TUFTS UNIVERSITY **EC192-3** **Professor Yannis M. Ioannides**

Department of Economics Spring Term 2015 15 Spring EC 192 syl- Febr 23 15.tex: Revised March 25, 2015

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Office hours: Mondays, 4:30 – 6:00 pm; Wednesdays, 11:00am –12:00 pm. Other times by arrangement. Please feel free to email or call me to communicate with me or to set up an appointment for a time other than my regular office hours.

SOCIAL INTERACTIONS AND SOCIAL NETWORKS*

Call No: 24096. Time Block G+: MW 1:30–2:45 pm. Braker 225

Syllabus

* This course includes a Research Paper.

This course satisfies the quantitative elective requirement for Quantitative Economics majors.

This is an upper level elective course and a prerequisite is EC 16 or equivalent. EC 18 will also work, and EC 15 or EC 107 would be fantastic. But, I am happy to consent to other ways of satisfying the prerequisites. So, please do not be deterred and talk to me about it.

1 Course Description

This course is brand new in a fast developing but very new area of economics. Social networks pervade our social and economic lives. They are important when we look for jobs and while, well, networking! They are important in determining how diseases spread, which products we buy, which languages we speak, how we vote, whether we engage in illegal activities, how much education we obtain, and our prospects in professional success. Social networks have structure, and some network structures are more likely to emerge in a society, and are related to social organization in the broad sense.

Social interactions are influences among economic agents that do not necessarily go through the market. They express the social elements in personal decisions and market outcomes. They, too, also pervade our lives. This course provides an overview and synthesis of our understanding of social interactions and social networks. There is a lot of recent research on these topics that is important for many economic phenomena. This research is drawing from studies by sociologists, economists, computer scientists, physicists, and mathematicians.

The course will aim at synthesizing it at the level of an undergraduate economics class. We will read sections of popular and not just economics books, like Schelling's *Micromotives and Macrobehavior*, Gladwell's *The Tipping Point*, Barabasi's *Linked*, Christakis and Fowler's

Connected, and others. These books will go on reserve, and one suggestion that we will discuss in the first day of class is how to organize reading them and discussing them in class.

We will also study some math of social networks (and in the process we will also see how Google works) and examine how statistical and econometric analysis can help us understand such phenomena better.

The range of applications is very broad, ranging from real estate to human development to public health. We will work on series of analytical tools that will tie together all these applications.

1.1 Requirements

Exams. The course grade will be based on performance in two exams — please see schedule below — and a final exam, a research paper and the presentation of a "big question" and of your own paper. The course satisfies the Quantitative elective requirement for Quant Economics majors. The time schedule of the exams and their contribution towards the course grade are as follows:

Notable dates

- Thursday, February 19, Monday's schedule, class meets!
- Monday, *March 9 ,* 1:30–2:45 pm, *exam no. 1* to count for 30%.
- Wednesday, *April 15*, 1:30–2:45pm, *exam no. 2*, to count for 30% of the grade. This exam will not be a traditional midterm. You will be given ten questions, and four of them will be chosen for the exam. You will thus have plenty of opportunity to focus your preparation.
- Monday, April 20, patriot Day (holiday). Monday, April 27, Last class.
- Monday, May 4: 12:00 – 2:00 pm. Last day for presentation of papers. *The research paper,* the other major requirement for the course, and together with its class presentation, will count for 30% of the grade.
- I want to encourage student participation and group discussions. I will designate a number of accessible articles on key questions, spread throughout the term, which will be assigned to students (by mutual agreement) for presentation. Your participation in those discussions will contribute 10% to the course grade.

The final version of the paper will be due on Monday, May 4, 2015. However, there will be several stages. First, you will put together a proposal for the paper, due by February 23, to be followed by a draft, which will be due on April 13. This plan is designed to spread the work over the entire term and to allow you to be ready for class presentations at the end of the term. The grade for the paper will be made up of 5% from the proposal, 5% from

the draft and the remainder from the final version. This scale puts a lot of emphasis on the quality of the research effort that you make early on in the term.

To encourage participation and learning from one another, I will assign each draft to another student as a reviewer.

You may be allowed to *combine* the paper requirement for *this* course with that of *another* course, *provided* that this is made *explicit* ahead of time and *both the other instructor and I* are aware of your plans and *all three of us have agreed* to an appropriate amount of work. Violations of these conditions will be an academic integrity matter.

Class presentations are an excellent exercise. They also provide valuable case studies and help students learn from each others' research. Normally, students feel very eager about presenting the work in class, and their presentations enrich the class experience. We will discuss in class ideas on how to make best use of class presentations. We will dedicate the last two sessions of the class, April 16 and 23, to class presentations.

