

Online contract labor platforms and employer-employee matching

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We propose to conduct a field experiment on the online platform for contract labor oDesk.com, in order to understand how contractors and prospective employers match to each other in online jobs. Online markets for contract labor that enable workers to bid on contracts to provide a wide range of services anywhere in the world, are growing very rapidly. Workers on online labor markets earned about \$700 million by 2009, and these markets combined are expected to be worth \$1 billion by the end of 2012 (Horton, 2010; *Financial Times*, 2012). oDesk is the largest platform in this market.¹

Although these markets dramatically reduce some transaction costs and allow a much larger set of contractors and employers to reach each other, potentially leading to better matches, they also present some important limitations. In particular, the absence of fact-to-face interactions limits the information that the parties can acquire about each other (Autor, 2001). Building a reputation on the platform is therefore critical for employers to attract good applicants on the one hand, and for applicants to be hired for the jobs they want at the best conditions. In previous work (Ajay, Lacetera and Lyons, 2012), we explored how the experience that contractors accumulate on the platform significantly increases their likelihood of being hired for a job (see also Pallais, 2012). In this project, we plan to explore how applicants and employers match to each other as a function of the reputation of the employers and the proposed compensation scheme.

In the experiment, we will vary employer reputation and contract types for a given task. oDesk allows for two compensation schemes: fixed price, where hired contractors are paid a predefined, fixed amount, but the employer can decide to not pay at all if not satisfied with the job; and hourly contracts, where employers are guaranteed a pay per hour of work, and hours can be recorded and monitored. Given these features, freelancers may be reluctant to apply for fixed price jobs if they think the employer may be unlikely to pay even when the quality of work performed is not low. Thus employer reputation may be more important when posting fixed price jobs because reputation can signal whether employers paid for fixed priced jobs in the past and whether previously hired freelancers were satisfied that employers treated them fairly.

The experiment will be executed by setting several different employer profiles on oDesk that vary by reputation, where reputation will be proxied by experience on the platform. We will begin with setting different job profiles and solicit applications for jobs to be performed. After a defined amount of time (12 months), we will add new employer profiles and propose a similar set of tasks and contract types. We will be testing for differences in the interest expressed by applicants for these jobs and contract types, and the type of applicants we attract, as a function of the difference in experience among employers. We will also look at how much applicants bid. We expect, for example, that bids on fixed-price job postings with low employer reputation will be higher than identical hourly wage jobs with high reputation employers and the quality of applicants to be lower in the former than the latter scenario.

In addition to shedding light on how online labor markets operate, this research will provide important insights for more traditional, “offline” markets and for the provision of incentives in organizations. Research has shown not only that different payment schemes affect workers’ behavior and productivity; but also that a selection effect is caused by different payments, whereby workers of different types are attracted to a given job or task (Dohmen and Falk, 2011; Lazear, 2000). However, there are no studies on whether and how worker sorting depends not only on the proposed compensation schemes, but also on the *type of employer* proposing a particular scheme. This is an important question to answer in order to

¹ California-based oDesk was founded in 2004. The platform has been growing at annual rates greater than 100%. To date, the total earnings on oDesk are more than US\$225 million, the total number of jobs posted is more than 1 million, and almost 1 million contractors are part of the oDesk network.

understand if the same compensation would attract the same kind of workers to any organization offering it, or the outcomes are more contingent. Just like experience and subsequent reputation have been found to matter in online product markets, here we will test, for the first time, its impact on employer-worker matching, in addition to how it depends on the compensation type. Answering these questions with a natural field experiment will allow assessing causality with minimal modifications of the natural setting of interest. Moreover, by not being aware that they are being observed, subjects' behavior is not affected by additional confounding factors such as "demand effects" or social desirability effects (Harrison and List, 2004; List, 2008).

