



The cost of segregation in (social) networks [☆]



Nizar Allouch

University of Kent, School of Economics, Keynes College, Canterbury, UK

ARTICLE INFO

Article history:

Received 21 September 2015

Available online 1 September 2017

JEL classification:

C72

D31

H41

Keywords:

Public goods

Income redistribution

Welfare effect

Networks

Bonacich transfer index

ABSTRACT

This paper investigates the welfare effect of income redistribution in the private provision of public goods on networks. We first show that the welfare effect of income redistribution is determined by Bonacich centrality. Then we develop an index based on the network structure of interactions, which, roughly speaking, measures the welfare effect of income redistribution confined to a component of contributors. The proposed index vanishes when applied to large components of contributors that display special segregated interactions, which suggests an “asymptotic neutrality” of redistributive policies.

© 2017 The Author. Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Private contributions are important to the provision of many public goods. Examples include essential infrastructure, charitable education, and awareness campaigns helping individuals make better decisions over a wide spectrum of issues ranging from health and environment to voting. Access to these public goods, however, may often be constrained by geographical location or social interactions, benefiting nearby communities and acquaintances while effectively excluding others. A recent literature initiated by [Bramoullé and Kranton \(2007\)](#) studies a network model of public goods: each consumer can only access provisions available in his neighborhood, formed by himself and his direct neighbors in the network.¹ Other important contributions include [Galeotti et al. \(2010\)](#), [Galeotti and Goyal \(2010\)](#), [Bramoullé et al. \(2014\)](#), [Elliott and Golub \(2015\)](#),² and, for related empirical evidence, [Acemoglu et al. \(2015\)](#).

[☆] I would like to thank Daron Acemoglu, Abhijit Banerjee, Ted Bergstrom, Yann Bramoullé, Richard Cornes, Sergio Currarini, Matthew Elliott, Itay Fainmesser, Andrea Galeotti, Benjamin Golub, Matthew Jackson, Maia King, Gilat Levy, Judith Payne, John Quah, Roberto Serrano, Rajiv Vohra, Nick Vriend, John Weymark, Leeat Yariv, Yves Zenou, and participants in seminars at Autònoma de Barcelona, Bielefeld, Birkbeck, Boston College, Brown, Caltech, Cambridge, Laval, MIT, Montreal, Paris, Rochester, York, and participants in several workshops and conferences, for valuable comments. Part of this research started while I was visiting the Economics Department at Cambridge University, whose hospitality is gratefully acknowledged; in particular, special thanks are due to Sanjeev Goyal for many valuable discussions. Special thanks are also due to two anonymous referees and the associate editor for many valuable comments.

E-mail address: n.allouch@kent.ac.uk.

¹ Tiebout's seminal contribution provided an underpinning of the literature investigating local public goods in the absence of spillovers across communities and with a specific focus on the market forces underlying the movement of consumers to their preferred communities. An exception is [Blach and Zenginobuz \(2006\)](#), who investigate local public goods with geographic spillovers among nearby communities.

² For related contributions, see also [Acemoglu et al. \(2016\)](#), [Bervoets and Faure \(2016\)](#), [López-Pintado \(2017\)](#), [Günther and Hellmann \(2017\)](#), [Hiller \(2017\)](#), and [Kinader and Merlino \(2017\)](#).

Enhancing private provision of public goods has long been an important policy objective. Yet, for pure public goods, which correspond to a complete network structure of interactions, it is well known from Warr (1983) and Bergstrom et al. (1986) that private provision is subject to a strong neutrality result, whereby income redistribution among contributors that leaves the set of contributors unchanged has no effect either on the aggregate provision of public goods or the consumption of private goods.³ The neutrality result, further analyzed in Bernheim (1986) and Andreoni (1989), is equivalent to complete crowding-out of tax-financed government provision, “dollar-for-dollar”. Neutrality of income redistribution can be a serious problem for public goods that rely mostly on private provision, but these results for pure public goods may not hold when local interaction patterns are accounted for, as pointed out by Allouch (2015).⁴

