Social Structures, Electoral Competition and Public Goods Provision[*]

Cesi Cruz[†]
Julien Labonne[‡]
Pablo Querubin[§]

November 2018

Abstract

We study the relationship between social structure and political incentives for public goods provision. We argue that when politicians–rather than communities–are responsible for the provision of public goods, social fractionalization promotes political competition and increased public goods provision. We test this using large-scale data on family networks from over 20 million individuals in 15,000 villages of the Philippines. We take advantage of naming conventions to assess intermarriage links between families and use community detection network algorithms to identify the relevant clans in all of those villages. We show that there is more public goods provision and political competition in villages with more fragmented social networks, a result that is robust to controlling for a large number of village characteristics and to alternative estimation techniques. Using original survey data collected in 284 villages, we also show that fragmented villages are associated with a broader distribution of political influence.

[†]University of British Columbia: cesi.cruz@ubc.ca

[‡]University of Oxford: julien.labonne@bsg.ox.ac.uk

[§]New York University: pablo.querubin@nyu.edu

1 Introduction

Political institutions are built on existing social structures, with their own hierarchies, rules, and norms governing interactions and behavior. We offer a novel framework for theorizing about the link between social structure – the configuration and relative position of social groups – and subsequent electoral strategies for redistribution. While social cohesion tends to be associated with a host of positive outcomes, this often applies to contexts in which collective action problems are the primary obstacle (for example, when citizens need to contribute directly towards a public good). We argue than when politicians, rather than communities, are responsible for the provision of public goods, social cohesion can also be associated with lower political competition, especially in clientelistic political contexts.[1] The more societies are divided into multiple relevant social groups, the subsequent redistributive strategies adopted by politicians to attract voters may shift towards greater–rather than lower–public goods provision.[2]

We study these questions in the context of local politics in the Philippines. The provision of public goods in the Philippines is partly the responsibility of elected municipal mayors whose budgets depend mostly on transfers from the central government. Mayors must allocate their budget across the different *barangays* (villages) that compose the municipality. A critical actor in Filipino social and political life are *clans* or extended families: political alliances at the local level often involve securing the support of clan leaders who can leverage strong norms of in-group cooperation and reciprocity to deliver *en bloc* the votes of their family members (Hollnsteiner, 1963; Fegan, 2009).[3]

---

[1]See Hicken (2011) for an overview of the literature on clientelism.

[2]While individualized political exchange is common in much of the developing world, the electoral returns to vote buying and other forms of political exchange are not always clear (Cantú, Forthcoming).

[3]While there are important differences in ethnic composition and religious affiliation across regions and larger administrative divisions, municipalities and villages in the Philippines are relatively homogeneous.

We demonstrate that mayor decisions to provide public goods across the different villages that comprise their municipality vary as a function of the social structure of the village. To do this, we use a unique dataset covering 20 million individuals in more than 15,000 villages across 709 municipalities of the Philippines. The dataset includes information on family names and we use naming conventions in the Philippines to establish ties between families through intermarriages. Following Padgett and McLean (2006, 2011) and Cruz, Labonne and Querubin (2017), we consider a tie between two families to exist whenever we observe at least one marriage between members of the two families. We graph the full family network in all villages in our sample. We then use community detection algorithms (Girvan and Newman, 2002; Pons and Latapy, 2005) to identify the configuration of clans in every village, based on the relative number of ties within and between clusters of families in the network. To account for the relative influence of each clan, we use the set of clans in each village to create a measure of social fractionalization or fragmentation with a Herfindahl index that captures how the village population is distributed across the different clans. We hypothesize that in less fractionalized or more cohesive villages, clan leaders are more effective in concentrating political influence and capturing politicians for private, personal interests at the expense of public goods provision.

Our results suggest that social fractionalization is *positively* correlated with village-level provision of public goods such as schools, public marketplaces, water systems and health centers. These correlations are sizable; for example, a one standard deviation increase in social fractionalization increases the probability that a health center is located in the village by around 6 percentage points (an increase in 10% relative to the sample mean). These correlations are robust to the inclusion of municipality fixed effects and a broad set of village covariates such as village population, the number of distinct families in the village, whether the village is classified as rural, as well as controls for different occupations and educational levels, amongst others. To address concerns about reverse causality (i.e. whether family ties, and thus our social fractionalization measures, are affected by public goods provision) we restrict our network to ties between individuals 45 years old or older, and use the social fractionalization measure in the restricted network - capturing marriages that took place at least 20 to 25 years ago - as an instrument for the corresponding measure in the full network. Our results are similar when we use this approach.

We next turn to the relationship between social fractionalization and political competition.

Using electoral data from barangay elections we find that social fractionalization is correlated with two features of village-level electoral competition: (i) a larger number of candidates running for office; and (ii) narrower vote margins for the winning candidate. A similar pattern holds for winning margins in mayoral elections. Finally, we make use of an original survey collected in two provinces shortly after the 2013 local elections, in which we asked respondents to list up to five (5) politically influential leaders of their community (not necessarily restricted to elected officials). We find that social fractionalization is correlated with a broader distribution of political influence.

Our results should be interpreted cautiously since naturally, social structure measures are not randomly assigned across villages. While we control for several village-level characteristics that may potentially confound our estimates, and follow an instrumental variables approach, we cannot fully account for all variables that may have shaped intermarriage networks over many decades. At the same time, the correlations uncovered in this paper point to the importance of understanding how a community's social structure shapes electoral competition and the incentives of politicians to provide public goods.

Much of the literature on public goods provision uses ethnic, linguistic, or religious fractionalization as a measure of social structure (see, e.g. Montalvo and Reynal-Querol, 2005; Habyarimana et al., 2007; Kramon and Posner, 2013).[4] This literature has shown mixed results, with many papers showing a negative relationship between fractionalization and public goods provision across both developed and developing countries (Alesina, Baqir and Easterly, 1999; Easterly and Levine, 1997; Miguel and Gugerty, 2005; Martinez-Bravo et al., 2012), while others question these correlations on both methodological and substantive grounds (Wimmer, 2016; Kustov and Pardelli, 2018; Soifer, 2016). In contrast to the literature's tendency to focus on how fractionalization may exacerbate collective action problems and undermine citizen contributions to public goods, we focus on how social structure affects the incentives of politicians to provide public goods, and thus our paper is related to recent contributions by Desmet, Ortuño-Ortín and Weber (2017) and Munshi and Rosenzweig (2018). We also contribute by isolating the role of social structure in an ethnically homogenous context, which allows us to demonstrate the direct effects of social structure for political competition and politician incentives to provide public goods.

---

[4]For an overview of the literature, please see Stichnoth and Van der Straeten 2011.

Second, we add to the literature on local elite capture and the delivery of public goods (Bardhan, 2002; Bardhan and Mookherjee, 2006). Closely related to our paper is the work by Acemoglu, Reed and Robinson (2014) who find that places in Sierra Leone with more ruling families exhibit better development outcomes today. In these places "chiefs constrained by greater competition will be less able to manipulate access to land for their own benefit or will have to compete by offering and providing public goods" (p. 321). Similarly, Anderson, Francois and Kotwal (2015) show that the economic elite use within-group social cohesion to dominate local politics in India. In our context, heads of clans who concentrate a large share of the village population can undermine political competition and provide votes in exchange for targeted transfers, at the expense of public goods.

Our paper is also related to a growing literature on the economic and political impact of families and kinship ties (Todd, 1985; Padgett and Ansell, 1993; Padgett and McLean, 2006; Alesina and Giuliano, 2013; Bertrand and Schoar, 2006; Moscona, Nunn and Robinson, 2017). In addition, the role of political dynasties has been studied in countries as diverse as the United States (Dal Bo, Dal Bo and Snyder, 2009), the Philippines (Querubin, 2016), Japan (Smith, 2018) and India (Chandra, 2016).

We also contribute to the literature on the role of social networks on the distributive strategies of politicians in the developing world (Auyero, 2000; Calvo and Murillo, 2009; Eubank et al., 2017; Szwarcberg, 2012; Hughes, 2016; Larson and Lewis, 2017). In particular, we build on Cruz, Labonne and Querubin (2017) who show that a candidate's centrality in family networks contributes to higher vote shares during the elections. In this paper, rather than exploiting the position of individual candidates in the network, we study how the network structures of villages condition the distributive strategies of politicians.

Finally, we also contribute to the literature on social diversity, political competition and public goods provision. A series of studies have documented that greater social diversity leads to a larger number of parties and stronger political competition (Amorim-Neto and Cox, 1997; Potter, 2014; Lublin, 2017). This is consistent with our finding that greater fractionalization is associated with a larger number of candidates and less concentrated political influence. Similarly, the papers by Besley and Burgess (2002); Crost and Kambhampati (2010); Rosenzweig (2015) provide evidence of a positive correlation between electoral competition and public goods provision.[5]

---

[5]However, there are also studies that document a *negative* correlation between political competition and public goods

The rest of the paper is structured as follows. In Section 2 we describe our theory on the political implications of social structure and provide some context on local politics in the Philippines. Section 3 discusses the challenge of characterizing social structures and introduces the community detection algorithms used in the analysis. Sections 4 and 5 present the data the main results, respectively, while Section 6 concludes.

2 Theory: Social Structure and Electoral Competition

The literature on social network structure and political outcomes has focused largely on developing theoretical models, partly because of the difficulty in collecting large-scale social network structure data. Siegel (2009) presents a theory of collective action as a function of social network structures: size, the strength of ties, and the influence of elites. Rolfe (2012) develops a theory of voter turnout rooted in social context, emphasizing that the features and structure of networks exercise a positive effect on turnout distinct from the aggregate individual characteristics of the people that make up the networks. Similarly, Fowler (2005)'s model of turnout implies that increasing the density of social networks only improves turnout to a certain point; networks that are too dense may lead to declines in turnout. A notable exception to the general lack of empirical work on network structure and politics is Eubank et al. (2017)'s test of the social context theory of turnout using new data from Uganda.

Most large-scale empirical studies of social structure focus on related concepts such as diversity[6] or social capital.[7] At the same time, because there are many social factors that encompass a broad range of interactions, it is difficult to establish the precise mechanisms behind the previously observed relationships in the literature between features of the social network structure and outcomes for politics and public goods provision.

