Family Networks and Distributive Politics*

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Abstract

We study the distribution of public services by local politicians when political support spreads through social networks. We sketch a model showing that incumbents target goods and services to individuals who would lead to the largest aggregate loss of support if they stopped supporting the incumbent. Those individuals have high betweenness centrality. Using data on 3.6 million households from the Philippines, we show that households with high betweenness centrality receive a greater number of public services from their local government. This result is robust to the inclusion of controls for program eligibility, detailed measure of family wealth and elite status, family ties with politicians, and other measures of centrality.

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1 Introduction

Political behaviour, including voter turnout and preferences over candidates, is often shaped by relatives and friends. Given that political support spreads through networks, incumbents seeking to maximise political support by distributing favors need to move from targeting individual supporters (Dixit and Londregan, 1996, 1998)[1] to targeting key players in the network.[2] We formalise this idea with a simple model of electoral support. In this model, it is optimal for incumbents to target individuals whose loss of allegiance would induce the largest aggregate reduction in support. Given this, we show that it is advantageous for incumbents to target favors towards individuals with high betweenness centrality.

The objective of this paper is to put these predictions to the test. To this effect, we use complete census data from the Philippines to investigate whether households that have a high blocking potential in the municipal network of family ties receive more services from their municipal government. To minimize omitted variable bias, we flexibly control for the social proximity between municipal politicians and all households in that municipality. We also control for a large number of household characteristics – such as land wealth and historical elite status – that could affect either service eligibility or the ability to lobby for services. Village fixed effects are used to control for location-specific factors that could affect service provision, such as variation in eligibility, cost of provision, or social network structure. To the best of our knowledge, we are the first to empirically assess whether public services are targeted towards households holding a specific centrality status in the aggregate social network.

We find that households with higher betweenness centrality receive more services from their municipal government. These results hold after we include

[1] For empirical applications see, for example, Besley et al. (2004), Bardhan and Mookherjee (2005), Galasso and Ravallion (2005), Bardhan and Mookherjee (2006), Besley, Pande and Rao (2012) and, Niehaus et al. (2013).

[2] For a review of the economics literature on key players, see Zenou (2016).

village fixed-effects as well as detailed measures of household composition and the education and occupation of the household head. The results are similar if we focus on either the extensive or the intensive margin. Importantly, these findings are not driven by one specific service but hold across the seven public services most commonly distributed by municipal governments in our sample.[3] The point estimates suggest that moving from the bottom to the top of the betweenness distribution increases the number of services received by 0.029 units, which is equivalent to 3.7% of the mean number of services.[4] If we look at each service separately, point estimates on betweenness vary between 2.7% and 8.7% of the sample mean. Moving from the 25th to the 75th percentile in betweenness yields roughly half the same increase in services.

We are able to rule out a number of alternative explanations for our findings. First, we use old network links as instruments to reduce concerns about reverse causality and endogenous centrality. Second, we show that the point estimate on betweenness is stable when we control for a number of household characteristics, including other centrality measures such as degree, eigenvector, and Katz centrality (with different decay factors), and for the size of various neighborhoods. The relationship between betweenness centrality and the allocation of services from the municipal government is independent from concerns about information diffusion, though those concerns also explain how incumbents target goods and services to their constituents. Third, the results are robust to controlling for distance between the household and candidates running in the 2007 election, either successful or unsuccessful. This reduces the concern that our results arise simply because elected officials are more central (Cruz, Labonne and Querubin, 2017) or because politicians target services towards their relatives (Fafchamps and Labonne, 2017). Fourth, drawing inspiration Bellows and

[3]We find no support of our theoretical predictions for another four services on which we have data. What sets them apart is that they either are seldom allocated or are unused by some incumbents, and they reach less than 1% of respondents.

[4]Other studies of the effects of political connections report a similar effect size. For example, Gagliarducci and Manacorda (2016) find that, in Italy, a family connection to an individual in office increases private sector earnings by 3.5%.

Miguel (2009), we replicate our analysis using only those households for which the head is single. In this subsample, network position – and thus betweenness – is unaffected by the head's marriage. Our results are basically unchanged, confirming that betweenness is not significant simply because it proxies for marriage choice.

