CAPCO





Empowering the Financial WorldFISGLOBAL.COM



Journal

The Capco Institute Journal of Financial Transformation

Recipient of the Apex Award for Publication Excellence

Editor

Shahin Shojai, Global Head, Capco Institute

Advisory Board

Peter Leukert, Head of Strategy, FIS **Nick Jackson**, Partner, Capco

Editorial Board

Franklin Allen, Nippon Life Professor of Finance, University of Pennsylvania

Joe Anastasio, Partner, Capco

Philippe d'Arvisenet, Adviser and former Group Chief Economist, BNP Paribas

Rudi Bogni, former Chief Executive Officer, UBS Private Banking

Bruno Bonati, Chairman of the Non-Executive Board, Zuger Kantonalbank

Dan Breznitz, Munk Chair of Innovation Studies, University of Toronto

Urs Birchler, Professor of Banking, University of Zurich

Géry Daeninck, former CEO, Robeco **Stephen C. Daffron**, CEO, Interactive Data

Jean Dermine, Professor of Banking and Finance, INSEAD

Douglas W. Diamond, Merton H. Miller Distinguished Service Professor of Finance, University of Chicago

Elroy Dimson, Emeritus Professor of Finance, London Business School

Nicholas Economides, Professor of Economics, New York University

Michael Enthoven, Board, NLFI, Former Chief Executive Officer, NIBC Bank N.V.

José Luis Escrivá, Director, Independent Revenue Authority, Spain

George Feiger, Pro-Vice-Chancellor and Executive Dean, Aston Business School

Gregorio de Felice, Head of Research and Chief Economist, Intesa Sanpaolo

Peter Gomber, Full Professor, Chair of e-Finance, Goethe University Frankfurt

Wilfried Hauck, Chief Financial Officer, Hanse Merkur International GmbH

Pierre Hillion, de Picciotto Professor of Alternative Investments and Shell Professor of Finance, INSEAD

Andrei A. Kirilenko, Visiting Professor of Finance, Imperial College Business School

Mitchel Lenson, Non-Executive Director, Nationwide Building Society

David T. Llewellyn, Professor of Money and Banking, Loughborough University

Donald A. Marchand, Professor of Strategy and Information Management, IMD

Colin Mayer, Peter Moores Professor of Management Studies, Oxford University

Pierpaolo Montana, Chief Risk Officer, Mediobanca

Steve Perry, Chief Digital Officer, Visa Europe

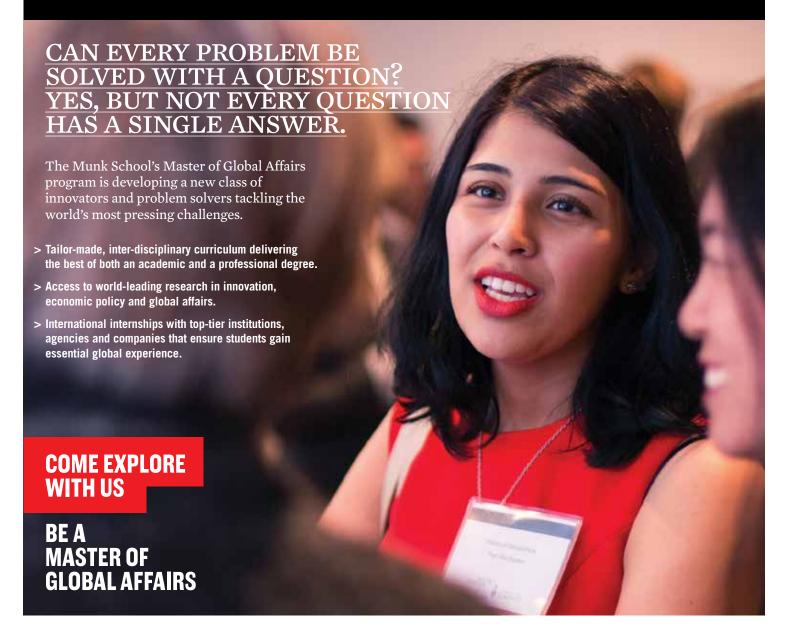
Derek Sach, Head of Global Restructuring, The Royal Bank of Scotland

 $\textbf{Roy C. Smith}, Kenneth G. Langone \ Professor \ of \ Entrepreneurship \ and \ Finance, \ New \ York \ University$

John Taysom, Visiting Professor of Computer Science, UCL

D. Sykes Wilford, W. Frank Hipp Distinguished Chair in Business, The Citadel

AND DISRUPTIONS THAT DETERMINE INNOVATION AND PROSPERITY?