_____

provision. See, for example, Gottlieb and Kosec (2017).

[6]An extensive literature has reported both negative effects of ethnic and linguistic fractionalization on public goods provision (Alesina, Baqir and Easterly, 1999; Easterly and Levine, 1997; Miguel and Gugerty, 2005). An emerging literature has also raised important concerns, such as: (i) conflating ethnolinguistic diversity with factors such as the share of disadvantaged groups (Kustov and Pardelli, 2018) or regional differences within countries (Soifer, 2016), (ii) accounting for whether the political regime is semi-democratic or authoritarian (Gao, 2016).

[7]See, e.g. Atkinson and Fowler (2014) on social capital and turnout.

In general, the existing literature is based on the notion that social structures are expected to affect the spread of information among voters, the ability to engage in collection action, and the aggregation of preferences. However, collective action problems may be less relevant in contexts in which politicians are responsible for providing public goods that are funded with transfers from the central government (rather than with citizen contributions). We make a theoretical and empirical contribution to the existing literature in two main ways: First, by focusing on an ethnically homogenous context, we can use a more general measure of social structure than ethnic diversity. Clans and extended families play an important political role in other parts of the world (see, for example, Acemoglu, Reed and Robinson (2014) for the case of Sierra Leone), and the importance of trust and reciprocity for coordinating group voting behavior has also been widely documented in other settings (see, for example, Finan and Schechter (2012) for the case of Paraguay). Second, we propose and test an alternative channel through which social structure may impact public goods provision: elite capture and political competition.

There are several reasons why social cohesion may trigger less public goods provision. First, when members in a society are concentrated in a relatively small number of politically relevant groups, leaders of larger groups have high bargaining power and can demand private, targeted, excludable transfers in exchange for the electoral support of its members. As a consequence political influence becomes more concentrated. By political influence, we refer to social persuasion and the ability to broker political exchange at the community level. This is especially important in contexts where voters engage with politicians through brokers and rely on information from friends, family, and neighbors in order to make political decisions.[8]

In turn, the concentration of political influence leads to a less competitive electoral context. In other words, social concentration increases the likelihood of elite capture which can potentially undermine politicians' incentives to provide public goods (Anderson, Francois and Kotwal, 2015). Reinforcing this channel, social fractionalization also increases the agency and transaction costs for politicians of engaging in the clientelistic exchange of private transfers for votes. Consider a

---

[8]The importance of local political influence is not limited to the developing world. For example, Katz and Lazarsfeld (1955) show that individuals were most influenced by peers of similar social status. Similarly, research from surveys in the United States identify discussion networks (Huckfeldt and Sprague, 1991) and social cohesion (Huckfeldt et al., 1995) as important factors for the transmission of political information to citizens.

society in which a large share of citizens belong to handful of groups; in this case politicians can secure a large number of votes by brokering deals with the leaders of a small number of groups, that they can also more easily monitor. As the number of groups becomes larger (and each group becomes smaller), this strategy becomes less attractive. Following Lizzeri and Persico (2004), as society becomes more fragmented, the incentives for politicians to provide policies with diffuse (as opposed to targeted and excludable) benefits increases which can encourage the provision of public goods. In the next section we illustrate some of these ideas in the Philippine context.

2.1 Clans and Elections in the Philippines

Local democracy in the Philippines is vibrant and highly relevant for studies of public service delivery. The country is divided into roughly 1,600 cities and municipalities which are themselves divided into over 42,000 *barangays* (villages). The 1991 Local Government Code devolved significant responsibilities for the delivery of a number of social services to municipalities, including primary health care programs, repair and maintenance of local infrastructure, and provision of agricultural, fishery, mines, and geoscience services. (Llanto, 2012). Municipalities are expected to finance these services through yearly transfers from the central government, known as the Internal Revenue Allotment (IRA), which are based on municipal population and land area (Llanto, 2012). While municipalities can also raise their own revenues through local taxes and business fees, the IRA provides 85 percent of their budgets on average (Troland, 2014).

Municipalities are governed by a mayor, a vice-mayor and eight municipal councilors.[9] All municipal officials are elected in first-past-the-post elections organized, by law, at fixed intervals of three years. Political parties tend to be weak and unstable, and there are typically large shifts in party affiliations after each election (Hutchcroft and Rocamora, 2003; Mendoza, Cruz and Yap, 2014). The mayor, as the chief executive of the municipal government, enjoys significant discretionary powers. Previous research has highlighted their often-excessive control over local policies and affairs, referring to them as "budget dictators" (Hutchcroft, 2012; Capuno, 2012). The average municipality only spends 90 percent of its budget every year, so mayors are expected to be able to determine how funds are spent in the short run.

_____

[9]Cities follow a similar pattern, but the number of councilors is determined by population.

7

Mayors must often decide how to allocate the budget across the different barangays that compose the municipality. Every three years each barangay also elects a barangay captain (village head) and a barangay council. These are responsible for the maintenance of public goods and assisting the mayor with the implementation of several municipal programs.

The nature of political competition revolves around family alliances (Lande, 1964; Hutchcroft and Rocamora, 2003) and it is characterized by strong clientelistic practices (Hutchcroft and Rocamora, 2003; Mendoza et al., 2016). As a result, electoral strategies tend to focus on contingent political exchange–which refers to the exchange of a wide range of clientelistic goods and services including jobs/patronage (Lande, 1964), money/vote buying (Cruz, 2018; Khemani, 2015), and other private goods and services.

Politicians competing in municipal and barangay elections must often seek the support of clans (extended families). Fegan (2009) argues that families are key political actors because their reputation, loyalties, and alliances are transferable from members who die or retire to the younger generations. Corpuz (1965, p 83) also makes reference to the importance of norms of behavior within families: "behavior in the family is regulated by ethics and norms that are unwritten and informal, depending for their effectiveness upon internalized sanctions." In particular, one feature of Filipino culture is the concept of *utang na loob* (literally, "inner debt"), which refers to a debt of gratitude that fosters reciprocity and feelings of social obligation. These norms of loyalty and reciprocity often extend beyond immediate relatives. As stated by Hollnsteiner (1963), "keeping with the highly familistic orientation of Philippine society whereby an individual represents his family, *utang na loob* is not limited to an individual-to-individual relationship but is rather seen as operative from family to family" (p.79).

An implication of this is that politicians can often secure a large number of votes by brokering deals with the heads of clans who can commit to deliver the votes of all clan members in exchange for access to private transfers and services including money, jobs, medical, educational and funeral expenses for family members, construction materials, preferential access to government programs and business and building permits, amongst others (Fafchamps and Labonne, 2017*a*,*b*). These private transfers often come at the expense of the provision of public goods that would benefit all village residents equally. Barangay captains and councilors often operate as brokers between municipal candidates and local clans and must monitor that clans vote as promised and that

resources flow to the families. The way in which both vertical and horizontal social norms of reciprocity enable these transactions is described in great detail by Hollnsteiner (1963) in her ethnography of one Filipino municipality:

> *The ease with which the elite politician can communicate with his lower-level segment proves invaluable when election time comes (...) Once the political elites choose their respective candidates they begin making contact with all their lower status allies. Any favors which these elites have done for the allies now pay off as the latter cannot refuse to vote for this person to whom they feel a strong debt of gratitude... Not only that, the lower status person seeking to discharge his utang na loob will pledge to get his segment to vote as he will. His success will depend to some extent on his abilities as salesman, but certainly also on the number of relatives, compadres, friends and utang na loob debtors he has in the town (...) An efficient political system, in the view of Hulo residents, chiefly involves the management of the downward flow of patronage from local leaders to the people and reciprocal flow of support from people to leaders. The system is realized through a network of vertical and horizontal alliances...* (pp. 91, 110)

Importantly, the extent to which villages are highly fragmented influences the electoral strategies of politicians. In villages in which the population is concentrated, clientelistic transactions between politicians and clan heads become more likely. On the one hand, the bargaining power of each individual clan head increases as they can deliver the votes of a relatively large number of village residents. On the other hand, candidates also favor these strategies since the concentration of voters in a relatively small number of clans decrease the transaction and monitoring costs involved in the distribution of private transfers. Similarly, in villages where voters are concentrated in fewer clans, we expect to observe a concentration of political influence in a small set of individuals. Thus, in villages with low levels of clan fractionalization we expect to observe lower public goods provision and weaker political competition.

On the other hand, in highly fragmented villages the provision of targeted transfers becomes relatively less attractive as clan leaders control relatively small numbers of voters and enforcing several individual transactions becomes infeasible. In highly fragmented villages, politicians may thus opt for adopting policies with more diffuse benefits and provide more public goods in order to attract the electoral support of a large number of voters. Consequentially, political influence

9

should be more broadly distributed and political competition should be more intense in these highly fragmented villages.

The importance of a village's social structure for electoral and distributive strategies is nicely summed up by Hollnsteiner (1963): *"The campaign (...) is the culmination of a contest to see who makes best use of the social structure."* *(p. 86).*

3 Identifying Clans and Measuring fractionalization

3.1 Clans and Communities

An empirical challenge in our context is characterizing the social structure in every village, given that the basic unit of political organization in the Philippines are families, which are themselves organized into extended families or clans. Key to our analysis is determining the number of politically relevant clans in each village. Theoretically, for our purposes a clan is a set of families: i) connected to each other by marriage and ii) where mutual norms of cooperation and reciprocity are enforced by all its members. In other words, they are the set of individuals who would agree to vote for the politician that provides patronage or transfers to one of the clan members (most likely, the clan's leader). While individuals in the Philippines can easily provide us with this information, absent detailed village-level surveys it is very hard to collect this data at a large scale. We propose to use social network analysis to address this issue, by identifying cohesive groups of families in the network. Cohesive groups are those with many ties within the group and relatively fewer ties to other groups.

Consider a social network in which a node is a family (identified with a unique family name) and edges between nodes imply that a marriage has occurred between members of these families. An example is illustrated in panel a) of Figure 1 that shows a network with 15 different families. This network features three *components*, that is, groups within which nodes are path-connected, but disconnected from other sets of nodes in the network (Jackson, 2010). One intuitive approach would be to identify each different clan with the different components in the marriage network. This approach, while appealing, can be quite restrictive in practice since family networks in real life (and in our Filipino context, in particular) rarely feature neatly distinct components as those illustrated in panel a).