The economics department also hires a Stata consultant; more details to come.

1.2 Electronic Resources and Data Sets

I strongly recommend that you substantiate your work with data and encourage use of statistical and econometric techniques. A special class session with Connie Reik and Joshua Quan, research librarians, will be scheduled. And, I personally have a fair amount of experience with electronic resources and am anxious to help you. I will provide a document with suggestions about economics-related resources on the web and the library.

Academic Integrity

Last but not least, I urge all of you to become acquainted with the academic integrity policies at Tufts University. I take academic integrity very seriously. Plagiarism occurs when a writer deliberately uses someone else's language, ideas, or other original (not common-knowledge) material without acknowledging its source. You risk being accused of plagiarism if you do not refer properly to your sources. If you are not sure what plagiarism is you can go to two useful websites:

`http://uss.tufts.edu/arc/writingresources/plagiarism.asp`

`http://uss.tufts.edu/arc/writingresources/differentforms.asp`

Tufts subscribes to a program called *Turnitin* which evaluates the content of written work for originality. I may use it to check your submissions; you can also use it to check your own work before you submit your assignments (many faculty use it to check their own research for accidental plagiarism).

Disabilities

It is the university's policy for students with documented disabilities to receive specific accommodations on examinations. Students needing special accommodation must provide a letter of support from the program director of disability services explaining what special accommodations are needed. I must receive that letter early in the semester and at least two

weeks before the midterm examination or any other assignment for which you need special accommodations.

1.3 Books

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This class is a quantitative economics elective, and as a result by design is pitched at an appropriate level. All books and other materials for the course will become available on reserve at Tisch, as hard copies, or on `trunk` and occasionally just `online.`

1. We will read a few chapters from

   Easley, David, and Jon Kleinberg. 2010. *Networks, Crowds and Markets.* Cambridge. [**EK**]

   This book is a notch too demanding for this class, but the parts that we will use are quite accessible to you. The book was developed for a class at Cornell and is `online` in its entirety:

   `http://www.cs.cornell.edu/home/kleinber/networks-book/networks-book.pdf`

   Pdf is available on `Trunk`.

2. A number of other books have been placed on reserve at Tisch. Some are technical, and will be used only in an auxiliary fashion. Some are "chatty" pop science works, and we will use them for the purpose of student class presentations that will provide important background for the class. The entire class does not have to read these books in their entirety; subsets of the class will and present to the rest of us.

   (a) Barabasi, Albert-Laszlo. 2002. *Linked: The New Science of Networks.* Perseus.

   (b) Christakis, Nicholas A., and James H. Fowler. 2009. *Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives – How Your Friends' Friends' Friends Affect Everything You Feel, Think, and Do.* Little, Brown and Company.

   (c) Gladwell, Malcolm. *The Tipping Point: How Little Things Can Make a Big Difference.* Little, Brown and Company.

   (d) Schelling, Thomas C.. 1978. *Micromotives and Macrobehavior.* W. W. Norton.

3. Another resource is an electronic journal, ECONOMICS OF NETWORKS eJOURNAL, Sponsored by Networks, Electronic Commerce and Telecommunications ("NET") Institute and distributed by ERN/SSRN. Tufts subscribes to this organization and you should be able to get access to it. Let me know if you cannot, and I will investigate accordingly. It distributes abstracts and links to the papers, and some of them are quite appropriate for the class and have a broader scope than simply economics.

I will introduce statistical and econometric tools that are needed for the class. They are limited to linear regression models and some of their properties. I will place online a concise source for whatever tools we shall need.

Items marked by asterisk (*) denote very technical material which is typically optional. Its intuitive content will be presented in simple terms on class. Required readings will be available on reserve. `URL` is provided, when appropriate, for material on the web.

Do not be deterred by the complexity of some items on the list of readings. The class will be defined entirely by the lectures.

READING LIST

2 Social interactions: basics

Ioannides, Yannis M. 2013. *From Neighborhoods to Nations: The Economics of Social Interactions*. Princeton University Press. "Introduction. " Chapter 1. On `trunk` and on reserve.

Manski, Charles F. 2000. "Economic Analysis of Social Interactions." *J. Econ. Perspectives*. 14(3): 115–136.

3 Social networks: basics

Jackson, Matthew O. 2014. "Networks in the Understanding of Economic Behaviors." *J. Econ. Perspectives*. 28(4): 3–22. Online.

4 Identification issues: basics

Ioannides, Yannis M., 2008. "Social Interactions (Empirics)". *The Palgrave Dictionary of Economics online.* On `trunk.`

Ioannides. 2013. "Social Interactions: Theory and Empirics." Chapter 2. On `trunk` and on reserve at Tisch.