Risk

New Entrants

- Crowdfunding: A New Disruptive Technology? Roy C. Smith, Won Jun Hong
- 15 Get Bold with Blockchain Benjamin Jessel, Tommy Marshall
- 21 The Role of Financial Institutions in Advancing **Responsible Value Chains** Herman Mulder
- 30 **Robo-Advice 2.0: The Next Generation** Andrew Arwas, Katie Soleil

Regulatory

- Economists' Hubris The Case of Business **Ethics in Financial Services** Shahin Shojai
- The Dodd-Frank Act Five Years Later: Are We 62 More Stable?

Todd J. Zywicki

72 The Volcker Rule as Structural Law: Implications for Cost-Benefit Analysis and **Administrative Law**

John C. Coates

86 A Historical Perspective on the Different Origins of U.S. Financial Market Regulators Susan M. Phillips, Blu Putnam

Investment

93 **Knowledge Management in Asset** Management

Eduard v. Gelderen, Ashby Monk

- **Private Equity Capital Commitments: An Options-Theoretic Risk Management Approach** Andrew Freeman, D. Sykes Wilford
- 117 **Credit Risk Decomposition for Asset Allocation** Álvaro Mª Chamizo Cana, Alfonso Novales Cinca
- Time to Rethink the "Sophisticated Investor" 124 Peter Morris
- **Fund Transfer Pricing for Bank Deposits: The Case of Products with Undefined Maturity** Jean Dermine
- **Delegated Portfolio Management,** Benchmarking, and the Effects on Financial Markets

Deniz Igan, Marcelo Pinheiro

Crowdfunding: A New Disruptive Technology?

Roy C. Smith — Kenneth Langone Professor Of Finance and Entrepreneurship, Stern School of Business, NYU **Won Jun Hong** — Former Research Assistant, Stern School of Business, NYU

Abstract

The Jumpstart Our Business Startups (JOBS) Act was passed by Congress with bipartisan support and signed into law in 2012. Many regulators and investor advocates opposed the new law because the securities it was enabling the sale of were very risky, and the public at large was unlikely to fully understand these risks, which include over-promotion, misrepresentation, mispricing, and manipulation of prices in aftermarket trading.

The first IPO under the new crowdfunding rules, a U.S.\$17 million

issue by Elio Motors, has now been completed successfully. Between the SEC's new rules and new procedures developed in the market, a different way to access investors in start-up companies has been created which could provide an alternative pathway for many companies to raise early state capital. If it catches on, then much of what we know about start-up financing could be changed forever; the new pathway could disintermediate the risk capital industry, just as Uber has done to taxis, and Amazon has done to retailing. The change could be very big.

Crowdfunding: A New Disruptive Technology?

The Jumpstart Our Business Startups (JOBS) Act was passed by Congress with bipartisan support and signed into law in 2012. Its purpose was to enable "emerging growth" startup companies to raise capital directly from the public through the internet in order to help them grow and create more jobs. Many regulators and investor advocates opposed the new law because the securities it was enabling the sale of were very risky, and the public at large was unlikely to fully understand these risks, which include over-promotion, misrepresentation, mispricing, and manipulation of prices in aftermarket trading.

EARLY FORMS OF CROWDFUNDING

The basic idea behind crowdfunding is to establish internet sites through which companies can announce themselves and their business plans and solicit funding without going through expensive venture capital or underwriting processes.

Kickstarter, founded in 2009, is a for-profit "benefit corporation" that is permitted to consider benefits to society as well as profits in its business activities. Kickstarter enables artists and other creative people, and companies with interesting new products or designs, to demonstrate their products usually through a 30-day online "campaign," and to receive funding in the form of "donations" in exchange for rewards, premiums, or an opportunity to acquire the product as soon as it becomes available to the public. Kickstarter does not sell or broker stocks in companies, but it does enable startups to raise small amounts of initial funding to launch their first batch of products.

Since 2009, Kickstarter has raised over U.S.\$2 billion in campaigns for 100,000 projects from nearly 10 million people, including 135 campaigns that raised more than U.S.\$1 million for companies like Oculus Rift (virtual reality), Pebble Time (electronic smart watch), Dash (Wireless Smart Headphones), and the Micro (3D Printer).