By contrast, the slightly modified network in panel b) of Figure 1 differs only from panel a) in that we have added two additional edges (represented by dashed lines): one between families A and K and another one between families I and M. The three distinct sets of nodes are still apparent, but this modified network has only one component (the full network). Thus, an approach based on components would identify only one clan in this network and all individuals would belong to that clan. An alternative that considers both the distinct sets of nodes but also the additional links among them is the concept of *communities*. In a social network, communities are groups of nodes with dense connections internally (i.e. within the group) and sparser connections between groups (Jackson, 2010). Intuitively, the social network in panel b) has three different communities even though it has only one component.

Our approach is thus to associate different clans with the different communities detected in the social networks. At the same time, the community structure in a network is a latent feature that needs to be uncovered; there are several potential ways to partition a network's nodes into separate groups.
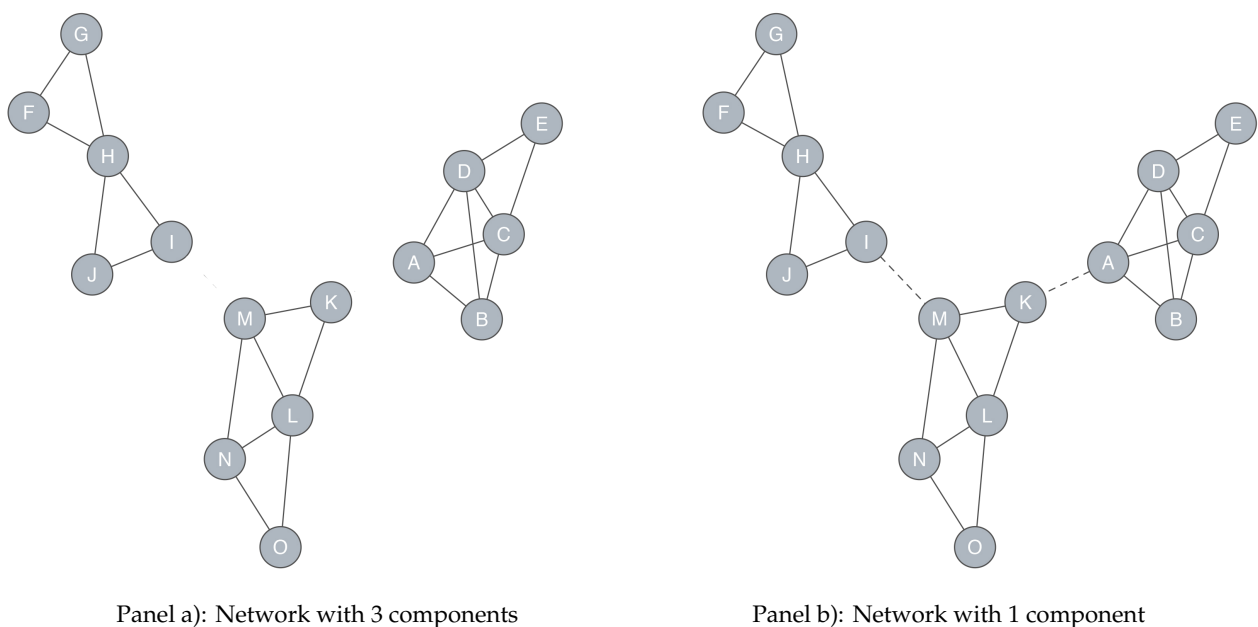

Panel a): Network with 3 components   Panel b): Network with 1 component

Figure 1: Sample marriage networks. Nodes represent families and edges indicate a marriage between those families

3.2 Community Detection

One approach to uncovering a community structure in social networks is based on edge removal. The intuition is as follows: if two groups of nodes are only loosely connected with each other, then removing the edges between those two groups will generate components in the restricted network. Communities correspond to those components in the restricted network. The networks in Figure 1 can be used to illustrate this approach. The two dashed edges in panel b) loosely connect groups of nodes that are densely connected with each other. Removing those two edges will yield a restricted network like the one illustrated in panel a) with three different components.

Approaches based on edge removal differ in terms of the selection rule regarding which edges to remove. We follow an algorithm proposed by Girvan and Newman (2002) that consists in the sequential removal of edges with high *betweenness centrality*. This centrality measure captures the extent to which the edge serves as a link between different groups. It is calculated using the number of shortest paths between nodes in the network that pass through that edge (Freeman, 1977).[10] For example, the dashed edge between nodes J and E in Figure 2 has the highest betweenness centrality in that network. Similarly, the dashed edges in panel b) of Figure 1 have a high betweenness centrality.
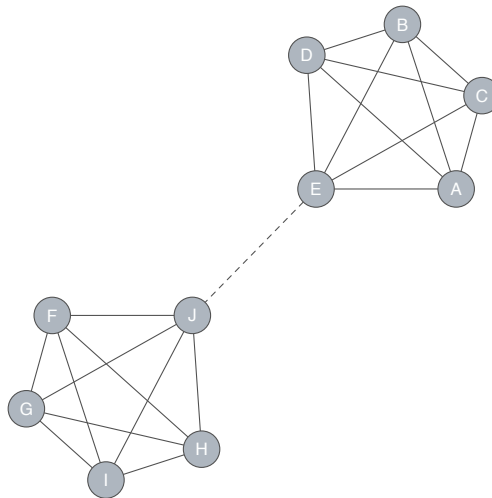

Figure 2: Edge with High Betweenness Centrality

---

[10]For more information on calculating betweenness centrality, please refer to Appendix A.

The Girvan-Newman algorithm proceeds as follows:

1. Calculate the betweenness for all edges in the network

2. Remove the edge with the highest betweenness

3. Recalculate betweenness for all edges affected by the removal

4. Repeat from step 2 until no edges remain

5. From resulting dendrogram, select the partition that maximizes network modularity

3.3 Measuring fractionalization

The algorithm delivers a partition of C communities (indexed by $c = 1, \ldots, C$), each containing a share s_c of nodes. We then use this to compute our main independent variable, the measure of social fractionalization (*SF*), using a standard Herfindahl-Hirschman index:

$$SF = 1 - \sum_{c=1}^{C} s_c^2$$

The measure can be interpreted as the probability that two randomly selected families are from the different clans. We use this approach because we are interested in accounting for both the overall configuration of clans in the village, as well as differences in relative size or strength among clans.[11]

While in our baseline analysis we focus on communities identified by the Girvan-Newman algorithm, for robustness we also implement the *walktrap* algorithm developed by Pons and Latapy (2005). Intuitively, the algorithm relies on the idea that random walks on a graph tend to get "trapped" into densely connected parts corresponding to communities. The algorithm thus generates a large number of random walks and groups together nodes that are tied together through those walks. See Pons and Latapy (2005) for more details.

---

[11]By contrast, other measures of social structure tend to focus on one or the other: for example, connectedness is measured by density measures, while variance in connectedness among actors is measured using centralization measures (essentially the distribution of centrality in the network).

4 Data

In this section we present our various data sources and describe our main dependent and independent variables.

4.1 Family networks

Our main independent variable is the extent to which a village's population is fragmented into several clans. To do this we identify network communities and use them as proxies for clans in the family network of the village. To construct the family networks, we use data collected for the National Household Targeting System for Poverty Reduction (NHTS-PR). The large-scale household-survey, implemented between 2008 and 2010, reports several socio-economic characteristics of the household as well as the gender, age, educational attainment and occupational category of every household member. We have access to the full dataset but focus on the 709 municipalities where full enumeration took place.[12] This leaves us with information on 20 million individuals in about 15,000 barangays in 709 municipalities. Importantly, we secured access to the non-anonymized version of the dataset and have two family names (the middle and last name) for every individual.[13]

We are able to measure large scale family networks in the Philippines due to naming conventions with three convenient features: (i) within a municipality, a shared family name implies family connections; (ii) each individual carries two family names, which establishes that a marriage took place between members of those two families; (iii) names are difficult to change.[14]

More concretely, family names in the Philippines have the following structure:

firstname midname lastname

where *firstname* corresponds to the individual's given first name, *midname* corresponds to the mother's maiden name (for men and single women) or the father's family name (for married

---

[12]In the remaining municipalities, only households in so-called *pockets of poverty* were interviewed.

[13]Fernandez (2012) describes the data in more detail.

[14]There are strict legal constraints on name changes in the Philippines which reduce concerns about strategic name changes.

women) and *lastname* corresponds to the father's family name (for men and single women) or the husband's family name (for married women).

The naming structure and distribution of family names in the Philippines can be traced back to the 19th century. In 1849, concerned with the arbitrary way in which Filipinos chose their surnames and the implications for tax collection, Governor Narciso Claveria y Zaldua created a catalog with a list of 61,000 different surnames. Municipal officials throughout the country then assigned a different name to each family. Since then, names have been transmitted through generations according to well-established and enforced naming conventions. As a consequence very common family names are not as prevalent in the Philippines as in other countries and thus, sharing a family name is very strongly correlated with an actual family tie. This is especially the case within municipalities and villages.

Given the full names of all individuals in an area, we are able to reconstruct all of the ties (edges) in the family network by examining the joint occurrences of middle and last names.[15] As noted above, each individual maintains two family names: their father's name and either their mother's maiden name or their husband's name, in the case of married women. Thus each individual's set of family names indicates an intermarriage between the two families–either in their generation (in the case of married women) or their parents' generation (in the case of men and single women). As a result, we are able to observe ties between families merely by the occurrence of the names within an individual.

For example, Figure 3 below depicts the family network that can be drawn from a list of relatives of the previous Philippine President, Benigno Cojuangco Aquino. His middle name is his mother's maiden name, Cojuangco, and his last name is his father's last name, Aquino, implying a marriage tie between the Cojuangco and Aquino families. Similarly, we can show ties between the Aquino, Abellada, and Aguirre families through the names of his sister Aurora Aquino Abellada and cousin Bam Aguirre Aquino. On the Cojuangco side, we can show ties to the Sumulong and Teodoro families through the names of his cousin Gilberto Cojuangco Teodoro and uncle Jose Sumulong Cojuangco, as well as an indirect tie to the Prieto family through Gilberto's wife Monica Prieto Teodoro.