Durlauf, Steven N., and Yannis M. Ioannides. 2010. "Social Interactions." *Annual Review of Economics*. 2:451–478. On `Trunk.`

5 Social networking modeling

Jackson, Matthew O. 2008. *Social and Economic Networks.* "Introduction." `Trunk.`

Jackson, Matthew O. 2010. "An Overview of Social Networks and Economic Applications." Ch. 12. In: Benhabib, Jess, Alberto Bisin, and Matthew O. Jackson, eds. *Handbook of Social Economics*, Volume 1A. On `trunk.`

Easley and Kleinberg. 1–58, 77–102.

6 Applications

6.1 Examples: Peer effects in medical schools and among roommates at Dartmouth

Sacerdote, Bruce. 2001. "Peer Effects With Random Assignment: Results for Dartmouth Roommates." *Quarterly J. Econ.* 116:681–704.

Arcidiacono, Peter, and Sean Nicholson. 2005. "peer Effects in Medical School." *J. Public Econ.* 89:327–350.

For technical issues of estimation, see Aghion and Howitt. 2001. Appendix, "Basic elements of Econometrics." 443–456.

6.2 Overview and methodological issues

Blume, Laurence E., William A. Brock, Steven N. Durlauf, and Yannis M. Ioannides. 2011. "Identification of Social Interactions." Ch. 18. 854–964. In Jess Benhabib et al. Eds. *Handbook of Social Interactions*. Elsevier. On trunk and online.

Topa, Giorgio, and Yves Zenou. "Neighborhood and Network Effects." In Duranton, Gilles, J. Vernon Henderson and William Strange, Eds. *Handbook of Regional and Urban Economics*. Volume 5. On `Trunk`.

6.3 Decisions of Individuals

Sacerdote, Bruce. 2001. "Peer Effects With Random Assignment: Results for Dartmouth Roommates." *Quarterly J. Econ.* 116:681–704.

Austen-Smith, David, and Roland G. Fryer, Jr. 2005. "An Economic Analysis of 'Acting White'." *Quarterly J. Econ.* 120(2):551–583.

Echenique, Federico, and Roland G. Fryer Jr. 2007. "A Measure of Segregation Based on Social Interactions." *Quarterly J. Econ.* 122(2):441–485.

Georgarakos, Dimitris, Michael Haliassos, and Giacomo Pasini. 2014. "Household Debt and Social Interactions." *Rev. Financial Studies.* `On trunk.`

Mas, Alexandre, and Enrico Moretti. 2009. "Peers at work." *American Economic Review.* 99(1): 112–145. on trunk.

6.4 Housing Decisions and Neighborhoods

Ioannides, Yannis M. 2002. "Residential Neighborhood Effects," *Regional Science and Urban Economics,* 32(2):145–165. On trunk.

Rossi-Hansberg Esteban, Sarte P., and Owens R. 2010. "Housing Externalities." *Journal of Political Economy.* 118(3):829858.

Rossi-Hansberg Esteban, Sarte P. 2012. "Economics of Housing Externalities." *International Encyclopedia of Housing and Home.* 2:47–50.

Ioannides, Yannis M., and Jeffrey E. Zabel. 2003. "Neighborhood Effects and Housing Demand." *Journal of Applied Econometrics.* 18:563–584. On trunk.

"Empirical Nonlinearities and Neighborhood Effects in the Intergenerational Transmission of Human Capital," *Applied Economics Letters.* 10, 535–539, 2003.

Ioannides, Yannis M. 2013. "Estimation of Human Capital Accumulation with Nonlinear Interactions Structures." pp. 275–284. In: *From Neighborhoods to Nations: The Economics of Social Interactions.* Section on trunk. Book on reserve.

Ioannides, Yannis M., and Giulio Zanella. 2008. "Searching for the Best Neighborhood: Mobility and Social Interactions." Tufts University and University of Siena working paper. April. Online at http://www.tufts.edu/~yioannid/IoannidesZanellaMobility08.pdf. On trunk.

6.5 Neighborhoods and Human Development

Leventhal, Tama. 2014. "Children's Development in Neighborhood Contexts: Testing Conventional Wisdom." Lecture. March 2.

Epple, Dennis, and Richard E. Romano. 2011. "Peer Effects in Education: A Survey of the Theory and Evidence." Ch. 20, 1054–1055, 1111–1160. In Jess Benhabib *et al.* Eds. *Handbook of Social Interactions.* Elsevier. `On trunk` and online.

