Literature

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The aim of this article is to present the state of the art on Policy Diffusion and Innovation in Public Policy.

Our topic lies in the intersection of policy diffusion, innovation and public policy. Hence, we draw from the policy diffusion theories from Political Science, the literature on the policy reforms - especially on public goods and services - from Economics. Last, insights on governance, coordination and costs will be also drawn from Public Administration. The combination of these fields allows as to explain this research from a multi-model point of view.

Policy innovation happens when a government adopts a new policy (Shipan and Volden 2008). The mechanisms of the policy adoption can be diverse. The policy innovation can be endogeneous, coming from within the government, the residents or local stakeholders. Also, policy innovation can be a result of policy diffusion, e.g. the result of the spread of adoptions and innovations.

(Jackson and Yariv 2011) In an overview on social networks and diffusion. Structures can influence economic behavior, diffusion of behavior and policies. Epidemiological models can be useful to model economic phenomena, as members interact. Relevant to our research, units or agent might be interested about the proportion of units adopting a given action. For their decision, when a given adoption threshold has been reached, their incentive might increase and they might want to take an action - same or different - from that of the neighbors. Agents that don't adopt early policies can free-ride on the information on the results of the actions of the neighbors. In empirical literature diffusion has been analyzed through the lenses of social networks on several fields. These include: marketing, labor economics, political economy, etc.

The components of the network and the connections between them are important in applications such as contagion, learning and diffusion. Different subgraphs of the network are the components. Hence, if we consider Catalonia as the whole network, the several components are municipalities that form connections between them. These components are network partitions forming path-connected groups of nodes. A network that consists of only one

component is a connected network. A network that has several components but doesn't have a cycle (e.g. several trees) is a forest. A special case of a forest is a star network where one node acts as a center, e.g. every link of the network involves that node. The set of nodes that the node i Is linked to is called the neighborhood.

The *degree* of a node is the number of links involving that node.

Early literature about diffusion: Hybrid con adoption Ryan and Gross 1943, Griliches 1957, Drug adoption Coleman Katz, Menzel 1966

Importance of social connections

"opinion leaders" in the study of voting

Whereas, as typically in economics, there is a growing literature with studies on correlations, casual inference might not be possible without a specific setting. Therefor several authors use experiments as in

Various field experiments, such as those by Duflo and Saez (2003), Karlan, Mobius, Rosenblat, and Szeidl (2009), Dupas (2010), Beaman and Magruder (2010), and Feigenberg, Field, and Pande (2010),

Another way to reach casual inference is using sctructural modeling. Banerjee, Chandrasekhar, Duflo, and Jackson (2010)

Newman, Barabasi & Watts (2006),

The Handbook of Social Economics (forthcoming)

There are some popular texts such as Watts (2003) and Barabasi (2004), as well as a history of thought of the sociology literature by Freeman (2006) .

Goyal (2008)

Jackson (2008) synthesizes the analyses of networks from sociology, economics, statistical physics, mathematics, and computer science.

Greenhouse gas emissions trading (ET) system has been an emerging policy to govern global issues. In this setting, multiple authorities are part of a governance system, whereas they scale and interconnectedness might differ, leading to a polycentric setting Ostrom 2010 a 2010b

Social network analysis arose in Sociology (e.g., Boissevain & Mitchell, 1973; Coleman, 1958; Scott, 1991; Wasserman & Faust, 1997; Wellman, 1983) but has recently emerged as a crucial methodology in political science as well (e.g., Bach & Newman, 2010; Cao, 2009, 2010; HafnerBurton, Kahler, & Montgomery, 2009; Hafner-Burton & Montgomery, 2006; Ward, Stovel, & Sacks, 2011).

The setting

The set $N = 1, ..., n$ is the set of nodes that form part of the network. These nodes in our contexts are municipalities of Catalonia. Two nodes are either connected or not, - they cooperate or they don't. IMC is a reciprocal relationship, all the participants that form