Kickstarter is not the only player in this crowdfunding sub-market. GoFundMe has raised over U.S.\$1 billion for personal advocacies, such as education, environment, and minority empowerment related issues. Indiegogo competes directly with Kickstarter and has a presence in Canada, U.K., France, and Germany. Smallknot offers similar features as well.

STARTUP FINANCING

New "startup" businesses typically obtain their initial financing from their founding investors, friends and family members, angel investors or corporate partners, and from venture capital investment firms (VCs). Many startups, failing to have access to the other sources of funds, appeal to VCs for their initial financing in what is essentially an asymmetrical market. VCs reject most of the proposals made to them, and only invest in companies at pricing levels that could provide a high return to them, and thus involve considerable dilution of their founders' equity, along with other terms that reduce the founders' powers of control, and leave the company committed to the VC relationship indefinitely.

According to The National Venture Capital Association, in 2015, VCs invested U.S.\$58.8 billion, about half of which was in seed capital or early stage investments. 1,400 companies raised venture capital for the first time in 2015. VC funds were also selling shareholders in 45 IPOs (27% of all such issues), valued at U.S.\$17.4 billion.

Thus it is clear that VCs control an important pathway to startup financing in the U.S., but, at the same time, the total number of companies able to access this pathway is quite small relative to the number seeking startup funds.

INITIAL PUBLIC OFFERINGS (IPOS)

IPOs are an important part of the market for new issues of equity securities. In 2015, 169 companies raised around U.S.\$30 billion via IPOs (a 35% decline from 2014 and the lowest volume in six years). Of these issues, only about 30 were IPOs of U.S.\$50 million or less.² Consequently, the IPO market is also not a major source of startup or early stage financing, relative to the demand for such funds.

IPOs are filed with the SEC on standard Forms S-1 (but with reduced disclosure and exemption from audits of internal controls available to "emerging growth" companies, thanks to the JOBS Act). According to the SEC, around 75% of all smaller company IPOs issued after April 2012 were undertaken by companies that identified themselves as emerging growth companies. These issues had to be sold only to "accredited investors," meaning that the investor must have more than U.S.\$1 million in net worth (excluding their primary

¹ https://www.kickstarter.com

² http://www.renaissancecapital.com/ipohome/press/ipopricings.aspx

Crowdfunding: A New Disruptive Technology?

residence) or income of over \$200,000 per year (\$300,000 if married) for the past two years and expect the same level of income in the current year.

On Oct. 30, 2015, the SEC released further rules applicable to exemption from registration for certain smaller crowdfunding transactions (under Title III of the JOBS Act), and provided a framework for the regulation of "registered funding portals" and broker-dealers that issuers are required to use under the new rules.

The requirements for obtaining the exemption under Title III are that (a) the amount raised not exceed U.S.\$1 million in a 12-month period, (b) that individual investments in all crowdfunding issuers in a 12-month period are limited to the greater of U.S.\$2,000 or 5% of annual income or net worth, if such is less than U.S.\$100,000, or 10% of net income or net worth (not to exceed U.S.\$100,000) if annual net income or net worth of the investors is U.S.\$100,000 or more, and (c) transactions are conducted through a registered broker-dealer or a registered funding portal.

SEC REGULATION A+

On June 19, 2015 (as required by the JOBS Act), the SEC announced new crowdfunding rules for sales to "non-accredited issuers" (i.e., more or less ordinary retail investors) under its "Regulation A+." These issues are divided into Tier-1 and Tier-2 offerings. Tier-1 offerings are limited to U.S.\$20 million within a 12-month period and require compliance with State "Blue Sky" securities laws that authorize the sale of possibly speculative securities in the state.

Tier-2 offerings are capped at U.S.\$50 million within a 12-month period. Tier-2 offerings, however, preempt State Blue Sky securities laws. This provides a significant advantage as it eliminates the burden and expense associated with compliance with numerous individual State Blue Sky securities laws.

For Reg A+ offerings, issuers must file registration statements on (a new) Form 1-A that, though abbreviated compared to Form S-1, still must contain all information material to an investment decision. These issues may be sold to non-accredited investors if the investors certify that their investment in the issue being offered will not exceed 10% of the greater of their net income or net worth.