Estimation equation, pay schemes and amounts, and statistical power. The basic estimation equation is: $Y_{ije} = \alpha_0 + \alpha_1 EXP_j + \alpha_2 CONTR_j + \alpha_3 CONTR_j \times EXP_j + \beta X_{ije} + \varepsilon_{ije}$, where Y is an outcome variable. We will consider the quality of the individual applicant i for a job j by employer e ; the number of applicants per job by an employer; and the wage bid made by each individual. EXP and $CONTR$ are indicators for low vs. high employer experience, and for hourly wage vs. fixed-price job. The vector X contains additional variables that we can observe on the platform. $\hat{\alpha}_1$ gives us the estimated change in the average of the relevant outcome variable for hourly-wage jobs by employers with experience as opposed to those offering hourly wage jobs without experience; $\hat{\alpha}_2$ represent the estimated average difference between fixed price and hourly jobs for employers without experience; finally, $\hat{\alpha}_3$ is the estimator of the difference between fixed price and hourly wage jobs by experienced employers.

We will propose tasks within two types of jobs: data entry, and web search. The former is a more repetitive task where performance (e.g. errors) is easier to assess in an objective way. The latter is less "defined" and evaluation is more subjective. We will establish if the relationship between the outcome measures, employer experience and contract types also depends on the type of job. It has been shown, for example, that the response to performance pay may differ for more creative vs. repetitive jobs (Ederer and Manso, 2012). To contain costs, we will define relatively short jobs (expected time to completion of 10 hours or less), and the hired contractor will be chosen randomly under the constraint that his or her bid implies an overall expense below \$40 (the median hourly wage on oDesk is about \$4).

As for the required sample size, these experiments are demanding because we are not only interested in the individual level outcomes, but also the job-level ones, therefore we need a large enough set of jobs in order to obtain meaningful statistics at this level. We will start in year 1 (2013) by posting 64 jobs by "inexperienced" employers (16 for each contract and job type); in year 2, 64 jobs will be posted again by the same employers (now with 1-year experience), and 64 by "inexperienced" employers; in year 3 we will have three levels of experience, with additional $64 \times 3 = 192$ jobs. We will then have a total of $64 \times 6 = 384$ jobs, of which half by employers without experience, and half by employers with some experience. We will sequence the intervention over 3 years in order to limit the number of jobs added to the platform at once, and potentially to assess the impact of experiences of different time length. Using the data from which the study in Agrawal et al. (2012) is drawn, we know that on average there are about 15 applicants per job, with a standard deviation of about 10 once we exclude the very large jobs (in terms of applicants and budget). Having 48 jobs for each category of interest – 8 categories in terms of experience, contract type, and type of job – should allow for meaningful statistical analyses at both the job level and the individual level. We will be also able to observe the outcomes for the contractor that is eventually hired. Again, we will have one observation per job, therefore the above sample size calculation applies here, too.

Budget. At \$40 on average per job, the expected expenses for subject payment will be $384 \times \$40 = \$15,360$. The remainder of the \$20,000 grant will be used for travel and compensating RAs.

Expertise of the applicants. Lacetera and Lyons are currently working on related projects on the oDesk platform. Lyons, in particular, has gained experience and in-depth knowledge on the platform and on how to run experiments on it. Lacetera has conducted a number of field experiments in different contexts. Please see the attached CVs.

