Short after that, Ricardo started working on his thesis project. He has an outstanding mind for research, with an unusual curiosity which leads him to explore and discover better and novel ways of doing what he thinks he needs to do –everything, on his own initiative. I have to say, I have never seen a student so proactive and hard working. This has been possible due to his strong formation in econometrics and computing capabilities. He could analyze and learn from any research work he encounter, and extract from it what he needed for his own. He actually developed everything that was demanded to estimate and use complex network information in his research. He also worked with a team of engineering students and young graduates to develops novel application to generate unused data.

Ricardo is also outstanding as part of research teams. Given that a new PhD student on the same field joined the program the year after, we decided to hold research meetings every week, at which each of them would present the advance work of the week and potential challenges each one had encounter. The work we did together was substantial, which allowed both students to be the first in reaching graduation of the program.

Finally, my impressions would not be complete if I do not include information on how I see Ricardo as a person. I have to say that he is a great person, hard worker – as I said-, but also collaborative, always friendly and happy to share what he knows, etc.

Because all these, I do believe Ricardo can be of great value, contributing and learning a big deal from a research and teaching experience.

You can contact me for any further information you might need. Best regards,

Virginia Sarria Allende
Finance Professor
IAE Business School