---

[15] A similar method is used by Cruz, Labonne and Querubin (2017), Haim (2018) and Rubin (2018).
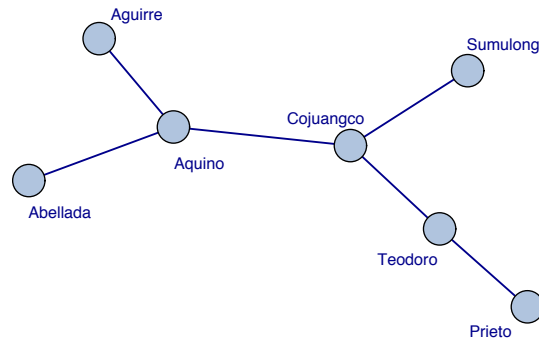
Figure 3: Family network for selected members of former President Aquino's family.

Once the networks are constructed, we implement the Girvan-Newman algorithm and as discussed in Section 3, we then compute our main independent variable, the measure of social fractionalization (*SF*).

4.2 Outcome Variables

4.2.1 Public Goods

For our main outcome, we use data from the 2010 population census that lists the public goods available in every barangay. We use this to code dummies for whether the barangay has an elementary school, a high school, a public market, a health center or a community water system.

4.2.2 Political Competition

To examine the correlation between social fractionalization and political competition we use electoral outcomes from the 2010 municipal elections and the 2010 and 2013 barangay elections collected from the Commission of Elections (COMELEC) website. For municipal elections, we have precinct-level data on the number of registered voters, the number of individuals who voted and the number of votes received by each mayoral candidate. For barangay-level elections, we have precinct-level data on the votes obtained by every candidate for barangay head (*punong barangay*) and for the barangay council (*barangay kagawad*). We combine this information with data from the Project of Precincts to match each precinct to a specific village (in the Philippines there is at least one precinct per village).

Our main variables to measure political competition are the win margin (vote share of the candidates that received the most votes in that precinct minus vote share of the runner-up in that precinct) and the number of candidates running in the race. We also use the indices of effective number of candidates, proposed by Laakso and Taagepera (1979) and Golosov (2010).[16]

To capture the effects on non-electoral political competition - the concentration of political influence - we use data from from a survey conducted shortly after the 2013 local elections. The survey covers 3,408 households in 284 villages in 12 municipalities in the provinces of Ilocos Norte and Ilocos Sur. Respondents were asked to "name five individuals living in the barangay, but not living in your household, whose opinions you respect the most when it comes to politics." This allows us to test whether social fractionalization affects the overall number of influential leaders that villagers mention in their responses.

4.2.3 Other Outcomes

We also use the 2013 survey to examine the extent to which social fractionalization is correlated with heterogeneity in preferences over public goods and collective action. Previous studies have found these variables to be important channels to understand the effect of ethnic and religious fractionalization on public goods provision.

More specifically respondents were asked about their preferred allocation of the municipality's Local Development Fund (LDF) across 10 different sectors.[17] As a measure of heterogeneity in preferences, we simply take the standard deviation in respondents preferred allocation for each budget item.

To measure social capital and collective action we simply use dummy variables for whether

---

[16]The Laakso and Taagepera (1979) index is given by $N = 1/\sum_{i=1}^{n} s_i^2$, where n is the number of candidates and s_i is the share of votes of candidate i. The index by Golosov (2010) is defined as $N = \sum_{i=1}^{n} s_i/(s_i + s_1^2 - s_i^2)$, where s_1 is the vote share of the candidate with the largest number of votes.

[17]Every year, each municipality receives transfers from the central government and mayors are encouraged to allocate 20 percent of the transfers to development projects. The 10 sectors on which we have data are: public health services, public education services, cash or in-kind transfers (such as loans or job assistance), water and sanitation services, road construction and rehabilitation, construction of community facilities (such as multipurpose halls or basketball courts), business loans and other private economic development programs, agricultural assistance and irrigation systems, peace and security and community events and festivals.

the household participated in any formal group (such as unions, farmer's or other professional associations, community development associations, micro finance groups and cooperatives) or in communal voluntary work activities (known locally as *bayanihan*) and average those over all village respondents.

5 Empirical Analysis and Results

Our main analysis consists of village-level cross-sectional regressions between public goods and political competition outcomes and our index of social fractionalization. More concretely, we estimate OLS regressions of the form:

$$y_{vm} = \alpha + \beta SF_{vm} + \gamma X_{vm} + \delta_m + \epsilon_{vm} \tag{1}$$

where y_{vm} is the outcome variable in village v in municipality m (public goods provision and political competition), SF_{vm} is our measure of social fractionalization, X_{vm} corresponds to a full set of village covariates and δ_m is a full set of municipality fixed-effects. Standard errors are clustered at the municipality level.

The inclusion of municipality fixed effects is important in this context since they allow us to absorb all municipality-specific characteristics that may be correlated with both social fractionalization and our different outcome variables. Moreover, we are interested in how mayors adjust their electoral and distributive strategies across the different villages in their municipality as a function of the level of social fractionalization. Thus, we are interested in exploiting within-municipality variation. For ease of interpretation, in all regressions we include a standardized version (mean zero, standard deviation one) of the social fractionalization index.

5.1 Public Goods

We begin by looking at the simple correlation between social fractionalization and indicator functions for the presence of different public goods in the village. Estimates of β are reported in Panel A of Table 1. The coefficients reveal a positive and statistically significant correlation between social fractionalization and public goods provision. For example a one-standard deviation increase in

social fractionalization is associated with an increase in 8 percentage points in the likelihood of having a secondary school in the village, and a 6 percentage point increase in the likelihood of having a public market or a health center in the village. Some of these estimates are sizable; relative to the mean they correspond to an increase of 40% for high schools and 30% for public markets.

However, these coefficients must be interpreted very cautiously since social fractionalization is not randomly assigned across villages. While municipality fixed effects account for municipal-level confounders, omitted variable bias remains a concern since other village characteristics may be correlated with social fractionalization and public goods provision. For example, it is possible that larger, heavily populated, urban villages feature more social fractionalization and are also more likely to have public goods located in them. It may also be the case that wealthier villages feature greater fractionalization and can use their resources to secure more public goods from politicians. Finally, reverse causality may also be a concern: there may be higher migration into villages with a larger supply of public goods, and new migrants may generate more social fractionalization (i.e. more disperse marriage networks).

To deal with this concern, we follow two approaches. First, we control for a wide range of village characteristics. To deal with potential demographic confounders we include average age, gender ratio, village population, and the number of distinct families in the village. We also include average length of stay in the village which may account for differential migration patterns. To control for economic characteristics of the village we control for a dummy indicating whether the village is classified as rural, as well as population in each of 17 educational and 11 occupational categories, average per capita income and poverty incidence. The estimates of β once we include this set of controls are reported in Panel B of Table 1. The point estimates become smaller but remain statistically significant at conventional levels.

Table 1: Network fractionalization and Public Goods Provision

	(1) Elem. School	(2) High School	(3) Market	(4) Health Center	(5) Waterworks
Panel A: No Controls					
fractionalization	0.01**	0.08***	0.06***	0.06***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	15,449	15,449	15,449	15,449	15,449
R-squared	0.001	0.027	0.020	0.014	0.010
Mean Dep. Var.	0.806	0.209	0.190	0.639	0.597
Panel B: Full Controls					
fractionalization	0.03***	0.02***	0.02***	0.03***	0.02***
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
Observations	15,432	15,432	15,432	15,432	15,432
R-squared	0.075	0.172	0.139	0.049	0.037
Mean Dep. Var.	0.806	0.209	0.190	0.639	0.597

Notes: Results from village-level regressions with municipal fixed-effects. The dependent variable is a dummy equal to one if there is an elementary school in the village (Column 1), an high school in the village (Column 2), a market in the village (Column 3), an health center in the village (Column 4) and a waterworks system in the village (Column 5). In Panel B regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence. Standard errors (in parentheses) are clustered by municipality. * $p < .10$, ** $p < 0.05$, *** $p < .01$.

Our second approach to address concerns of endogeneity and reverse causality is to construct networks based on individuals aged 45 or older. These networks would mostly reflect marriage decisions made prior to when public goods are observed (i.e. a generation earlier) and thus the social fractionalization measures based on these networks are less likely to reflect reverse causality. In Panel A of Table 2 we report reduced form estimates of equation (1) but using the social fractionalization index from the network restricted to those 45 and older (i.e. regressing public good outcomes on the "lagged" social fractionalization index). In Panel B of Table 2 we instead use the social fractionalization index in the restricted network as an instrument for social fractionalization in the full network and report 2SLS estimates of β. In both panels we include the full set of village controls. The point estimates are all positive and statistically significant and slightly larger than the OLS estimates.

Table 2: Fractionalization on over 45 Networks and Public Goods Provision

	(1) Elem. School	(2) High School	(3) Market	(4) Health Center	(5) Waterworks
Panel A: OLS					
fractionalization (over 45)	0.03***	0.02***	0.02***	0.04***	0.02***
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
Observations	15,428	15,428	15,428	15,428	15,428
R-squared	0.078	0.173	0.139	0.052	0.036
Mean Dep. Var.	0.806	0.209	0.190	0.641	0.599
Panel B: IV					
fractionalization	0.06***	0.04***	0.03***	0.08***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	15,428	15,428	15,428	15,428	15,428
Mean Dep. Var.	0.806	0.209	0.190	0.641	0.599

Notes: Results from village-level regressions with municipal fixed-effects. The dependent variable is a dummy equal to one if there is an elementary school in the village (Column 1), an high school in the village (Column 2), a market in the village (Column 3), an health center in the village (Column 4) and a waterworks system in the village (Column 5). Regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence. Standard errors (in parentheses) are clustered by municipality. * $p < .10$, ** $p < 0.05$, *** $p < .01$.

