

Identifying Marginal Returns to Education Through Social Networks

Timothy Hersey (B.Ec)

Supervisors: Dr Virginie Masson & Dr Firmin Doko
Tchatoka



THE UNIVERSITY
of ADELAIDE

School of Economics
University of Adelaide
November 4, 2016

Thesis submitted in partial completion of the requirements for the degree of Bachelor of
Economics (Honours)

Declaration

Except where appropriately acknowledged this thesis is my own work, has been expressed in my own words and has not previously been submitted for assessment.

Word count: approx. 12,000

Signature

04/11/2016

Date

Acknowledgements

I would firstly like to thank my supervisors Virginie Masson and Firmin Doko Tchato, whose passionate teaching and support has always inspired me. Thank you to Virginie for helping me keep perspective over the year, for the chats and for your honesty. Thank you also to Firmin for your well-timed encouragements and positivity, particularly when things didn't appear to be going to plan. I would also like to thank my friends and family, whose incredible support has allowed me to do this, putting up with my insanity along the way. Finally, thank you to the Honours cohort; each of you have added something unique and valuable to the group and made this year enjoyable amongst the madness.

Identifying Marginal Returns to Education Through Social Networks

Timothy Hersey

Abstract

This thesis explores the role of peers in influencing the decision of individuals to attend college and the resulting labour market outcomes. It proposes a model, combining the econometric methods of networks and treatment effects, to estimate the marginal treatment effect of education when peers have influence on the wage outcome and probability of treatment for an individual. Using Monte Carlo simulations, the effect of networks on the treatment effects model is investigated. We further explore the model by varying the network structure and conducting sensitivity analyses, considering the impact of networks on policy. Our results suggest that networks initially have a significant positive impact on the returns to education and the effects of policy. However, this effect is reduced once homophily in characteristics is introduced.

Contents

1	Introduction	1
2	Review of Literature	3
	2.1 Peer Effects	3
	2.2 Returns to Education	7
3	Model	9
	3.1 College Attendance Decision	11
	3.2 The Wage Model and Returns to Education	14
4	Estimation	17
	4.1 Estimating College Attendance	17
	4.2 Estimating Marginal Returns to Education	20
5	Monte Carlo	21
	5.1 Baseline Model	21
	5.2 Alternate Network Models	27
	5.3 Relating Network Formation to \mathbf{Z}	29
	5.4 Sensitivity Analysis	33
	5.5 Policy Effects	43
6	Conclusion	44
	Appendix A Additional Figures and Tables	52

List of Figures

1	Watts-Strogatz network graphs	23
2	Support of P conditional on \mathbf{X}	25
3	Baseline graphs of the marginal treatment effect (MTE)	26
4	MTE - Changes in network specification	28
5	MTE - Correlating network formation with \mathbf{Z}	31
6	MTE - Network size=[200 100 100 100]	34
7	MTE - Altering model coefficients	39
8	MTE - \mathbf{X}, \mathbf{Z} and α correlated	41
9	MTE - Correlated error terms	42
A.1	MTE - Bootstrapped errors	52
A.2	MTE - Networks dependent on \mathbf{X}	53
A.3	MTE - Correlated network	53
A.4	MTE - Network size=[300 150 40 10]	54
A.5	MTE - Alternate model specifications	55

List of Tables

1	Incorporating peer effects	27
2	Effect of networks on policy	29
3	Linking networks and \mathbf{Z}	30
4	Changing the unobserved network effect	35
5	Alternate model specifications	37
6	Coefficient specification	39
7	\mathbf{X}, \mathbf{Z} and α correlated	41
8	Correlated error terms	43
9	The effect of localised policies	43
A.1	Network size=[300 150 40 10]	54