Datcher, Linda. 1982. "Effects of Community and Family Background on Achievement." *The Review of Economics and Statistics.* 64(1):32–41.

Patacchini, Eleonora, and Yves Zenou. 2011. "Neighborhood Effects and Parental Involvement in the Intergenerational Transmission of Education." *J. Regional Sci.* 51(5):987–1013. On trunk and online.

Sacerdote, Bruce. 2011. "Nature and Nurture Effects On Childrens Outcomes: What Have We Learned From Studies of Twins And Adoptees?" Ch. 1, 1–28. In Jess Benhabib *et al.*

Eds. *Handbook of Social Interactions*. Elsevier. `On trunk` and online.

Lund, Terese J., and Eric Dearing. 2012. "Is Growing Up Affluent Risky for Adolescents or Is the Problem Growing Up in an Affluent Neighborhood?" *J. Research on Adolescence*. 23(2):274-282.

Luthar, Suniya *et al.* 2013. " 'I can, therefore I must': Fragility in the Upper-middle Classes." *Development and Psychopathology*. 25:1529-1549.

6.6 Labor markets

Professor Laura Gee will lecture on "Social Networks and Labor Markets: How Strong Ties Relate to Job Transmission On Facebook's Social Network." March 11, 2015.

Gee, Laura, Jason Jones, and Moira Burke. "Social Networks and Labor Markets: How Strong Ties Relate to Job Transmission On Facebook's Social Network." working paper. Material to be made available when it is to be presented by Professor Gee.

Calvo-Armengol, Antoni, and Yannis M. Ioannides. 2008. "Social Networks in Labor Markets." *The New Palgrave Dictionary of Economics Online.*

Topa, Giorgio. 2011. "Labor Markets and Referrals." Ch. 22. In: Benhabib, Jess, Alberto Bisin, and Matthew O. Jackson, eds. *Handbook of Social Economics*, Volume 1A. 1193–1221. On `trunk.`

"Job Information Networks, Neighborhood Effects, and Inequality," with Linda D. Loury. 2004. *Journal of Economic Literature.* XLII, December:1056–1093. Online and `on trunk.`

Galeotti, Andrea, and Luca Paolo Merlino. 2014. "Endogenous Job Contact Networks." *International Economic Review*. 55(4):1201–1226. Section on empirical UK patterns: 1212–1219.

Mayer, Adalbert, and Steven L. Puller. 2008. The Old Boy (and Girl) Network: Social Network Formation on University Campuses. *J. Public Econ.* 92:329–347.

6.7 Summing up issues in the empirics of social interactions

The following paper summarizes nicely, using applied microeconometrics language most of the issues tackled by the social interactions literature.

Moffitt, Robert A. 2001. "Policy Interventions, Low Level Equilibria, and Social Interactions." 45–82. In Durlauf, Steven N., and H. Peyton Young, eds. *Social Dynamics.* Princeton, NJ: Princeton University Press.

The followin paper addresses some serious pitfalls associated with research on social interactions and peer effects.

Angrist, Joshua D.. 2014. "The Perils of Peer Effects." *Labour Economics*. 30:98–108.

6.8 Online Communities, Networks and Social Media

6.9 Influence

Goyal, Sanjeev, MarcoJ.van der Leij, and JosLuisMoraga-Gonzlez. "Economics: An Emerging Small World." *Journal of Political Economy*. 114(2): 403–412.

Fourcade, Marion, Etienne Ollion, and Yann Algan. 2014. "The Superiority of Economists." *J. Econ. Perspectives*. 29(1): 89-114.

Smith, Noah. 2014. "Why Economists Are Paid So Much." *Bloomberg View*.

`http://www.bloombergview.com/articles/2014-12-02/why-economists-are-paid-so-much`

6.10 Location Decisions of Firms

6.11 Economic development

Banerjee, Abhijit, Arun Chandrasekhar, Esther Duflo, and Matthew Jackson. 2013. "Diffusion of Microfinance." *Science*. 341, DOI: 10.1126/science.1236498, July 26.

Munshi, Kaivan. 2014. "Community Networks and the Process of Development." *J. Econ. Perspectives*. 28(4):23–48.

Feigenberg, Benjamin, erica Field, and Rohini Pande. 2013. "The Economic Returns to Social Interaction: Experimental Evidence from Microfinance." *Review of Economic Studies*. 80:1459–1483.

6.12 Production Systems

Carvalho, Vasco. 2014. "From Micro to Macro via Production Networks." *J. Econ. Perspectives*. 28(4):23–48.

6.13 Reading three notable "pop science books"

1. Christakis, Nicholas A., and James H. Fowler. 2009. *Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives – How Your Friends' Friends' Friends Affect Everything You Feel, Think, and Do*. Little, Brown and Company.