In this paper, we investigate the welfare effects of income redistribution on the private provision of public goods in networks. The fact that neutrality often breaks down in general networks gives rise to welfare improvement possibilities. This is very much in the spirit of the Second Welfare Theorem, although, unlike competitive equilibrium, the Nash equilibrium outcomes of private provision will typically be inefficient. As a first step to understanding welfare improvement possibilities, we restrict our attention to particular preferences that yield affine Engel curves studied in Gorman (1961), of which Cobb–Douglas preferences are a special case. Our analysis shows that, under a standard utilitarian approach, the welfare effect of income redistribution confined to a component of contributors is determined by the Bonacich centrality. Bonacich centrality, due to Bonacich (1987), measures power and prestige in social networks and was first shown in the economics literature to be proportional to the Nash equilibrium outcomes of a game by Ballester et al. (2006). Bonacich centrality has been shown to be important in several other applications in economics, including Ghigliano and Goyal (2010) for conspicuous consumption, İlkiliç (2011) for the tragedy of the commons, Belhaj and Deroian (2012) for risk sharing, Candogan et al. (2012) for monopoly pricing, and Acemoglu et al. (2012) for aggregate volatility.

In order to compare the welfare effect of income redistribution across components of contributors of different sizes and network structures, we introduce a new index, called the *Bonacich transfer index*, which measures the average welfare gain per unit of income redistribution. The proposed index is related to the standard deviation of Bonacich centralities. Intuitively, the higher is the heterogeneity of Bonacich centralities of a component of contributors, the more per-capita welfare gain can be achieved from a unit of income redistribution; in this regard, we show that the Bonacich transfer index may take a wide range of values. For instance, for a regular component of contributors the Bonacich transfer index is zero, whereas for a star component of contributors the Bonacich transfer index may be unbounded. Therefore, the Bonacich transfer index may be thought of as a summary statistic of the welfare effect of income redistribution that is determined by the network structure of interactions.

Next we analyze the welfare effect of income redistribution when components of contributors are comprised of several “segregated” groups. Segregated interactions of groups are represented by a network structure where, for each group, the density of inward ties is greater than the density of outward ties. We show that the Bonacich transfer index vanishes when applied to large components of contributors that display segregated interactions. This implies an “asymptotic neutrality” of income redistribution. Although our result mirrors the neutrality results for standard pure public goods, it is quite different in interpretation. More specifically, the asymptotic neutrality, unlike neutrality, allows for the possibility of income redistribution improving social welfare, but any resulting improvement becomes smaller as the component of contributors grows larger. The rest of the paper is organized as follows. Section 2 provides a review of related literature. Section 3 introduces the private provision of public goods in a network model. Section 4 relates the welfare effect of income redistribution to Bonacich centrality. Section 5 introduces the Bonacich transfer index. Section 6 applies the Bonacich transfer index to components of contributors that display special segregated interactions. We conclude the paper in Section 7 and prove our results in Section 8.

2. Related literature

The segregated network structure investigated in this paper could be the result of different processes. It could display physical or geographical linking constraints, or it could emerge as a result of processes and network formation dynamics, depending on the public goods under investigation. Schelling (1969) provides a simple, yet powerful, model showing that seemingly mild individual preferences for having neighbors of the same type may lead to full residential segregation, even though no individual prefers the final outcome.

The tendency of individuals to disproportionately form social ties with others similar to themselves is called the homophily principle in sociology. Homophily is a well-documented pattern of social networks and is often called upon in understanding various social interactions such as friendship and marriage, job market outcomes, speed of information diffusion, and even social mobility. There is an emerging literature in the economics of social networks that models a random process of network formation strongly influenced by homophily, including Currarini et al. (2009), Bramoullé et al. (2012), and Golub and Jackson (2012).

Our approach, although it is quite different in motivation, takes advantage of the insights of the above-mentioned literature, since we investigate components of contributors that already display segregated interactions, rather than the matching

³ The paper by Bergstrom et al. (1986) has been the focus of much attention, as evidenced by the special issue in the *Journal of Public Economics* celebrating its 20th anniversary.

⁴ See Bourlès et al. (2017) for another investigation of the neutrality result in a network setting.

Download English Version:

<https://daneshyari.com/en/article/7353191>

Download Persian Version:

<https://daneshyari.com/article/7353191>

[Daneshyari.com](https://daneshyari.com)