StartEngine Crowdfunding, a for-profit affiliate of a corporate "accelerator" founded in 2011,3 was formed to assist startup companies issue new stock under Regulation A+. It does not underwrite issues or take positions in them. It is not licensed as a broker; it

is, however, "an SEC registered funding portal" that connects startups to unaccredited investors via the Internet. In 2015, Startengine Crowdfunding was charging issuers U.S.\$20 per investor, regardless of the size of the purchase; however, this was raised to U.S.\$100 per investor after the Elio offering.

ELIO MOTORS IPO

On August 28, 2015 Elio Motors, a startup manufacturer of a slick looking, U.S.\$6,800 two-passenger, three-wheeled minicar that gets 84 miles per gallon, filed the first Form 1-A registration statement for a Type-2 IPO.

Elio's founders invested U.S.\$5 million in the company at an average price per share of U.S.\$0.26. Accredited investors have also purchased an additional U.S.\$9 million of shares at an average price of U.S.\$1.48 per share through private placements. In 2015, the company issued U.S.\$3 million of subordinated secured notes convertible into common stock at U.S.\$5.98 per share. By the end of 2014, the company had also raised U.S.\$58.6 million of long-term debt.4

This financing was done with no investment by VCs.

It is not that the founder, Paul Elio, did not reach out to VCs. Every time he pitched his idea to one of them, he encountered skepticism that there would ever be a mass-market for the tiny, three-wheeled commuter car. No single small-sized vehicle has ever had a material success in the U.S.; even the globally successful small cars, such as Daimler Benz's Smart and Fiat's 500C, ended up being uninteresting economically in the U.S. Small cars that are popular in European markets did not appeal to American consumers, who are used to larger vehicles. Besides, the VCs said, the costs of just testing the idea were quite high relative to the expected payoff. The automotive industry was not really suitable for VC investments, they said, Tesla Motors notwithstanding.⁵

To demonstrate market demand and raise some startup funds, in January 2013 Elio began introducing a two-tier (refundable and non-refundable) vehicle reservation system. A potential buyer can reserve a spot for future delivery of a vehicle by depositing

³ Its founders are Paul Kessler, a prolific venture capitalist who has invested in and/or worked with over 500+ companies, and Howard Marks, a founder of Activision (now a part of Blizzard-Activision), known for its blockbuster games Call of Duty.

⁴ Elio Motors Form 1-A, November 20, 2015

⁵ http://online.wsj.com/mdc/public/page/2_3022-autosales.html

Crowdfunding: A New Disruptive Technology?

an amount from U.S.\$100 to U.S.\$1,000. Non-refundable depositors will have priority for vehicle delivery and receive a discount that amounts to 50% of the committed deposit.⁶ Tesla employed such a two-tier scheme for its Model S reservation.

By January 1, 2016, Elio had collected more than 50,000 reservations for vehicles on its website, locking in more than U.S.\$340 million in advanced product orders, and U.S.\$21.1 million in deposits (80% of which are nonrefundable). Advanced reservations for vehicles are different from equity crowdfunding. Kickstarter and similar crowd-accessing donation platforms are closer to advanced reservations than to actual equity fundraising.

Elio hoped to raise sufficient funds from its equity crowdfunding issue to fund prototype building and testing of 25 vehicles to be used to demonstrate various performance and safety features required to obtain a major loan from the U.S. Department of Energy.

If the Elio car meets the required performance tests it may be able to tap into the U.S. Energy Department's Advanced Technology Vehicles Manufacturing (ATVM) loan fund.⁷ If so, this could provide up to U.S.\$185 million of additional capital for the company.⁸ The most noteworthy recipient of ATVM loan was Tesla Motors with a loan of U.S.\$465 million in January 2010.⁹ ATVM loans are highly attractive to the automotive industry since the loans carry low interest rates with long maturities and minimal fees.

In order to qualify for ATVM loans, the company must show that it is financially and technologically capable of vehicle production. In addition, the company's vehicles must meet the Energy Department's fuel efficiency, component quality and manufacturing location standards, which requires that all vehicles be assembled in the U.S.

Thus, in order to raise the U.S.\$235 million of startup capital it requires to begin production, Elio must be able to qualify for an Energy Department loan, and to obtain the loan it must first raise about U.S.\$20 million in additional equity capital.

Enabled by Startengine Crowdfunding, Elio Motors sought non-binding "indications of interests" for up to U.S.\$25 million of equity from accredited and non-accredited investors over a three-month, online testing period. The idea was to gauge market sentiment to determine an appropriate price level and number of shares to be sold from the indications of interest.