We also present evidence of heterogeneity that is consistent with our theory. The correlation between public services and betweenness centrality is weaker for the relatives of both the incumbent and the (unelected) runner-up. This makes sense: relatives of the incumbent occupy a position in the family network that is similar to the incumbent, and as such do not really allow the incumbent to reach out to a larger audience. In contrast, since relatives of the runner-up are unlikely to support the incumbent, there is little point trying to secure their support with public favors.

Our data does not allow us to assign a dollar value to the services received. Since households may prefer receiving few services of a higher value, this raises the concern that the effect of betweenness on the number of services received provides a poor measure of its effect on the financial value of these services. To mitigate this concern, we show that the same result holds for each service separately. It also holds for the attribution of a Philhealth card that entitles households to highly subsidized healthcare and is the most valuable service in our list. This demonstrates that we are not simply capturing a number effect and confirms that high betweenness households do receive more benefits from the municipal government.

We make contributions to the literatures on social networks and distributive politics. First, we depart from much of the distributive politics literature which, probably for reasons of data availability, focuses on individual characteristics such as ideology and poverty status (Hicken, 2011; Golden and Min, 2013).[5] We focus instead on the position of individuals in the social network defined by

[5]Cruz (forthcoming) is a notable exception. She shows that politicians target high degree individuals for vote-buying.

blood ties and marriage ties between families. Second, we do not limit ourselves to direct social ties to politicians (e.g., Fafchamps and Labonne (2017)). Rather we focus on social network characteristics that aggregate information from the entire network. This is made possible by the fact that our data provide exhaustive coverage of all nodes and links in the family network. Consequently the centrality measures do not suffer from the sampling bias identified by Chandrasekhar and Lewis (2011). In addition, we are able to verify the robustness of our findings on betweenness to the addition of other centrality measures proposed in the literature. Since centrality measures are correlated with each other, a large sample is necessary to precisely identify the relative explanatory power of different measures. Third, we managed to combine different data sources to form an unusually rich set. We have information on eleven different types of public services which cover the majority of services distributed to individual households by Filipino municipal governments. Previous studies tend to focus on only one or two services and, as pointed out by Kramon and Posner (2013), the response obtained depends on the service under scrutiny. Finally, by focusing on blood ties and marriage ties we contribute to literature on the economic and political consequences of the family (Alesina and Giuliano, 2011, 2014).

We also contribute to the literature on social networks more broadly defined (see Jackson, Rogers and Zenou (2017) for a recent summary). In this literature, social intermediation benefits have long been associated with betweenness and its close relative, structural holes (e.g., Burt (1992)). Yet, apart from the seminar work of Padgett and Ansell (1993) on the 15th century Medici family in Florence, betweenness has received much less empirical attention than centrality measures associated with the diffusion of influence and information. Our paper confirms the usefulness of the concept for understanding the distribution of political favors in contemporaneous data. Our work is also closely related to the concept of intercentrality developed by Ballester, Calvo-Armengol and Zenou (2006) and others (see Jackson, Rogers and Zenou (2017) for additional

references). Closely related to Bonacich centrality, intercentrality concerns itself with identifying the nodes whose removal most disrupts a mutual feedback process taking place on a social network. We complement this literature by focusing instead on the disruption caused by the elimination of shortest paths between nodes. We provide empirical evidence suggesting that efforts to avoid this disruption leads incumbent politicians to target favors towards individuals with high betweenness.

The remainder of the paper is organized as follows: Section 2 introduces the conceptual framework; Section 3 presents the context and the data; Section 4 discusses the results and Section 5 concludes.

2 Social networks and political support

In this Section we sketch a model of political cascades through social networks. Each incumbent M wishes to identify the individuals who would lead to the largest aggregate loss of support if they withdrew their allegiance.[6] We assume that cascades are most effective through short walk and we show that, in this case, targeting favors to high betweenness individuals is the optimal strategy for politicians seeking to secure support through cascades on the social network.

2.1 Basic set-up

Let the size of the electorate be N and let $g_{ij} = 1$ denote a link between individuals i and j. We define $G \equiv [g_{ij}]$ to be the network adjacency matrix.[7] The utility that individual i derives from supporting M is written:

[6] This is the opposite problem from the one studied by Lee et al. (2012). They assume that a social planner has information about the criminal propensities of all individuals in a social network and seeks to identify the key player, that is, the person whose removal would lead to the largest reduction in crime (see also Zenou (2016)).