   Ch. 1. In the Thick of It. Pages 3–32

   Ch. 2. When You Smile, the World Smiles with You. Pages 33–60.

   Ch. 3. Love the One Youre With. Pages 61–94.

   Ch. 4. This Hurts Me As Much As It Hurts You. Pages 95–134.

   Ch. 5. The Buck Starts Here. Pages 135–170.

Ch. 6. Politically Connected. Pages 172–210.

Ch. 7. Its in Our Nature. Pages 210–252.

Ch. 8. Hyperconnected. Pages 253–286.

Ch. 9. The Whole Is Great. 287–306.

2. Gladwell, Malcolm. *The Tipping Point: How Little Things Can Make a Big Difference.* Little, Brown and Company.

   Ch. 1, Introduction. Pages 1–29.

   Ch. 2, Law of the Few: Connectors, Mavens, and Salesmen. Pages 31–88.

3. Schelling, Thomas C.. 1978. *Micromotives and Macrobehavior.* W. W. Norton.

   Ch. 1, Micromotives and Macrobehavior. Pages 9–45

   Ch. 4, Sorting and Mixing: Race and Sex. Pages 137–166.

6.14 Culture and Language

Clingingsmith, David. 2014. "Are the Worlds Languages Consolidating? The Dynamics and Distribution of Language Populations." working paper. `On trunk`.

Currid, Elizabeth, and Williams, S. 2010. "The Geography of Buzz: Art, Culture and the Social Milieu in Los Angeles and New York." *Journal of Economic Geography.* 10(3): 423–451. `On trunk.`

Ronen, Shahar *et al.* 2014. "Links that Speak: The Global Language Network and its Association with Global Fame." *Proceedings of the National Academy of Sciences.* 111(52). December 30.

Online at: `http://www.pnas.org/content/111/52/E5616.full.pdf+html`

Clingingsmith, David, *et al.* 2009. "Estimating the Impact of the Hajj: Religion and Tolerance in Islam's Global Gathering." *Quarterly J. Economics* 124(3):1133–1170.

http://dash.harvard.edu/bitstream/handle/1/3659699/Kremer_EstimatingImpact.pdf?sequence=2

Williams, Sarah, and Elizabeth Currid-Halkett. 2014. "Industry in Motion: Using Smart Phones to Explore the Spatial Network of the Garment Industry in New York City." *PLOS ONE.* `www.plosone.org` Volume 9(2):e86165

6.15 Economies with network effects

Easley and Kleinberg. 449–469.

6.16 Group Decision Making

Condorcet jury theorem and related matters

Easley and Kleinberg, 645–656, 663–668.

Grofman, Bernard, et al. 1983. "Thirteen Theorems in Search of the Truth." *Theory and Decision* 15:261–278.

6.17 Elections

Li, Ji, and Lung-fei Lee. 2009. "Binary choice under social interactions: an empirical study with and without subjective data on expectations *Journal of Applied Econometrics*. 24(2): 257–281.

7 The World Wide Web

7.1 How Google works: analytics

Easley and Kleinberg. "Part IV. Information Networks and World Wide Web." 333–368.

Brin, Sergei, and Laurence Page. 1998. "The Anatomy of a Large-Scale Hypertextual Web Search Engine." *Computer Networks.* 30:107–117.

Citation analysis. Scientific works, US Supreme Court.

7.2 How Google works: business model

Schmidt, Eric. 2014. Talk. "How Google Works."

Schmidt, Eric *et al.* 2014. *Google : How Google Works.* Tisch Reserve.

8 Student Class Presentations

A detailed schedule of presentations will be handed out once students have decided on the final drafts of their papers.

9 Epilogue: Some Big Questions about Social Interactions and Social Networks

Ioannides, Yannis M., and Giorgio Topa. 2010. "Neighborhood Effects: Accomplishments and Looking beyond them." J. Regional Sci. 50(1):343–362.

Ioannides, Yannis M. 2013. Ch. 10. "Urban Magic: Concluding Remarks." 451–456.

Miller, Greg. 2010. "The Seductive Allure of Behavioral Epigenetics." *Science*. 2: 24–27.

Beauchamp, Jonathan P, et al. 2011. "Molecular Genetics and Economics." *J. Econ. Perspectives*. 25(4):57–82.

Manski, Charles F. 2011. "Genes, Eyeglasses and Social Policy." Journal of Economic PerspectivesVolume 25, Number 4Fall 2011Pages 8394

Internet of Things `http://en.wikipedia.org/wiki/Internet_of_Things`