In the Online Appendix we report several additional robustness tests (we include the full set of village covariates in all of them). We show that our estimates are similar when we construct social fractionalization indices based on a network in which edges are weighted by family size (Panel A, Table A.1) or if we use the share of voters (rather than the share of families) belonging to each community when computing the social fractionalization index (Panel B, Table A.1). Our estimates are also similar when we instead use the *walktrap* algorithm to identify the set of communities (clans) in every village (Panel C, Table A.1). This is reassuring and suggests our estimates do not depend on our particular choice of community detection algorithm. In Table A.2 we show that our estimates are also robust to: dropping urban areas (Panel A), dropping the village where the largest number of relatives the incumbent mayor reside (Panel B) and dropping municipalities in the Autonomous Region of Muslim Mindanao (ARMM), a majority muslim region and one of the poorest in the country, and where shared family names may be less likely to represent actual family ties (Panel C). Finally in Table A.3 we show that our estimates remain relatively unchanged

when we control for characteristics of the incumbent and the challengers' families in the village.[18] This addresses the concern that more fragmented villages are more likely to house immediate relatives of politicians and this is what drives the higher provision of public goods. In Panel C of Table A.3 we show that our estimates remain stable once we control for Herfindahl indices that capture fractionalization across ethnicity, religious affiliation and educational attainment and a Gini coefficient that measures economic (income) inequality in the village.

In sum, our results suggest that public goods provision is positively correlated with social fractionalization. This contrasts with the findings of the literature on ethnic and religious fractionalization that documents a negative correlation between public goods provision and fractionalization. As mentioned earlier, a key difference in our setting is that politicians and not communities are responsible for providing public goods. Moreover, cleavages or fractionalization across clans (as opposed to across ethnic or religious groups) may not have the same implications on preference heterogeneity and collective action documented by previous studies. We explore this directly in Tables 3 and 4 where we show respectively that: i) fragmented villages do not exhibit more heterogenous preferences over 10 different public goods categories, as measured by the standard deviation of respondent's average desired budget share on each item; ii) social fractionalization is not robustly correlated with collective action as measured by participation in voluntary work (*bayanihan*) or membership in groups and civil associations.[19]

---

[18]These include the politician's number of relatives, number of females relatives, number of relatives in each education/occupation category and eigenvector centrality of the family.

[19]The municipalities in which we conducted our surveys are not part of the NHTS-PR sample. Thus, to generate social networks we rely on the lists (family names) of registered voters in every village. However, network statistics based on NHTS-PR yield relatively similar results to those based on registered voter lists.

Table 3: Network fractionalization and Preferences over Public Goods

	(1) Health	(2) Education	(3) Emergencies	(4) Water	(5) Road	(6) ComFaci	(7) EconProg	(8) Agriculture	(9) Peace	(10) Festivals
Panel A: No Controls										
fractionalization	-0.05	-0.29	-0.21	-0.50**	-0.00	0.15*	0.19	-0.33	-0.14	-0.04
	(0.53)	(0.35)	(0.30)	(0.22)	(0.25)	(0.07)	(0.32)	(0.30)	(0.13)	(0.10)
Observations	283	283	283	283	283	283	283	283	283	283
R-squared	0.000	0.002	0.002	0.020	0.000	0.005	0.001	0.002	0.004	0.000
Mean Dep. Var.	11.19	11.19	8.285	7.425	6.836	5.526	7.798	15.14	5.855	4.064
Panel B: Full Controls										
fractionalization	0.05	-0.20	-0.09	-0.51**	-0.03	0.12	0.28	-0.29	-0.12	-0.03
	(0.51)	(0.35)	(0.30)	(0.22)	(0.27)	(0.07)	(0.29)	(0.32)	(0.11)	(0.09)
Observations	283	283	283	283	283	283	283	283	283	283
R-squared	0.082	0.066	0.118	0.057	0.023	0.043	0.065	0.071	0.049	0.011
Mean Dep. Var.	11.19	11.19	8.285	7.425	6.836	5.526	7.798	15.14	5.855	4.064

Notes: Results from villages regressions with municipal fixed-effects. The dependent variable is the standard deviation in the budget share that voters in the village would like to spend on Health (Column 1), Education (Column 2), Emergencies (Column 3), Water (Column 4), Roads (Column 5), Community Facilities (Column 6), Business Loans (Column 7), Agriculture (Column 7), Security (Column 8), and Community Events/Festivals (Column 10). In Panel B regressions control for village population, whether the village received the PPCRV experiment, is classified as rural, average education, age, household size, and length of residence, as well as the share of population that is female, receives remittances from abroad, and benefits from a CCT program. Standard errors (in parentheses) are clustered by municipality. * p < .10, ** p < 0.05, *** p < .01.

23

Table 4: Network fractionalization and Collective Action

	(1)	(2)	(3)	(4)
	Bayanihan		Group	
fractionalization	0.09*	0.08	-0.05	-0.05
	(0.05)	(0.05)	(0.04)	(0.05)
Controls	No	Yes	No	Yes
Observations	283	283	283	283
R-squared	0.008	0.092	0.002	0.128
Mean Dep. Var.	0.751	0.751	0.658	0.658

Notes: Results from villages regressions with municipal fixed-effects. The dependent variable is the share of the village population that participates in voluntary work (Columns 1-2) and the share of the village population that is a member of a formal group (Columns 3-4). In Columns 2 and 4, regressions control for village population, whether the village received the PPCRV experiment, is classified as rural, average education, age, household size, and length of residence, as well as the share of population that is female, receives remittances from abroad, and benefits from a CCT program. Standard errors (in parentheses) are clustered by municipality. * $p < .10$, ** $p < 0.05$, *** $p < .01$.

5.2 Political Competition

We hypothesize that in a context in which public service delivery is the responsibility of elected politicians, social fractionalization across clans may trigger greater political competition and shift politicians towards the provision of public (as opposed to private) goods. In this section we explore this possibility by estimating regression (1) but using different measures of political competition as outcomes. In Table 5 we first report the correlation between social fractionalization and political competition in barangay elections. Social fractionalization is positively correlated with the raw and effective number of candidates running for barangay captain (columns 1-3) and for the barangay council (column 5). For example, a one standard deviation increase in social fractionalization is associated with roughly an additional candidate in the barangay council elections. Also, social fractionalization is positively correlated with more competitive races as measured by the win margin between the winner and runner-up in barangay captain elections (column 4). A one-standard deviation increase in social fractionalization is associated with a decrease in the win margin of almost 2 percentage points, an effect of almost 5% relative to the sample mean. The point estimates are remarkably stable to controlling for the same set of village covariates included in the public goods regressions (Panel B, Table 5) or to reduced form or instrumental variables regressions based on the network of individuals older than 45 (Table 6). In Tables A.4-A.6 we also report the

24

same set of robustness checks conducted on the public goods estimates in the previous section.

Table 5: Network fractionalization and Competition in Barangay Elections

	(1)	(2)	(3)	(4)	(5)
	# Candidates Bgy. Cpt.			Win	# Candidates
	Raw	Laakso	Golosov	Margin	Bgy. Councilors
Panel A: No Controls					
fractionalization	0.06***	0.04***	0.03***	-1.73***	0.72***
	(0.01)	(0.01)	(0.00)	(0.28)	(0.09)
Observations	31,344	30,985	31,344	30,593	31,344
R-squared	0.004	0.003	0.002	0.002	0.012
Mean Dep. Var.	2.175	1.875	1.667	36.89	16.84
Panel B: Full Controls					
fractionalization	0.05***	0.04***	0.03***	-1.68***	0.59***
	(0.01)	(0.01)	(0.01)	(0.32)	(0.08)
Observations	31,306	30,947	31,306	30,555	31,306
R-squared	0.012	0.009	0.008	0.007	0.054
Mean Dep. Var.	2.175	1.875	1.667	36.89	16.84

Notes: Results from village elections regressions with municipal*election-year fixed-effects. The dependent variable is the number of candidates for barangay captain (Column 1), the effective number of candidates for barangay captain computed as Laakso (Column 2), the effective number of candidates for barangay captain computed as Golosov (Column 3), the win margin in the barangay captain election (Column 4) and the number of candidates for barangay councilor (Column 5). In Panel B regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence. Standard errors (in parentheses) are clustered by municipality. * p < .10, ** p < 0.05, *** p < .01.

Table 6: fractionalization on over 45 Networks and Competition in Barangay Elections

	(1)	(2)	(3)	(4)	(5)
	# Candidates Bgy. Cpt.			Win	# Candidates
	Raw	Laakso	Golosov	Margin	Bgy. Councilors
Panel A: OLS					
fractionalization (over 45)	0.06***	0.04***	0.03***	-1.74***	0.67***
	(0.01)	(0.01)	(0.01)	(0.36)	(0.09)
Observations	31,298	30,939	31,298	30,544	31,298
R-squared	0.014	0.010	0.009	0.007	0.067
Mean Dep. Var.	2.175	1.875	1.667	36.88	16.84
Panel B: IV					
fractionalization	0.10***	0.07***	0.06***	-2.89***	1.13***
	(0.01)	(0.01)	(0.01)	(0.55)	(0.12)
Observations	31,298	30,939	31,298	30,544	31,298
Mean Dep. Var.	2.175	1.875	1.667	36.88	16.84

Notes: Results from village elections regressions with municipal*election-year fixed-effects. The dependent variable is the number of candidates for barangay captain (Column 1), the effective number of candidates for barangay captain computed as Laakso (Column 2), the effective number of candidates for barangay captain computed as Golosov (Column 3), the win margin in the barangay captain election (Column 4) and the number of candidates for barangay councilor (Column 5). Regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence. Standard errors (in parentheses) are clustered by municipality. * $p < .10$, ** $p < 0.05$, *** $p < .01$.

Our underlying theory suggests that higher social fractionalization undermines the ability of a handful of individuals (for example, clan leaders) to exercise disproportionate influence on the political choices of village residents.For this reason, we also consider a non-electoral measure of political competition defined as the number of politically influential individuals mentioned by village respondents in our 2013 survey.[20] We can consider both the raw number of individuals nominated as well the effective number of nominees (where we take into account the number of nominations). The estimates reported in Table 7 suggest that political influence is less concentrated

---

[20]The surveys were pilot tested to ensure that the questions were capturing personalized political influence within communities and not national media or politicians. Indeed, respondents were overwhelmingly reporting their local village elected officials as politically influential, accounting for 47% of the responses. These village level officials often serve as brokers for higher level politicians during the elections. Consistent with the notion of social persuasion, the rest are personal connections of the respondent: family members and friends/neighbors are 20% and 29% of responses, respectively.

in highly fragmented villages: a one standard deviation increase in social fractionalization is associated with approximately one additional politically influential leader.