[7] We follow current practice and set $g_{ii} = 0$ throughout.

$$u_i(m,g) = a_i m_i - \frac{1}{2}m_i^2 + \phi \sum_j g_{ij}^{d_{ij}} m_i m_j \tag{1}$$

where m_i denotes the strength of i's support for M.[8] The first term is the direct gain i derives from supporting politician M. It depends on an idiosyncratic preference for M represented by a_i. We assume that the politician, on average, does not know a_i for each voter, but knows the average value of a_i in the population ($\bar{a}$). The second term is the cost of expressing support (e.g., voting), which for simplicity is normalized to $1/2$. d_{ij} is the distance between i and j in social network G and $g_{ij}^{d_{ij}}$ is the i,j element of matrix $G^{d_{ij}}$; it represents the number of shortest walks between i and j in network G. The third term captures the reinforcement of political support through the social network: individual i derives more utility from supporting M when many of the nodes she can reach also support M. The model abstracts away from the challenger and it is better thought as a model of political support between elections.

Utility maximization yields the following first order condition:

$$\frac{\partial u_i(m,g)}{\partial m_i} = a_i - m_i + \phi \sum_{j=1}^{N} g_{ij}^{d_{ij}} m_j = 0 \tag{2}$$

from which we obtain:

$$m_i = a_i + \phi \sum_{j \neq i} g_{ij}^{d_{ij}} m_j \tag{3}$$

Equation (3) shows that as long as $\phi \neq 0$ (i.e., political support is reinforced through the network) there is a multiplier in electoral support: the more support there is for M, the more this support cascades through the network. The

[8] We regard m_i as capturing essentially two things: (1) i's political support for M and (2) i's verbal messages about her support. Given this setup, when other people near i support M, they are more likely to express support for M, and this in turn make i more likely to support M and thus express support for M. We are quite agnostic regarding the process by which influence takes place though. Individuals might update their beliefs about M, they might want to conform (because imitating others offers a simple way of making a choice) perhaps they find imitating others a simple way of making a choice. We cannot distinguish between with the data we have.

incumbent wants to maximize this cascading effect by targeting favors to individuals in his/her constituency. In our empirical application, favors take the form of access to municipal programs under the control of the incumbent. Since politicians in the opposition have no control over the allocation of municipal goods and services, we only focus on the favor allocation problem facing the incumbent.[9]

Let $m = \{m_1, ...m_N\}$ be the vector of support decisions of all N voters, and let $a = \{a_1, ..., a_N\}$ be the vector of their propensities to support incumbent M. The Nash equilibrium voting behavior is given by:

$$\begin{aligned} m &= a + \phi W m \\ m &= (I - \phi W)^{-1} a \\ &= \sum_{s=1}^{\infty} \phi^s W^s a \end{aligned} \tag{4}$$

where W is the matrix of the number of shortest walks – i.e., $\forall i, j$, $w_{ij} = g_{ij}^{d_{ij}}$.[10]

Formally, let i's expected level of support for the incumbent be m_i^*. Let us assume that politician M only knows the mean value of a_i, which seems reasonable given the context of our study. Consequently, when the politician estimates m_i^*, each a_i in vector a of expression (4) is first replaced by its mean propensity $\overline{a}$. We thus have:

$$m_i^* = \overline{a} \sum_{s=1}^{\infty} \phi^s \sum_{j=1}^{N} w_{ij}^s \tag{5}$$

Recall that w_{ij} is the number of shortest walks between i and j. It follows that

[9] See Dixit and Londregan (1996, 1998) for a theoretical treatment involving two politicians competing on promises.