References

- Agrawal, A., Lacetera, N. and Lyons, E. (2012), "How Do Online Platforms Facilitate North-South Trade for Contract Labor?," 2012, working paper.
- Autor, D. H. (2001), Wiring the Labor Market. *The Journal of Economic Perspectives*, 15: 25-40.
- Deloitte (2007), Technology Fast 500: Annual list of the fastest growing companies in North America. 2007: 7.
- Dohmen, T. and Falk, A. (2011), "Performance Pay and Multidimensional Sorting: Productivity, Preferences, and Gender," *American Economic Review*, 101(2): 556-90.
- Ederer, F. and Manso, G. (2012), "Is Pay-for-Performance Detrimental to Innovation?," working paper.
- Financial Times* (2012), Virtual Working Takes off in Ems. blogs.ft.com.
- Harrison, G.W. and List, J.A. (2004), "Field Experiments," *Journal of Economic Literature*, 42(4): 1013-1059.
- Horton, J. (2010), Online Labor Markets," *Internet and Network Economics*, 6484: 515-522.
- Lazear, E.P. (2000), "Performance Pay and Productivity." *American Economic Review*, 90(5): 1346-61.
- List, J. (2008), "Informed Consent in Social Science," *Science* 322(5902): 672.
- oDesk* (2012), www.odesk.com.
- Pallais, A. (2012), Inefficient Hiring in Entry-Level Labor Markets. *Working Paper*.

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Curriculum Vitae

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UT Mississauga
Department of Management
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ACADEMIC POSITIONS:

Current:

- Assistant Professor of Strategic Management, Rotman School - University of Toronto, and Assistant Professor of Management, University of Toronto – Mississauga.
- Faculty Research Fellow, National Bureau of Economic Research

Previous:

- 2006-2010: Assistant Professor of Economics - Weatherhead School of Management, Case Western Reserve University, Cleveland, OH.

EDUCATION

- PhD in Strategy, M.I.T. Sloan School of Management – Cambridge, MA, US, 2006.
- *Laurea* in Economics, Universita' Bocconi, Milan, Italy, 2000. *Summa cum laude* and outstanding thesis distinction.
- Visiting Student, Brandeis University, International Business School, Waltham, MA, 1998.

RESEARCH ACTIVITIES

Fields of interest: Industrial and innovation economics; Motivations for altruistic behavior.

Publications and forthcoming articles

1. Time for Blood: The Effect of Paid Leave Legislation on Altruistic Behavior (with Mario Macis), *Journal of Law, Economics and Organization*, forthcoming 2013.
2. Heuristic Thinking and Limited Attention in the Car Market (with Devin Pope and Justin Sydnor), *American Economic Review*, 102, 5, 2206-36, 2012.
3. Individual Preferences, Organization, and Competition in a Model of R&D Incentive Provision, NBER working paper 17031 (with Lorenzo Zirulia), *Journal of Economic Behavior and Organization*, 84, 550– 570, 2012.
4. Will There Be Blood? Incentives and Displacement Effects in Pro-Social Behavior (with Mario Macis and Robert Slonim), *American Economic Journal: Economic Policy*, 4, 1, 186-223, 2012.
5. The Economics of Scientific Misconduct (with Lorenzo Zirulia), *Journal of Law, Economics and Organization*, 27, 3, 568-603, 2011.

6. The Effects of Increasing Competition and Uncertainty on Incentives and Extreme-Value Outcomes in Innovation Contests (with Kevin Boudreau and Karim Lakhani), *Management Science*, 57, 5, 843–863, 2011.
7. Inside or Outside the IP System? Business Creation in Academia (with Riccardo Fini and Scott Shane), *Research Policy*, 39, 8, 1060-1069, 2010.
8. Social Image Concerns and Prosocial Behavior: Field Evidence from a Nonlinear Incentive Scheme (with Mario Macis), *Journal of Economic Behavior and Organization*, 76, 225-237, 2010.
9. Do All Material Incentives for Prosocial Activities Backfire? The Response to Cash and Non-Cash Incentives for Blood Donations, *Journal of Economic Psychology*, 31, 4, 738–748, 2010.
10. Different Yokes for Different Folks: Individual Preferences, Institutional Logics, and the Commercialization of Academic Research (with Riccardo Fini), *Advances in the Study of Entrepreneurship, Innovation and Economic Growth, Vol 21: Spanning Boundaries and Disciplines: University Technology Commercialization in the Idea Age* (eds. Gary Libecap and Marie Thursby), 1-25, 2010.
11. Different Missions and Commitment Power in R&D Organization: Theory and Evidence on Industry-University Relations, *Organization Science*, 20, 3, 565-582, 2009.
12. Academic Entrepreneurship, *Managerial and Decision Economics*, 30, 7, 443-464, 2009.
13. Sample Size and Precision in NIH Peer Review (with David Kaplan and Celia Kaplan), *PLoS One*, July 23 2008.