Table 7: Network fractionalization and Politically Influential Individuals

	(1)	(2)	(3)
	# Influential Individuals		
	Raw	Laakso	Golosov
Panel A: No Controls			
fractionalization	0.74***	0.47**	0.45**
	(0.24)	(0.16)	(0.15)
Observations	269	269	269
R-squared	0.017	0.014	0.014
Mean Dep. Var.	9.137	5.900	5.157
Panel B: Full Controls			
fractionalization	0.80**	0.54***	0.53***
	(0.27)	(0.16)	(0.14)
Observations	269	269	269
R-squared	0.054	0.073	0.075
Mean Dep. Var.	9.137	5.900	5.157

Notes: Results from villages regressions with municipal fixed-effects. The dependent variable is the number of individuals named as influential by survey respondents (Column 1), the effective number of individuals named as influential by survey respondents computed as Laakso (Column 2), the effective number of individuals named as influential by survey respondents computed as Golosov (Column 3).In Panel B regressions control for village population, whether the village received the PPCRV experiment, is classified as rural, average education, age, household size, and length of residence, as well as the share of population that is female, receives remittances from abroad, and benefits from a CCT program. Standard errors (in parentheses) are clustered by municipality. * $p < .10$, ** $p < 0.05$, *** $p < .01$.

Finally, we study how social fractionalization correlates with political competition in mayoral elections at the village level. In this case, we keep the number of candidates constant, allowing us to explore whether races in more fragmented villages are more competitive. The estimates reported in columns 1-2 of Table 8 are consistent with previous findings and suggest that mayoral races are more tightly contested in highly fragmented villages.

Unfortunately we do not have access to systematic measures of vote buying or private transfers across a wide number of villages in the Philippines. Our theory suggests that socially fragmented villages receive more public goods at the expense of private or clientelistic transfers to clan leaders. In fact, in the Philippines, Khemani (2015) reports a strong negative correlation between the extent of clientelism (proxied by vote buying) and public goods provision at the local level. However, a

very strong correlate of vote-buying or clientelism in the Philippines is turnout.[21] In villages with a high prevalence of clientelism, clan leaders deliver the votes of their clan members and this maps into particularly high turnout rates. Consistent with this, in columns 3-4 of Table 8 we show that a one standard deviation increase in social fractionalization is associated with a 1 percentage point decrease in turnout. While indirect, this evidence is consistent with lower clientelism in highly fragmented villages.

Table 8: Network fractionalization, Turnout and Win Margin in Municipal elections

	(1)	(2)	(3)	(4)
	Win Margin		Turnout	
fractionalization	-1.94***	-0.63*	-0.80***	-0.68***
	(0.35)	(0.33)	(0.14)	(0.15)
Controls	No	Yes	No	Yes
Observations	17,023	17,021	18,352	18,350
R-squared	0.006	0.021	0.004	0.016
Mean Dep. Var.	33.60	33.60	72.64	72.64

Notes: Results from precinct-level regressions with municipal fixed-effects. The dependent variable is win margin in the 2010 municipal elections (Columns 1-2) and turnout in the 2010 municipal elections (Columns 3-4). In Columns 2 and 4, regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence. Standard errors (in parentheses) are clustered by municipality. * $p < .10$, ** $p < 0.05$, *** $p < .01$.

6 Conclusion

Using a unique dataset and approach, we are able to execute the largest study of village social network structures than has been previously possible using traditional survey-based methods of collecting social network data. We find compelling evidence that network structures—specifically, the fractionalization of social networks—are associated with higher levels of electoral competition and greater incentives for politicians to provide public goods. Our paper is amongst the first to provide evidence of how local social structures can affect electoral competition and public goods provision across the developing world. These correlations should be interpreted cautiously; while we have attempted to account for several potential confounders of social fractionalization at the

---

[21]This is consistent with the theory of turnout buying put forward by Nichter (2008).

village level we cannot be confident that other unobserved village characteristics do not bias our estimates. This is a common limitation of network studies; absent a natural experiment it is hard to leverage random variation in network characteristics and thus endogeneity is always a concern. However, the correlations uncovered in this paper point to the importance of understanding how a community's social structure shapes elite capture, electoral competition and the incentives of politicians to provide public goods.

We highlight alternative ways in which social fractionalization across different groups (cleavages) relevant in many societies (such as clans) may have different economic and political consequences, depending on the institutional context that shapes the incentives for politicians and citizens to exert effort towards the provision of public goods. While fractionalization may indeed make it difficult for the community to act collectively, fractionalization is also associated with less concentration of political influence, making it more difficult for politicians to circumvent normal channels of political competition by mobilizing voters through elite capture.

References

Acemoglu, Daron, Tristan Reed and James Robinson. 2014. "Chiefs: Economic Development and Elite Control of Civil Society in Sierra Leone." *Journal of Political Economy* 122(2):319–368.

Alesina, Alberto and Paola Giuliano. 2013. Family Ties. In *Handbook of Economic Growth*, ed. Philippine Aghion and Steven Durlauf. North Holland.

Alesina, Alberto, Reza Baqir and William Easterly. 1999. "Public Goods and Ethnic Divisions." *The Quarterly Journal of Economics* 114(4):1243–1284.

Amorim-Neto, Octavio and Gary W. Cox. 1997. "Electoral Institutions, Cleavage Structures, and the Number of Parties." *American Journal of Political Science* 41(1):149–174.

Anderson, Siwan, Patrick Francois and Ashok Kotwal. 2015. "Clientelism in Indian Villages." *American Economic Review* 105(6):1780–1816.

Atkinson, Matthew D and Anthony Fowler. 2014. "Social capital and voter turnout: evidence from saint's day fiestas in Mexico." *British Journal of Political Science* 44(01):41–59.

Auyero, Javier. 2000. *Poor People's Politics: Peronist Survival Networks and the Legacy of Evita*. Duke University Press.

Bardhan, Pranab. 2002. "Decentralization and Governance in Development." *Journal of Economic Perspectives* 16(4).

Bardhan, Pranab and Dilip Mookherjee. 2006. "Decentralisation and Accountability in Infrastructure Delivery in Developing Countries." *The Economic Journal* 116(January):101–127.

Bertrand, Marianne and Antoinette Schoar. 2006. "The Role of Family in Family Firms." *Journal of Economic Perspectives* 20(2):73–96.
URL: *http://www.aeaweb.org/articles.php?doi=10.1257/jep.20.2.73*

Besley, Timothy and Robin Burgess. 2002. "The Political Economy of Government Responsiveness: Theory and Evidence from India*." *The Quarterly Journal of Economics* 117(4):1415–1451.
URL: *http://dx.doi.org/10.1162/003355302320935061*

Calvo, Ernesto and Maria Victoria Murillo. 2009. "Selecting Clients: Partisan Networks and Electoral Benefits of Targeted Distribution.".

Cantú, Francisco. Forthcoming. "Groceries for Votes: The Electoral Returns of Vote Buying." *Journal of Politics* .

Capuno, Joseph. 2012. "The PIPER Forum on 20 Years of Fiscal Decentralization: A Synthesis." *Philippine Review of Economics* 49(1):191–202.

Chandra, Kanchan. 2016. Democratic Dynasties: State, Party, and Family in Contemporary Indian Politics. In *Democratic Dynasties: State, Party, and Family in Contemporary Indian Politics*, ed. Kanchan Chandra. Cambridge University Press pp. 10–50.

Corpuz, Onofre D. 1965. *The Philippines*. Englewood Cliffs, New Jersey: Prentice-Hall.

Crost, Benjamin and Uma S. Kambhampati. 2010. "Political Market Characteristics and the Provision of Educational Infrastructure in North India." *World Development* 38(2):195 – 204. Formal and Informal Institutions and Development.
URL: *http://www.sciencedirect.com/science/article/pii/S0305750X09001879*

Cruz, Cesi. 2018. "Social Networks and the Targeting of Vote Buying." *Comparative Political Studies* 0(0):0010414018784062.
URL: *https://doi.org/10.1177/0010414018784062*

Cruz, Cesi, Julien Labonne and Pablo Querubin. 2017. "Politician Family Networks and Electoral Outcomes: Evidence from the Philippines." *American Economic Review* 107(10):3006–3037.

Dal Bo, Ernesto, Pedro Dal Bo and Jason Snyder. 2009. "Political Dynasties." *Review of Economic Studies* 76(1):115–142.

Desmet, Klaus, Ignacio Ortuño-Ortín and Shlomo Weber. 2017. "Peripheral diversity: transfers versus public goods." *Social Choice and Welfare* 49(3):787–823.

Easterly, William and Ross Levine. 1997. "Africa's Growth Tragedy: Policies and Ethnic Divisions*." *The Quarterly Journal of Economics* 112(4):1203–1250.
URL: *http://dx.doi.org/10.1162/003355300555466*

Eubank, Nicholas, Guy Grossman, Melina Platas and Jonathan Rodden. 2017. "Social Networks, Social Context, and Political Participation: Evidence from Uganda.".

Fafchamps, Marcel and Julien Labonne. 2017*a*. "Do Politicians' Relatives Get Better Jobs? Evidence from Municipal Elections in the Philippines." *Journal of Law, Economics & Organization* 33(2):268–300.

Fafchamps, Marcel and Julien Labonne. 2017*b*. "Family Networks and Distributive Politics." *University of Oxford, mimeo* .

Fegan, Brian. 2009. Entrepreneurs in Votes and Violence: Three Generations of a Peasant Political Family. In *An Anarchy of Families: State & Family in the Philippines*, ed. Alfred McCoy. Madison, WI: University of Wisconsin Press pp. 33–108.

Fernandez, Luisa. 2012. "Design and Implementation Features of the National Household Targeting System in the Philippines." *World Bank - Philippines Social Protection Note No 5* .

Finan, Frederico and Laura Schechter. 2012. "Vote Buying and Reciprocity." *Econometrica* 80(2):863–881.

Fowler, James H. 2005. Turnout in a Small World. In *Social Logic of Politics*, ed. Alan Zuckerman. Temple University Press.

Freeman, L.C. 1977. "A Set of Measures of Centrality Based on Betweenness." *Sociometry* 40:35–41.