[10] Parameter ϕ must be small enough for the solution to expression (4) to be finite. A sufficient condition is that ϕ be smaller than 1 divided by the norm of the largest eigenvalue of W. This is a standard technical condition made in all network peer-effect models of this type (e.g., Jackson 2010, p. 42 and footnote 28). If this condition is not satisfied, peer effects are so strong that the multiplier effect that they generate leads to infinite outcomes – i.e., the network autoregressive system 'explodes'.

the average equilibrium level of support is:

$$m^* = \frac{\overline{a}}{N} \sum_{s=1}^{\infty} \phi^s \sum_{j=1}^{N} \sum_{i=1}^{N} w_{ij}^s \tag{6}$$

2.2 Blocking potential

We now explore what happens to aggregate support if node l is removed from the network.[11] Let W_{-l} be the matrix where $w_{ij(-l)}$ is the number of shortest walks between i and j not going through l. Let m^*_{-l} be the average equilibrium support once l is removed. We know that $\forall i, j, s$ it must be true that $w^s_{ij(-l)} \leq w^s_{ij}$. Let us define:

$$m^*_{-l} = \frac{\overline{a}}{N} \sum_{s=1}^{\infty} \phi^s \sum_{j=1}^{N} \sum_{i=1}^{N} w^s_{ij(-l)} \tag{7}$$

It follows that the loss of aggregate support associated with removing node l is:

$$\Delta m(l) \quad = \quad \frac{\overline{a}}{N} \sum_{s=1}^{\infty} \phi^s \sum_{j=1}^{N} \sum_{i=1}^{N} (w^s_{ij} - w^s_{ij(-l)}) \tag{8}$$

Proposition 1 *$\Delta m(l)$ is strictly increasing in the betweenness centrality of node l.*

Proof 1 *The proof proceeds in two steps. First let's note that $\forall i, j$ $w^1_{ij} - w^1_{ij(-l)}$ is equal to the number of shortest paths between i and j that go through l. So, $\sum_{j=1}^{N} \sum_{i=1}^{N} (w^1_{ij} - w^1_{ij(-l)})$ is strictly increasing in the number of shortest paths that go through l.*

Second, by construction, all elements $w^s_{ij(-l)}$ are polynomials of degree s in $(w_{ij(-l)})_{i,j=1,\ldots,N}$ with all the coefficients positive. It follows that the $w^s_{ij(-l)}$ are all decreasing in the number of shortest paths going through l. So keeping the network constant, $\forall i, j, s$, the term $(w^s_{ij} - w^s_{ij(-l)})$ is increasing in the number of shortest paths that go through l.

As betweenness centrality of node l is the (normalised) number of shortest paths going through l it follows that $\Delta m(l)$ is strictly increasing in the betweenness centrality

[11] In a similar vein, Zenou (2016) examines what happens to mutual influence among peers when a key player is removed from the social network.

of node l.

An important corollary is that the derivative of the loss of aggregate support with respect to betweenness is stronger than its derivative with respect to Katz centrality. Indeed, one can increase Katz centrality of node l by adding walks between l and j that are longer than the distance between l and j (d_{lj}). Since those walks do not affect the shortest path between l and j (d_{lj}), they do not affect $\Delta m(l)$.

Now let us suppose an individual whose allegiance has not been secured by politician M can impede cascades of political support in her favor. Further suppose that, by targeting the allocation of local public services towards a particular individual, the incumbent can secure the allegiance of that individual. Who should the incumbent target? Proposition 1 and its corollary imply that it is better for the incumbent to secure the allegiance of a high betweenness individual.

This prediction stands in contrast with a large literature focusing on the diffusion of information and influence through networks (see Jackson, Rogers and Zenou (2017), Section 7 for a review). This literature shows that the choice of an optimal target or *seed* depends on the way information diffuses through the network. Katz and eigenvalue centrality identify the optimal seed when the effect of information is amplified through network feedback. The difference between the two is that Katz centrality allows for decay in information transfer (Jackson 2008). When decay is maximized, Katz centrality boils down to degree centrality; when it is minimized, the Katz measure boils down to eigenvalue centrality. Banerjee et al. (2016) examine the optimal choice of seed when information spreads for a finite number of steps from the seed, without network feedback effect. Battaglini and Patacchini (forthcoming) develop a model of lobbyists seeking to influence connected legislators and predict that congressmen with higher Katz centrality should receive more campaign contributions. Using US data they find empirical support for this theoretical prediction. Other models of

diffusion on networks have been proposed by Galeotti and Goyal (2009), Bloch (2016) and Mayzlin (2016) as well.[12] Although the different approaches vary in the assumptions they make about diffusion and strategic interaction between nodes, they all agree that seeding high centrality nodes is generally more advantageous than targeting low centrality nodes when the intention is to diffuse information through a network.[13]

In the remainder of the paper we investigate the extent to which betweenness centrality predicts the way political incumbents target public goods and services to their constituents. We show that, in Philippine municipalities, betweenness is a robust predictor of the attribution of public goods and services over and above what is predicted by centrality measures capturing diffusion concerns.