Working papers and submitted papers

14. Would You Buy a Honda Made in the U.S.? The Impact of Production Location on Manufacturing Quality (with Justin Sydnor), NBER working paper 18005. R&R, *Review of Economics and Statistics*.
15. Rewarding Altruism? A Natural Field Experiment (with Mario Macis and Robert Slonim), NBER working paper 17636.
16. How Do Online Platforms Facilitate North-South Trade for Contract Labor? (with Ajay Agrawal and Elizabeth Lyons)
17. Effect of Social and Economic Incentives and Information on Voluntary Blood Donations: Evidence from a Randomized Trial in Argentina (with Victor Iajya, Mario Macis and Robert Slonim).
18. Removing Financial Barriers to Organ and Bone Marrow Donation: The Effect of Leave and Tax Legislation in the U.S (with Mario Macis and Sarah Stith), NBER working paper 18299.

Work in progress

1. The Auctioneer Effect (with Devin Pope and Justin Sydnor).
2. Explaining Ethnic Differences in Donation Behavior (with Mario Macis and Robert Slonim).
3. Viral Altruism (with Mario Macis and Angelo Mele).
4. Stereotype Threats, Creativity, and Entrepreneurship (with Sonia Kang, Mario Macis and Robert Slonim).
5. Knowledge Maps and Communication Costs (with Christian Catalini and Alex Oettl).

Awards and research grants

- NET Institute Grant for project “Viral Altruism” (with Mario Macis and Angelo Mele)
- Dean’s Excellence Award, University of Toronto-Mississauga, 2010-11 and 2011-12.
- Social Sciences and Humanities Research Council of Canada (SSHRC) Institutional Grant for short term project “Stereotypes, Identity, and Entrepreneurial Decisions” (with Sonia Kang).

- Social Sciences and Humanities Research Council of Canada (SSHRC) Grant for Conference: “Frontiers in the Economics of Markets and Organizations”, University of Toronto (with Alberto Galasso and Tanjim Hossain), 2012, \$12,500
- Meritorious Service Award, *Management Science*.
- Social Sciences and Humanities Research Council of Canada (SSHRC) Grant, Field Experiments in Global Health: Motivating Voluntary Blood Donations in Argentina (with Victor Iayja, Mario Macis and Robert Slonim), 2010-11, \$42,000.
- National Science Foundation Grant, Field Experiments on the Provision of Incentives for Blood Donation (with Mario Macis and Robert Slonim), 2009-12, \$330,000.
- Russell Sage Foundation Grant for Young Scholars, Incentives for Blood Donation: Natural and Field Experiments (with Mario Macis and Robert Slonim), 2008-9, \$5,000.
- International Motor Vehicle Program grant, Empirical Studies of Used-Car Auctions (with Justin Sydnor), 2008-9, \$50,000.
- Early Career Award, Atlanta Science & Technology Policy Conference, Georgia Tech, 2006.
- IRI Foundation Fellowship, 2006.
- MIT - Sloan School Fellowship, 2001-2005.