For traditional public offerings of equity shares in startup companies, a registration statement containing voluminous information about the company and the risks involved in investing in it is filed with the SEC, at considerable expense to the company. (Regulation

A+ does allow emerging growth enterprises to offer shares with less cumbersome SEC disclosures than are required for traditional IPO processes). Underwriters must also be retained to purchase and resell the stock being offered based on demand estimated by pre-offering marketing and sales efforts.

In August 2015, Elio Motors closed its non-binding, three-month market test with over U.S.\$42 million of interest in purchasing the shares indicated by 11,000 (mostly non-accredited) investors with an average order of U.S.\$3,820.10

On August 29, Elio Motors filed a registration statement on the newly approved abbreviated Form 1-A to obtain SEC approval for the offering. The proposed offering was to be of a minimum of 1 million and a maximum of 2 million shares. The expected offering price, set by the Company, was U.S.\$12 per share.

The registration statement disclosed that Elio had not yet sold any vehicles, and in 2014 had lost U.S.\$20.7 million and ended the year with a cumulative shareholder deficit of \$45 million. For the six months ended June 30, 2015, the unaudited results showed a net loss of U.S.\$8.8 million and an accumulated deficit of U.S.\$53.8 million. The SEC reviewed the registration statement over a period of about three months, requesting changes or additions as appropriate. After a series of amendment filings, Elio Motors finally obtained approval for the offering from the SEC in late November 2015.

Elio retained Fund America Securities, a registered broker dealer, to perform several administrative functions under the new rules in connection with the offering, including determining investment limits for subscribing investors, certifying that investors are qualified, applying checks against money-laundering, serving as a registered agent for Blue Sky filings, and transferring subscription information to Elio's transfer agent.

⁶ Investor information can be found at: http://ir.eliomotors.com/

^{7 &}quot;To date, the program, which is administered by the U.S. Department of Energy's Loan Programs Office, has made over \$8 billion in loans, including loans to Ford (\$5.9 billion), Nissan (\$1.45 billion) and Tesla. The ATVM loans are made attractive to applicants due to their low interest rates (set at U.S. Treasury rates (approximately 2% to 4%), minimal fees (no application fees or interest rate spread and only a closing fee of 0.1% of loan principal amount), and long loan term life of up to 25 years (set at the assets' useful life)." Source: Security and Exchange Commission EDGAR Database

⁸ Wall Street Journal, http://www.wsj.com/articles/Mr. Elio-elios-quest-to-build-a-threewheel-car-1433301222

⁹ US Department of Energy, Loan Programs Office, http://energy.gov/lpo/tesla

¹⁰ Eliomotors.com

Crowdfunding: A New Disruptive Technology?

RESULTS OF THE ELIO OFFERING

The offering was conducted online via the Startengine Crowdfunding website for 74 days from late November 2015 to late February 2016, during a period in which the S&P 500 stock index dropped 6.8% and VCs and other investors in many high visibility technology "unicorns" took substantial write-downs.

In February 2016, the company announced that it had accepted orders for U.S.\$17 million of shares (5.3% of the company) from 6,600 investors, which capitalized the company in the market initially at U.S.\$321 million.

Trading in the shares began on February 19, 2016 on OTCOX, an over-the-counter exchange. One week after the offering, shares were trading at U.S.\$16.50 and soon thereafter increased to U.S.\$37 per share, and by February 29 reached a high of U.S.\$75 per share, before dropping sharply to U.S.\$20.75 on March 4, underscoring the extreme volatility that can occur in thinly traded markets. Trading volume was only in the hundreds of shares during most of the period following the offering. The tradable "float" in the company's shares, even after a tripling of the share price, was still only U.S.\$52 million, an amount too small to attract interest from large institutional investors.

WHAT IS DIFFERENT ABOUT THE ELIO OFFERING?

Since Elio had been denied venture capital financing, the offering essentially allowed the company to turn to ordinary investors as an alternative source of startup capital, and to do so at a much lower cost than VC investors would have required had they been willing to invest. The offering represented only 5.3% of total shares outstanding; VC investors, as a group, typically own 30%-50% of outstanding shares by the time of a traditional IPO.