3 Context and Data

In this Section, we provide background information on local politics in the Philippines and we describe the data used in the analysis.

[12]Diffusion competition between firms has been examined by Goyal, Heidari and Kearns (forthcoming) and Goyal and Vigier (2014)). In these models, diffusion effort becomes entangled with pricing considerations. Dziubiński and Goyal (2017) discuss how to design a network to best resist outside attacks. They show that star networks have desirable properties for that purpose.

[13]The reader may wonder whether these predictions change when incumbents target multiple nodes. For diffusion processes with decay (e.g., Jackson (2010)) – or with a maximum number of diffusion steps as in Banerjee et al. (2016) – targeting those nodes with the highest centrality (in a diffusion sense) need not be optimal. The reason is that high diffusion centrality nodes often are near each other, and nearby nodes tend to duplicate each other's influence. More widespread diffusion can be achieved by targeting nodes that are central in different parts of the network, although not necessarily central in the network as a whole. Things are different when the objective is to maximize political support through the social network. Here there is no duplication effect: each individual node can hurt the incumbent by individually withdrawing support. Consequently, it remains beneficial to target those nodes whose withdrawal of support can cause the most damage, and these are the nodes with high betweenness. Optimal seeding of diffusion processes also raises computational difficulties, making it hard to implement in practice. As shown by Akbarpour, Malladi and Saberi (2018), however, the gain from optimal seeding need not be large: the authors show that diffusion through a handful of random seeds rapidly approaches the gain from seeding optimally. Given this, diffusion or Katz centrality need not be as robust a predictor of targeting as is often anticipated. This critique does not apply to betweenness.

3.1 Local Politics in the Philippines

Municipalities in the Philippines are responsible for delivering a number of social services that are financed mostly through yearly block grants from the central government. These municipalities are governed by a mayor, a vice-mayor, and eight municipal councilors. All are elected at-large every three years in first-past-the-post elections.

According to existing evidence, local politics in the Philippines is clientelistic and mayors attempt to use their resources and discretion to prolong their time in office (Capuno, 2012; Cruz, Labonne and Querubin, 2017). The primary drivers of resource allocations tend to be political considerations. For example, when the Department of Social Welfare and Development started implementing a large-scale conditional cash transfer program in 2008, it was deemed necessary to establish a centralized targeting system rather than rely on local officials to identify beneficiaries.

Hollnsteiner (1963) argues that incumbents often use influential individuals as political brokers. Alliances are kept alive by reciprocal exchange rooted in the Filipino concept of *utang na loob*. It corresponds to a debt of gratitude: repayment by one side builds a new debt of gratitude for the other side. Importantly, non-repayment generates *Hiya*, often translated as shame. These debts of gratitude operate between families rather than between specific individuals. Importantly, rewards are not targeted to voters directly but to key players in family networks (Kerkvliet, 1996).

We focus on family ties since they are particularly relevant in the political context we study (Cruz, Labonne and Querubin, 2017). Family ties offer the additional advantage of capturing social ties that are both long lasting and fairly impervious to endogenous manipulation. The same cannot be said of friendship or membership to business organizations. The only way for someone to modify their family centrality is to marry into a particular family, an act that is not only a serious social and personal commitment, but is also likely to re-

spond to many considerations other than centrality. Moreover, since Filipinos can only have one wife, the number of links they can create through marriage is quite limited, especially considering that divorce is illegal in the Philippines.

We believe that, within the context that we study, local politicians are able to identify high betweenness families within their municipality. First, municipal politicians are deeply embedded in local marriage networks (Hollnsteiner, 1963; Kerkvliet, 1996). Local political relationships in the Philippines are characterized by *"kasal, binyag, libing"* which literally means "weddings, baptisms, funerals." This well-known term in the Philippines refers to the fact that politicians are expected to support their constituents throughout their lives. In particular, they serve as godfathers for baptisms and weddings. Second, politicians are engaged in repeated interactions with their constituents and, through trial and error, they are able to learn which families are more likely to deliver high political support. Indeed, local elections in the Philippines have been organised regularly since the beginning of the 20th century and thus local political elites have had sufficient time to learn about those key families. Our findings might not generalize to countries where local elections were introduced more recently. As a result, local politicians are very well informed of all the family relationships in their constituency – and thus are able to observe which families are more central in a betweenness sense.