Gao, Eleanor. 2016. "Tribal Mobilization, Fragmented Groups, and Public Goods Provision in Jordan." *Comparative Political Studies* 49(10):1372–1403.
URL: *https://doi.org/10.1177/0010414015621075*

Girvan, M. and M. E. J. Newman. 2002. "Community structure in social and biological networks." *Proceedings of the National Academy of Sciences* 99(12):7821–7826.
URL: *http://www.pnas.org/content/99/12/7821*

Golosov, Grigorii V. 2010. "The Effective Number of Parties: A New Approach." *Party Politics* 16:171–192.

Gottlieb, Jessica and Katrina Kosec. 2017. "When Political Competition Leads to Bad Outcomes: Evidence on the Role of Coordination Failure from a Developing Democracy." *Unpublished Manuscript* .

Habyarimana, James, Macartan Humphreys, Daniel N. Posner and Jeremy M. Weinstein. 2007. "Why Does Ethnic Diversity Undermine Public Goods Provision?" *American Political Science Review* 101(4):709?725.

Haim, Dotan. 2018. "Civilian Social Networks and Credible Counterinsurgency." *UCSD, mimeo* .

Hicken, Allen. 2011. "Clientelism." *Annual Review of Political Science* 14(1):289–310.

Hollnsteiner, Mary. 1963. *The Dynamics of Power in a Philippine Municipality*. University of the Philippines.

Huckfeldt, Robert and John Sprague. 1991. "Discussant Effects on Vote Choice: Intimacy, Structure, and Interdependence." *The Journal of Politics* 53:122–158.

Huckfeldt, Robert, Paul Allen Beck, Russell J. Dalton and Jeffrey Levine. 1995. "Political Environments, Cohesive Social Groups, and the Communication of Public Opinion." *American Journal of Political Science* 39(4):1025–1054.
URL: *http://www.jstor.org/stable/2111668*

Hughes, D. Alex. 2016. Political Actors Use Social Networks to Coordinate Behavior PhD thesis University of California, San Diego.

Hutchcroft, Paul. 2012. "Re-slicing the pie of patronage: the politics of internal revenue allotment in the Philippines, 1991-2010." *Philippine Review of Economics* 49(1):109–134.

Hutchcroft, Paul and Joel Rocamora. 2003. "Strong Demands and Weak Institutions: The Origins and Evolution of the Democratic Deficit in the Philippines." *Journal of East Asian Studies* 3:259–292.

Jackson, Matthew O. 2010. *Social and Economic Networks*. Princeton University Press Princeton University Press.

Katz, Elihu and Paul F. Lazarsfeld. 1955. *Personal Influence, the Part Played by People in the Flow of Mass Communications*. New York: Free Press.

Khemani, Stuti. 2015. "Buying votes versus supplying public services: Political incentives to under-invest in pro-poor policies." *Journal of Development Economics* 117:84–93.

Kramon, Eric and Daniel N. Posner. 2013. "Who Benefits from Distributive Politics? How the Outcome One Studies Affects the Answer One Gets." *Perspectives on Politics* 11(2):461?474.

Kustov, Alexander and Giuliana Pardelli. 2018. "Ethnoracial Homogeneity and Public Outcomes: The (Non)effects of Diversity." *American Political Science Review* pp. 1–8.

Laakso, M. and R. Taagepera. 1979. "Effective Number of Parties: A Measure with Application to West Europe." *Comparative Political Studies* 12:3–27.

Lande, Carl H. 1964. *Leaders, Factions, and Parties: the Structure of Philippine Politics*. New Haven: Yale University Press.

Larson, Jennifer M and Janet I Lewis. 2017. "Ethnic Networks." *American Journal of Political Science* 61(2):350–364.

Lizzeri, Alessandro and Nicola Persico. 2004. "Why did the Elites Extend the Suffrage? Democracy and the Scope of Government, with an Application to Britain's 'Age of Reform'." *The Quarterly Journal of Economics* 119(2):707–765.
URL: *http://dx.doi.org/10.1162/0033553041382175*

Llanto, Gilberto M. 2012. "The Assignment of Functions and Intergovernmental Fiscal Relations in the Philippines 20 Years after Decentralization." *Philippine Review of Economics* 49(1):37–80.

Lublin, David. 2017. "Electoral Systems, Ethnic Heterogeneity and Party System Fragmentation." *British Journal of Political Science* 47(2):373–389.

Martinez-Bravo, Monica, Gerard Padro i Miquel, Nancy Qian and Yang Yao. 2012. Social Fragmentation, Public Goods and Elections: Evidence from China. Working Paper 18633 National Bureau of Economic Research.
URL: *http://www.nber.org/papers/w18633*

Mendoza, Ronald U., Edsel L. Beja Jr., Victor S. Venida and David B. Yap. 2016. "Political dynasties and poverty: measurement and evidence of linkages in the Philippines." *Oxford Development*

Studies 44(2):189–201.

URL: *http://dx.doi.org/10.1080/13600818.2016.1169264*

Mendoza, Ronald U., Jan Cruz and David B. Yap. 2014. "Political Party Switching: It's More Fun in the Philippines." *Asian Institute of Management (AIM) Working Paper No. 14-019* .

Miguel, Edward and Mary Kay Gugerty. 2005. "Ethnic diversity, social sanctions, and public goods in Kenya." *Journal of Public Economics* 89(11):2325 – 2368.

URL: *http://www.sciencedirect.com/science/article/pii/S0047272704001562*

Montalvo, Jose G. and Marta Reynal-Querol. 2005. "Ethnic diversity and economic development." *Journal of Development Economics* 76(2):293 – 323.

URL: *http://www.sciencedirect.com/science/article/pii/S0304387804001129*

Moscona, Jacob, Nathan Nunn and James A. Robinson. 2017. "Keeping It in the Family: Lineage Organization and the Scope of Trust in Sub-Saharan Africa." *American Economic Review* 107(5):565–71.

URL: *http://www.aeaweb.org/articles?id=10.1257/aer.p20171088*

Munshi, Kaivan and Mark Rosenzweig. 2018. "Ethnic Diversity and the Under-Supply of Public Goods." *NBER Working Paper 19197* .

Nichter, Simeon. 2008. "Vote Buying or Turnout Buying? Machine Politics and the Secret Ballot." *American Political Science Review* 102(1):19–31.

Padgett, John F. and Christopher K. Ansell. 1993. "Robust Action and the Rise of the Medici, 1400-1434." *American Journal of Sociology* 98(6):1259–1319.

Padgett, John F. and Paul D. McLean. 2006. "Organizational Invention and Elite Transformation: The Birth of the Partnership Systems in Renaissance Florence." *American Journal of Sociology* 111(5):1463–1568.

Padgett, John F. and Paul D. McLean. 2011. "Economic Credit in Renaissance Florence." *Journal of Modern History* 83(1):1–47.

Pons, Pascal and Matthieu Latapy. 2005. Computing Communities in Large Networks Using Random Walks. In *Computer and Information Sciences - ISCIS 2005*, ed. pInar Yolum, Tunga Güngör, Fikret Gürgen and Can Özturan. Berlin, Heidelberg: Springer Berlin Heidelberg pp. 284–293.

Potter, Joshua D. 2014. "Demographic Diversity and District-Level Party Systems." *Comparative Political Studies* 47(13):1801–1829.

Querubin, Pablo. 2016. "Family and Politics: Dynastic Persistence in the Philippines." *Quarterly Journal of Political Science* 11(2):151–181.

Rolfe, Meredith. 2012. *Voter Turnout: A Social Theory of Political Participation*. Political Economy of Institutions and Decisions Cambridge University Press.

Rosenzweig, Steven C. 2015. "Does electoral competition affect public goods provision in dominant-party regimes? Evidence from Tanzania." *Electoral Studies* 39:72 – 84.
URL: *http://www.sciencedirect.com/science/article/pii/S0261379415001006*

Rubin, Michael. 2018. "Rebel Territorial Control and Civilian Collective Action in Civil War. Evidence from the Philippines." *UCSAE, mimeo* .

Siegel, David A. 2009. "Social Networks and Collective Action." *American Journal of Political Science* 53(1):122–138.
URL: *http://www.jstor.org/stable/25193871*

Smith, Daniel. M. 2018. *Dynasties and Democracy: The Inherited Incumbency Advantage in Japan*. Stanford University Press.

Soifer, Hillel David. 2016. "Regionalism, Ethnic Diversity, and Variation in Public Good Provision by National States." *Comparative Political Studies* 49(10):1341–1371.
URL: *https://doi.org/10.1177/0010414015617965*

Stichnoth, Holger and Karine Van der Straeten. 2011. "ETHNIC DIVERSITY, PUBLIC SPENDING, AND INDIVIDUAL SUPPORT FOR THE WELFARE STATE: A REVIEW OF THE EMPIRICAL LITERATURE." *Journal of Economic Surveys* 27(2):364–389.
URL: *https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-6419.2011.00711.x*

Szwarcberg, Mariela. 2012. "Revisiting clientelism: A network analysis of problem-solving networks in Argentina." *Social Networks* 34(2):230–240.

Todd, E. 1985. *The Explanation of Ideology: Family Structures and Social Systems*. Blackwell Reference B. Blackwell.

URL: *https://books.google.com/books?id=NMCMAAAAIAAJ*

Troland, Erin. 2014. "Do Fiscal Transfers Increase Local Revenue Collection? Evidence From The Philippines". Working Paper. `https://pdfs.semanticscholar.org/7aab/f946088afeff374633417672e282d9cbdd5b.pdf`.

Wimmer, Andreas. 2016. "Is Diversity Detrimental? Ethnic Fractionalization, Public Goods Provision, and the Historical Legacies of Stateness." *Comparative Political Studies* 49(11):1407–1445.

URL: *https://doi.org/10.1177/0010414015592645*

Social Structures, Electoral Competition and Public Goods Provision

Online Appendix

A.1 Network Measures

Edge Betweenness Centrality

Edge betweenness centrality is the extent to which an edge (marriage between 2 families) serves as a link between different groups of families. It assesses centrality by looking at whether the edge is an important hub in the paths traversing the network and is calculated using the number of shortest paths in the network that necessarily pass through the edge. This measure is analogous to betweenness centrality, which considers the relative importance of a node in the paths traversing the network (Freeman, 1977).