The Elio IPO involved no underwriters or underwriting fees. Legal and other fees associated with the offering, excluding fees to Startengine and Fund America Securities, a broker-dealer acting as a sales agent, amounted to approximately U.S.\$150,000, or only 0.1% of the amount raised. Total expenses of the offering, based on pro-rating Elio's estimated minimum and maximum amounts, were U.S.\$1,689,000, or 9.9% of the proceeds received. Of these, per-investor fees to Startengine Crowdfunding at U.S.\$20 per investors were U.S\$132,000; fees paid to Fund America totaled approximately U.S.\$649,000. We also estimate that Elio spent approximately U.S.\$750,000 on marketing and public relations in connection with the offering. Traditional IPOs of comparable size generally involve

underwriting fees and commissions of approximately 7% plus legal, auditing, and other expenses of another 2% to 3%.

Shares were priced by Elio (not by underwriters or venture capital investors) after a three-month market trial at U.S.\$12 per share (up from U.S.\$5.98 per share for a private placement of convertible debentures earlier in 2015).

The shares were marketed entirely thorough the Internet using user-friendly Startengine and Elio's websites, which enabled potential investors to "reserve" shares in the offering on a "non-binding" basis (as well as reserving the company's product when it became available). Once the SEC permitted the offering to be sold, investors were contacted by email to confirm their acceptance of their allocation of shares.

After the offering the shares were traded on OTCQX, an over-the-counter exchange specializing in small companies operated by OTC Markets. The shares are not being listed on NASDAQ or the NYSE. Trading in the shares is limited and in small amounts, suited to "ordinary" retail investors. However, despite that, in the after-market following the IPO, Elio shares initially rose to a 38% premium over the offering price despite a significant downturn in the stock market indices, and in preliminary pre-IPO valuations of high-visibility technology companies.

Although Elio's Reg A+ fundraising did not meet its maximum goal of U.S.\$25 million, raising U.S.\$17 million still impressed a lot of entrepreneurs. Following Elio's offering, over 40 companies made Form 1-A filings and 12 had received their approvals by February 20, 2016. Startup companies in many different industries, including healthcare, banking, and even cannabis distributers, are now eyeing crowdfunding as an alternative to traditional venture capital or initial public offerings in order to tap a different source of funds with less equity dilution.

IS CROWDFUNDING AN "UBER?"

"Uber" refers in this context to the ridesharing company's disruptive challenge to a settled industry. Bypassing venture capital or private equity investors and the traditional Wall Street dominated IPO process to access ordinary investors through the Internet could certainly be disruptive if Elio's success is repeated by other companies.

¹¹ Porter Wright Morris & Arthur LLP, 2015, "Diverse companies receive SEC approval to raise fund with Regulation A+," Federal Securities Law Source, December 15.

Crowdfunding: A New Disruptive Technology?

Whether it will or not will depend on the longer-term success of the investments, i.e., whether investors will be able to expect to sell shares purchased in the IPO at a later date at a profit, and whether the issuers of the shares will find the process easier and cheaper to use than the traditional methods.

It is possible, however, that the very limited liquidity in the crowdfunding stocks will cause prices to decline and exit opportunities to be constrained, which could discourage future offerings. If crowdfunding investor demand is reduced by poor performance of the initial issuers or by frustrations with the available liquidity, then crowdfunding may fail to offer a viable alternative to traditional methods.

This could happen because of the inability of ordinary investors to analyze risky investment opportunities, or their inability to endure high levels of volatility associated with risky investments, or because of over-promotion or mispricing by the companies involved.

Bypassing the skilled financial intermediaries also deprives companies of their experienced advice and counsel that many VCs and underwriters highlight as a compelling reason for using them.

In the traditional early stage financing methods, venture capitalists or underwriters vet the companies thoroughly and agree to pricing levels at which they are willing to risk their own money. It has long been thought that this screening process generates value to investors, and that investors are prepared to reject alternative processes that do not include it. Crowdfunding now presents this unscreened alternative, and the Elio Motors offering suggests that the perceived value of the vetting may have been exaggerated.

For many years, angel investors (individuals investing in startup situations) have grown to become significant players in the venture finance area, with 316,000 investors funding 73,000 companies in deals worth U.S.\$28 billion in 2015. Angel financing assists more startups than traditional VCs do. Angels do not rely on VCs or other traditional intermediaries to do their screening, they do their own. Crowdfunding increases angel investors' knowledge of and access to deals well beyond what they might encounter on their own.

In addition, for many years the U.S. IPO market has included many smaller companies issuing shares in modest amounts. Biotech companies, in particular, tend to use the IPO and follow-on equity markets as a substitute for additional rounds of venture capital finance, despite limited liquidity in their shares. On the whole, there has been enough success in smaller size IPO market for it to continue to attract investment capital.