Data collected by Cruz, Keefer and Labonne (2018) highlights the importance of relatives and friends in voting decisions. The survey was implemented in 284 Philippine villages shortly after the 2013 municipal elections and collected data on voting influence. Respondents were asked about various influences that affected their voting and were asked to ranked them on a scale from 0 (not important) to 4 (very important).[14] The average rating given to "pref-

[14]The exact question wording was as follows: *We'll show you some flashcards with factors that commonly influence how people vote. When deciding who you will vote for, which of the following factors influences you the most? [Show worksheet with 0-4 scale]. Here is a worksheet with a scale from 0 to 4, where 0 is not important and 4 is very important. Please place the flashcards where they belong on the scale. (1) Preferences of your family and friends; (2) Whether candidates will spend the municipal budget on things that are important to me and my family; (3) Gift or money from the candidates before the elections*

erences of family and friends" was 1.4. Twenty-nine percent of respondents ranked it as the most important factor influencing their vote.

3.2 The Data

Our main data source is the National Household Targeting System (NHTS). The dataset includes information on household composition and, of particular relevance for our paper, on services received by any household member from their municipal government. The specific services on which we have data are: (i) Scholarship; (ii) Day Care Service; (iii) Supplemental Feeding; (iv) Subsidized Rice; (v) PhilHealth (Subsidized health insurance); (vi) Skills/Livelihood Training; (vii) Housing; (viii) Microcredit; (ix) Self-Employment Assistance; (x) Municipal Cash Transfer Program and, (xi) Other.[15] There is also detailed information on the gender, education and occupation of each household member. Our sample includes more than 3.2 million households in 562 municipalities.[16]

Because we have access to the unanonymized version of the dataset, we can take advantage of local naming conventions to assess family links between individuals. Names used in the Philippines were imposed by Spanish colonial officials in the mid-19th century. One of the stated objective was to distinguish families at the municipal-level to facilitate census-taking and tax collection (Scott, 1998; Gealogo, 2010). Last names were selected from the *Catalogo alfabetico de apellidos*, a list of Spanish names. They do not reflect pre-existing family ties.

(4) The candidate's ability to use political connections to get money and projects for the municipality; (5) Fear of reprisal from candidates and; (6) Approachability or helpfulness of the candidate.

[15]Unfortunately, official budget data are not disaggregated enough for us to estimate the share of the municipal budget allocated to those services.

[16]The data set comprises 709 municipalities in which all households in the municipality were interviewed. We drop municipalities in which the original wave of data collection didn't gather information on access to services – a different questionnaire was used.

Secondly, we restrict the sample to municipalities in which the data were collected before the May 2010 elections. This represents 90% of the observations, the great majority of which were collected in the year before the elections. The remaining observations were collected in the eight months after the elections, and thus may include households who received public services after the election – and for whom an immediate electoral motive cannot have been at work. We cannot, however, rule out that, in these municipalities, some recipients of public services were selected before the election. For instance, services such as the subsidized health insurance card are valid for up to a year. For this reason, the data are not well suited to a rigorous comparison of the allocation of public services before and after the election.

In each municipality a name was only given to one nuclear family. As a result, there is a lot of heterogeneity in names used at the local level, reducing concerns that names capture a similar ethnic background or other social grouping. Names are transmitted across generations according to well-established rules. Specifically, each individual has two family names: a last name and a middle name. A man's last name is his father's last name and his middle name is his mother's last name. Similar conventions apply to unmarried women. A married woman has her husband's last name and her middle name is her maiden name, i.e., her father's last name.[17]

In the Philippines the process to change one's middle or last name is long and the probability of success is low. This reduces concerns about strategic name changes. Article 376 of the Civil Code of the Philippines (Republic Act No. 386, 1949) states that *No person can change his name or surname without judicial authority.* This has been upheld in a number of court cases which have sometimes reached the Supreme Court.[18]

The exhaustive coverage of the sample makes it possible to identify the position of each household in the family network. Surnames and middle names identify two lineages to which each individual belongs. For marriages, we follow Cruz, Labonne and Querubin (2017) and use the joint occurrence of names to construct the network of inter-marriages in each municipality.[19] One might be concerned that two individuals in municipality A might be connected through an individual living in municipality B but, following Cruz, Labonne and Querubin (2017), we ignore cross-municipality links when computing the

[17] In our sample, 77% of household heads are married, 11% are widowed, 4% are single and 2% are divorced/separated.