Presentations to seminars and conferences

- **2013** (scheduled): AEA Annual Meetings, UC-Berkeley (Haas School of Business).
- **2012** (includes scheduled): AEA Annual Meetings, MIT Applied Economics Seminar, Imperial College London, London Business School, University of Bologna, NYU Stern School of Business (Economics of Strategy Conference), Washington University St. Louis – Olin School of Business, Iowa State University, London Business School (Sumantra Goshal Conference – invited panelist), University of Munich Workshop on Natural Experiments and Controlled Field Studies, University of Toronto (Applied Microeconomics brownbag), NBER Summer Institute (sessions: Development and Productivity; Labor and Public Economics), RCEF Conference, REER Conference (*discussant*).
- **2011**: Workshop on Advances with Field Experiments (University of Chicago), University of Toronto – Rotman School (OBHRM group), Stanford Institute for Theoretical Economics (Experimental Economics Workshop), NBER Productivity Spring Meeting, ASSA meetings, EARIE meetings, Southern Ontario Behavioral Decision Research Conference, University of Munich Workshop on Natural Experiments and Controlled Field Studies, CCC Doctoral Consortium (*discussant*), Canadian Economic Association meetings (*discussant*), REER Conference (*discussant*).
- **2010**: University of Toronto (Rotman School and Department of Economics), Georgia Tech, Boston University, Cleveland State University, University of Viterbo, AOM meetings, NBER Summer Institute, HBS Strategy Conference, FTC Microeconomics Conference, ASSA meetings, REER Conference (*discussant*).
- **2009**: MIT, NBER, University of Texas – Dallas, University of California – San Diego, University of Michigan, AOM annual meetings, ASSA meetings, DRUID, Kauffman Workshop on Graduate Education in Technology Commercialization, Kauffman workshop on entrepreneurship and innovation, Kauffman-Cleveland FED Conference on Entrepreneurial Finance (*discussant*), NBER Summer Institute (*discussant*), REER Conference (*discussant*).
- **2008**: University of Chicago, University of Bologna, REER Conference (Georgia Tech), ASSA Meetings (*presenter and discussant*), Wharton Technology Conference.
- **2007**: NBER, Boston University, Kent State University, REER Conference (Georgia Tech), London Business School Entrepreneurship Conference, Imperial College London Workshop on Industry-

University Relationships (*presenter and discussant*), ISNIE Annual Conference, CCC Doctoral Consortium (*discussant*).

- **2006:** HEC Paris, IESE Barcelona, Catholic University of Leuven, London Business School, Washington University St. Louis, Harvard Business School, NYU, Duke, University of Southern California, Boston University (Dept. of Strategy), Georgia Tech (School of Public Policy), MIT, NBER (Productivity Group), EARIE annual conference, ASSA Meetings, EPFL Lausanne Conference on Science and Technology Policy, EPFL Lausanne Conference on Science and Technology Policy (*discussant*), REER Conference (*discussant*).
- **2005:** Florida International University, Case Western Reserve University, Nova University of Lisbon, REER Conference, CCC Doctoral Consortium, EARIE annual conference
- **2004:** AOM annual meetings.

Refereeing Activity

- **Journals:** American Economic Review, Journal of Political Economy, Quarterly Journal of Economics, Review of Economic Studies, Science, AEJ: Economic Policy, RAND Journal of Economics, Review of Economics and Statistics, Journal of Labor Economics, Management Science, Organization Science, Journal of the European Economic Association, Journal of Law, Economics and Organization, Journal of economic Behavior and Organization, Strategic Management Journal, International Journal of Industrial Organization, Journal of Economics and Management Strategy, Southern Economic Journal, Small Business Economics, Economica, Research Policy, Journal of Evolutionary Economics, Industrial and Corporate Change, Academy of Management Review, Journal of Management and Governance, European Management Review, Metroeconomica, Journal of Economics Surveys.
- **Grant proposals:** National Science Foundation, Bicentennial Program for Science and Technology (Chile), Israel Science Foundation.

Press coverage

- Financial Times, The Economist, Business Week, Slate, Nature News, several blogs (Marginal Revolution, Market Design, You're the Boss – New York Times, Cheap Talk), Daniel Pink's *Drive*, CTV, CBC Television.