In the family network f, let $P_e(kj)$ indicate the number of shortest paths between family k and family j that necessarily pass through edge e, while $P(kj)$ is the total number of shortest paths between k and j.

The ratio $P_e(kj)/P(kj)$ approximates the importance of edge e in connecting k and j. If $P_e(kj) = P(kj)$, yielding a ratio of 1, then edge e lies on all of the shortest paths connecting families k and j. Conversely, if $P_e(kj) = 0$, then the intermarriage represented by edge e is not important for connecting families k and j.

Edge betweenness centrality is calculated by averaging this ratio for the entire network.

$$Betweenness_e(f) = \sum \frac{P_e(kj)}{P(kj)} \tag{2}$$

A.2 Additional Results

Table A.1: Network fractionalization and Public Goods Provision (Alternative Measures)

	(1) Elem. School	(2) High School	(3) Market	(4) Health Center	(5) Waterworks
Panel A: Edge removal, weighted by family size					
fractionalization	0.03***	0.02***	0.02***	0.03***	0.02***
	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Observations	15,432	15,432	15,432	15,432	15,432
R-squared	0.076	0.172	0.139	0.049	0.037
Mean Dep. Var.	0.806	0.209	0.190	0.639	0.597
Panel B: Edge removal, communities weighted by number of voters					
fractionalization	0.03***	0.02***	0.02***	0.03***	0.02***
	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Observations	15,432	15,432	15,432	15,432	15,432
R-squared	0.076	0.172	0.139	0.049	0.037
Panel C: Walktrap algorithm					
fractionalization	0.03***	0.02***	0.02***	0.04***	0.02***
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	15,432	15,432	15,432	15,432	15,432
R-squared	0.077	0.172	0.139	0.051	0.037
Mean Dep. Var.	0.806	0.209	0.190	0.639	0.597

Notes: Results from village-level regressions with municipal fixed-effects. The dependent variable is a dummy equal to one if there is an elementary school in the village (Column 1), an high school in the village (Column 2), a market in the village (Column 3), an health center in the village (Column 4) and a waterworks system in the village (Column 5). Regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence.Standard errors (in parentheses) are clustered by municipality. * p < .10, ** p < 0.05, *** p < .01.

Table A.2: Network fractionalization and Public Goods Provision (Exc. Outliers and ARMM)

	(1) Elem. School	(2) High School	(3) Market	(4) Health Center	(5) Waterworks
Panel A: Remove urban areas					
fractionalization	0.03***	0.02***	0.02***	0.03***	0.02***
	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Observations	13,728	13,728	13,728	13,728	13,728
R-squared	0.074	0.140	0.061	0.053	0.033
Panel B: Remove "home" village of the incumbent					
fractionalization	0.03***	0.02***	0.02***	0.03***	0.02***
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
Observations	10,914	10,914	10,914	10,914	10,914
R-squared	0.074	0.160	0.112	0.048	0.034
Panel C: Remove ARMM					
fractionalization	0.03***	0.02***	0.02***	0.03***	0.02***
	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Observations	13,728	13,728	13,728	13,728	13,728
R-squared	0.074	0.140	0.061	0.053	0.033

Notes: Results from village-level regressions with municipal fixed-effects. The dependent variable is a dummy equal to one if there is an elementary school in the village (Column 1), an high school in the village (Column 2), a market in the village (Column 3), an health center in the village (Column 4) and a waterworks system in the village (Column 5). Regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence.Standard errors (in parentheses) are clustered by municipality. * p < .10, ** p < 0.05, *** p < .01.

Table A.3: Network fractionalization and Public Goods Provision (Rob. Checks)

	(1) Elem. School	(2) High School	(3) Market	(4) Health Center	(5) Waterworks
Panel A: Controlling for Incumbent Characteristics					
fractionalization	0.03***	0.02***	0.02***	0.03***	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	9,697	9,697	9,697	9,697	9,697
R-squared	0.078	0.179	0.149	0.054	0.046
Panel B: Controlling for Incumbent and Challenger Characteristics					
fractionalization	0.03***	0.02***	0.02***	0.03**	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	8,739	8,739	8,739	8,739	8,739
R-squared	0.091	0.184	0.153	0.061	0.050
Controlling for Gini and fractionalization in Ethnicity, Religion and Educational Attainment					
fractionalization	0.03***	0.02***	0.02***	0.04***	0.02***
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
Observations	15,216	15,216	15,216	15,216	15,216
R-squared	0.080	0.175	0.139	0.054	0.038

Notes: Results from village-level regressions with municipal fixed-effects. The dependent variable is a dummy equal to one if there is an elementary school in the village (Column 1), an high school in the village (Column 2), a market in the village (Column 3), an health center in the village (Column 4) and a waterworks system in the village (Column 5). Regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence. Standard errors (in parentheses) are clustered by municipality. * $p < .10$, ** $p < 0.05$, *** $p < .01$.

Table A.4: Network fractionalization and Competition in Barangay Elections (Alternative Measures)

	(1)	(2)	(3)	(4)	(5)
		# Candidates Bgy. Cpt.		Win	# Candidates
	Raw	Laakso	Golosov	Margin	Bgy. Councilors
Panel A: Edge removal, ties weighted by family size					
fractionalization (over 45)	0.04***	0.03***	0.03***	-1.38***	0.51***
	(0.01)	(0.01)	(0.00)	(0.31)	(0.07)
Observations	31,306	30,947	31,306	30,555	31,306
R-squared	0.012	0.009	0.008	0.007	0.052
Panel B: Edge removal, communities weighted by number of voters					
fractionalization	0.05***	0.03***	0.03***	-1.52***	0.52***
	(0.01)	(0.01)	(0.00)	(0.31)	(0.07)
Observations	31,306	30,948	31,306	30,558	31,306
R-squared	0.012	0.008	0.007	0.007	0.048
Panel C: Walktrap algorithm					
fractionalization	0.04***	0.03***	0.02***	-1.46***	0.53***
	(0.01)	(0.01)	(0.01)	(0.32)	(0.06)
Observations	31,306	30,947	31,306	30,555	31,306
R-squared	0.011	0.009	0.008	0.007	0.054

Notes: Results from village elections regressions with municipal*election-year fixed-effects. The dependent variable is the number of candidates for barangay captain (Column 1), the effective number of candidates for barangay captain computed as Laakso (Column 2), the effective number of candidates for barangay captain computed as Golosov (Column 3), the win margin in the barangay captain election (Column 4) and the number of candidates for barangay councilor (Column 5). Regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence. Standard errors (in parentheses) are clustered by municipality. * $p < .10$, ** $p < 0.05$, *** $p < .01$.

Table A.5: Network fractionalization and Competition in Barangay Elections (Exc. Outliers)

	(1)	(2)	(3)	(4)	(5)
	# Candidates Bgy. Cpt.			Win	# Candidates
	Raw	Laakso	Golosov	Margin	Bgy. Councilors
Panel A: Remove urban areas					
fractionalization	0.05***	0.03***	0.03***	-1.81***	0.42***
	(0.01)	(0.01)	(0.00)	(0.33)	(0.07)
Observations	27,249	26,915	27,249	26,603	27,249
R-squared	0.019	0.015	0.014	0.010	0.071
Panel B: Remove "home" village of the incumbent					
fractionalization	0.05***	0.04***	0.03***	-2.17***	0.44***
	(0.01)	(0.01)	(0.01)	(0.38)	(0.08)
Observations	21,716	21,421	21,716	21,146	21,716
R-squared	0.014	0.011	0.011	0.009	0.063
Panel C: Remove ARMM					
fractionalization	0.06***	0.05***	0.04***	-2.28***	0.72***
	(0.01)	(0.01)	(0.01)	(0.36)	(0.07)
Observations	27,267	27,185	27,267	26,864	27,267
R-squared	0.019	0.012	0.011	0.009	0.071

Notes: Results from village elections regressions with municipal*election-year fixed-effects. The dependent variable is the number of candidates for barangay captain (Column 1), the effective number of candidates for barangay captain computed as Laakso (Column 2), the effective number of candidates for barangay captain computed as Golosov (Column 3), the win margin in the barangay captain election (Column 4) and the number of candidates for barangay councilor (Column 5). Regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence. Standard errors (in parentheses) are clustered by municipality. * $p < .10$, ** $p < 0.05$, *** $p < .01$.

Table A.6: Network fractionalization and Competition in Barangay Elections (Rob. Checks)

	(1)	(2)	(3)	(4)	(5)
	# Candidates Bgy. Cpt.			Win	# Candidates
	Raw	Laakso	Golosov	Margin	Bgy. Councilors
Panel A: Controlling for Incumbent Characteristics					
fractionalization	0.05***	0.04***	0.03***	-2.11***	0.51***
	(0.01)	(0.01)	(0.01)	(0.39)	(0.09)
Observations	19,703	19,440	19,703	19,197	19,703
R-squared	0.025	0.018	0.016	0.015	0.077
Panel B: Controlling for Incumbent and Challenger Characteristics					
fractionalization	0.05***	0.04***	0.03***	-1.99***	0.50***
	(0.01)	(0.01)	(0.01)	(0.40)	(0.09)
Observations	17,777	17,543	17,777	17,330	17,777
R-squared	0.032	0.025	0.022	0.023	0.084
Panel C: Controlling for Gini and fractionalization in Ethnicity, Religion and Educational Attainment					
fractionalization	0.06***	0.05***	0.04***	-2.27***	0.62***
	(0.01)	(0.01)	(0.01)	(0.34)	(0.07)
Observations	30,862	30,503	30,862	30,115	30,862
R-squared	0.012	0.010	0.009	0.009	0.055

Notes: Results from village elections regressions with municipal*election-year fixed-effects. The dependent variable is the number of candidates for barangay captain (Column 1), the effective number of candidates for barangay captain computed as Laakso (Column 2), the effective number of candidates for barangay captain computed as Golosov (Column 3), the win margin in the barangay captain election (Column 4) and the number of candidates for barangay councilor (Column 5). Regressions control for village-level average age, average length of stay in the village, gender ratio, village population, the number of distinct families in the village, whether the village is classified as rural, as well as education levels in the village, occupation in the village and average per capita income and poverty incidence. Standard errors (in parentheses) are clustered by municipality. * $p < .10$, ** $p < 0.05$, *** $p < .01$.