Further, ordinary investors have been able to purchase shares in traditional IPOs for years, but rarely get a chance to do so because underwriters allocate shares in the IPOs to hedge funds and favored high-net-worth clients. Even then, despite considerable vetting by underwriters, many IPOs disappoint investors in the aftermarket. Crowdfunding certainly removes barriers to entry that prevented ordinary investors from participating in the IPO market.

What crowdfunding does is to bring the power of the Internet to the startup funding market. Between the SEC's new rules and Startengine's new procedures, a different way to access investors in startup companies has been created that, after some early learning experience, should provide a viable pathway for many companies to raise early state capital.

If it does work, then much of what we know about startup financing could be changed forever. Most startups have to fight for VC attention, and submit to tough pricing demands and loss of control when they do get noticed. By the time a company is ready for an IPO (something usually decided by the VCs), they must submit again to considerable legal and accounting expenses and the 7% commissions that have been demanded by underwriters for generations, and considerable legal and accounting expenses and then take their chances that aftermarkets will provide adequate liquidity to sustain the price level.

If it catches on, platform companies like Startengine will expand, improve, and attract competition which may lower fees. They will be able to disintermediate the risk capital industry, just as Uber has done to taxis, and Amazon has done to retailing. The change could be very big.

¹² Torres, N., 2015, "What angel investors value most when choosing what to fund," Harvard Business Review, August 6. Available at: https://hbr.org/2015/08/what-angel-investors-value-most-when-choosing-what-to-fund.

FINANCIAL COMPUTING & ANALYTICS

STUDENTSHIPS

Four-Year Masters & PhD for Final Year Undergraduates and Masters Students

As leading banks and funds become more scientific, the demand for excellent PhD students in **computer science**, **mathematics**, **statistics**, **economics**, **finance** and **physics** is soaring.

In the first major collaboration between the financial services industry and academia, **University College London**, **London School of Economics**, and **Imperial College London** have established a national PhD training centre in Financial Computing & Analytics with £8m backing from the UK Government and support from twenty leading financial institutions. The Centre covers financial IT, computational finance, financial engineering and business analytics.

The PhD programme is four years with each student following a masters programme in the first year. During years two to four students work on applied research, with support from industry advisors. Financial computing and analytics encompasses a wide range of research areas including mathematical modeling in finance, computational finance, financial IT, quantitative risk management and financial engineering. PhD research areas include stochastic processes, quantitative risk models, financial econometrics, software engineering for financial applications, computational statistics and machine learning, network, high performance computing and statistical signal processing.

The PhD Centre can provide full or fees-only scholarships for UK/EU students, and will endeavour to assist non-UK students in obtaining financial support.





Imperial College London

financialcomputing.org

INDUSTRY PARTNERS

Financial:

Barclays
Bank of America
Bank of England
BNP Paribas
Citi
Credit Suisse
Deutsche Bank
HSBC
LloydsTSB
Merrill Lynch
Morgan Stanley
Nomura
RBS
Thomson Reuters
UBS

Analytics:

BUPA dunnhumby SAS Tesco

MORE INFORMATION

Prof. Philip TreleavenCentre Director
p.treleaven@ucl.ac.uk

Yonita CarterCentre Manager

Centre Manager y.carter@ucl.ac.uk

+44 20 7679 0359

Layout, production and coordination: Cypres – Daniel Brandt, Kris Van de Vijver and Pieter Vereertbrugghen

Graphics: DuKemp

Photography: Alex Salinas

 $\hbox{@}$ 2016 The Capital Markets Company, N.V.

De Kleetlaan 6, B-1831 Machelen

All rights reserved. All product names, company names and registered trademarks in this document remain the property of their respective owners. The views expressed in The Journal of Financial Transformation are solely those of the authors. This journal may not be duplicated in any way without the express written consent of the publisher except in the form of brief excerpts or quotations for review purposes. Making copies of this journal or any portion thereof for any purpose other than your own is a violation of copyright law.



centre-for-global-finance-and-technology/

CAPCO

BANGALORE **BRATISLAVA BRUSSELS** CHICAGO **DALLAS** DÜSSELDORF **EDINBURGH FRANKFURT GENEVA HONG KONG** HOUSTON **JOHANNESBURG KUALA LUMPUR** LONDON **NEW YORK ORLANDO PARIS SINGAPORE TORONTO** VIENNA ZÜRICH