Popular press articles

- How driving a mile could cost you \$200 (with Devin Pope and Justin Sydnor), Voxeu.org
- Incentives for altruism? The case of blood donations (with Mario Macis), Voxeu.org
- In America non sarebbe successo? Forse si' (with Mario Macis), lavoce.info
- Anche i manager hanno le loro colpe, lavoce.info
- Un tornaconto sul sangue? Ni, grazie (with Mario Macis), lavoce.info
- Il mercato non va all'università (with Mario Macis), lavoce.info
- Una bussola nella giungla dei blog (with Mario Macis), lavoce.info
- Un referendum da riformare (with Mario Macis), lavoce.info
- Quote rosa in modica quantità (with Mario Macis), lavoce.info
- La campagna elettorale passa in tv (with Mario Macis), lavoce.info
- L'aids e il vaccino che non c'è, (with Mario Macis), lavoce.info
- Par condicio con l'handicap (with Mario Macis), lavoce.info
- Università, privatizzazione e fantascienza (with Francesco Lissoni), lavoce.info

TEACHING ACTIVITIES

Principal Instructor:

- Management of Innovation (UT Mississauga, Master in Management of Innovation and Master in Biotechnology), 2011 – present.
- Entrepreneurial Strategy (UT Mississauga, Undergraduate elective), 2012 – present.
- Economic Analysis of Business Strategy (Undergraduate), 2007-9. Entrepreneurial Strategy (Undergraduate) 2006-9, New Venture Creation (MBA), 2006-8, Case Western Reserve University.

Teaching Assistant:

- Strategic Management, Technology Strategy (MBA, MIT, 2004-6), Applied Economics for Managers (Exec. MBA, MIT 2005), Organizational Economics (PHD, MIT 2004), Intermediate Microeconomics Economic Policy (Bocconi University, 2001), Industrial Organization (University of Brescia, 2001).

Teaching awards

- Winner, Weatherhead Undergraduate Teaching Award, CWRU, 2010.
- Nominated, Carl F. Wittke Award for Excellence in Undergraduate Teaching, CWRU, 2010.
- Glennan Fellowship for excellence in scholarship and teaching, CWRU, 2009.
- Finalist, Weatherhead Undergraduate Teaching Award, CWRU, 2008.
- Nominated, Weatherhead Undergraduate and Graduate Teaching Award, CWRU, 2007.

OTHER PROFESSIONAL EXPERIENCE

- Social worker in hospice for mentally challenged adults (in lieu of military service duties), ANFFAS, Milan, Italy, 2000-2001.
- Summer intern at the Bureau of Trade and Economic Cooperation, Italian Embassy, Rabat, Morocco, 1999.

LANGUAGES: Italian (native), English, French. Reading knowledge of Latin and Classic Greek.

2011

Rotman School of Management Strategic Management 2011-2012 Seminar Series

- How do Online Platforms Flatten Markets for Contract Labor?

Ad Hoc Referee

- Management Science
- Academy of Management

Teaching and Research Assistance Experience

2012 Professor Nicola Lacetera Toronto, ON

Research Assistant

2010-Present University of Toronto Toronto, ON

Teaching Assistant

- Advanced Topics in Strategy (Executive MBA Program)
- Corporate Strategy (MBA Program)
- Cooperative Strategy (MBA Program and Commerce Program)
- Management of Technology (Master of Management of Innovation Program)

2007-Present Professor Ajay Agrawal Toronto, ON

Research Assistant

2010-2011 The Next 36 Toronto, ON

Research Assistant

Summer 2009 Institute for Competitiveness and Prosperity Toronto, ON

Research Consultant

Technical Skills and Awards

Rotman PhD Fellowship 2009/2010 - 2013/2014.

Junior Fellow at Massey College, Toronto 2009-2012.

St. Michael's College Foundation In-Course Scholarship worth \$1,500

Graduate Silver Medal from St Michael's College

\$15,000 hockey scholarship to Wyoming Preparatory School

French bilingual certificate