[18] For example, in the case Wang v. Cebu City Civil Registrar (G.R. No. 159966, 30 March 2005, 454 SCRA 155), Justice Tinga indicated that *the Court has had occasion to express the view that the State has an interest in the names borne by individuals and entities for purposes of identification, and that a change of name is a privilege and not a right, so that before a person can be authorized to change his name given him either in his certificate of birth or civil registry, he must show proper or reasonable cause, or any compelling reason which may justify such change. Otherwise, the request should be denied.*

[19] We recognize that we lose some ties on the mother's sides, but this only occurs after a few generations. Recent ties are likely to be present in our data. For example, as long as a married woman has a brother or unmarried sister who's still alive, the relevant links on her mother's side are still present in the family network and are thus captured in our analysis.

networks. First, given the way names were introduced in the Philippines by Spanish colonial officials, the likelihood than two individuals sharing the same name are related is much higher when they live in the same municipality than when they live in different municipalities. As such, considering individuals in other municipalities would generate much noisier measures of centrality. Second, we do not have data on all neighbouring municipalities for all municipalities which would generate measurement error as well.

We then use the family network to compute various centrality measures: betweenness; degree; eigenvector; and Katz centrality with decay factor from .01 to .91 in .1 increments. We also construct neighbourhoods of distance 2, 3 and 4 for each individual, and we calculate the social distance of each individual to all the candidates in the 2007 elections.[20]

Since the data on public services is aggregated at the household level, network variables must be aggregated up within each household. To this effect, we first assign the family-level measures to individuals based on their last and middle names. We then aggregate the centrality and social distance measures to the household-level as follows.[21] For the centrality measures, we take the highest among all household members. For the distance measures, we take the smallest among all household members. As discussed in more details below, the results are robust to using ties from the household head and his/her spouse only and to alternative ways of aggregating them.

We use three additional source of data to identify elite families. First, we compiled data on landholding at the municipal level from the Department of Agrarian Reform, and we use it to identify the largest landowning families in each municipality. Second, we use records on the list of mayors between 1893-

[20] Unfortunately, the dataset does not include information on first name and so we are unable to identify the candidates individually. We compute the minimum distance to an individual sharing the candidate middle or last name.

[21] We only use data from household members older than 15. Some connections involve children but only married children bring new links (otherwise they have the same names as their fathers). Since links are defined using all married couples, irrespective of age, this means that any link between two families arising from a marriage between their respective children is automatically incorporated in our calculations of all network measures - e.g., distance, centrality, etc.

1898 to identify influential families in the late Spanish colonial period. Third, we use information on citizens who met with the Taft Commission between 1900-1902 to identify influential families in the early American period.[22] Those data are described in more details in Cruz, Labonne and Querubin (2017).

Descriptive statistics are presented in Table 1 and the correlation between the various centrality measures is given in Table A.1. The average household is at social distance 2.2 to the mayor and to the vice-mayor. While the numerical values of the centrality measures are difficult to interpret, it is important to note that, as is typical for social network data, they exhibit large right skew. For example, the standard deviation of betweenness centrality is twice its mean. As indicated at the end of the conceptual section, we expect politicians with a limited number of public services at their disposal to award them to the top-ranked individuals in terms of betweenness. In case information diffusion instead is the priority of politicians in the discretionary allocation of public services, the same reasoning applies: public services should be allocated to individuals in the municipality with the highest Katz, degree, or eigenvector centrality (depending on the type of diffusion process). To reflect this, all centrality measures used in the analysis are percentile ranks instead of raw centrality measures. To avoid spurious correlations, estimated regressions control for household characteristics that predict centrality.[23] The various centrality measures are positively correlated, but the correlations are far from perfect, allowing identification.

Our main outcome variable of interest is the number of services households

[22] As mentioned by Cruz, Labonne and Querubin (2017), these historical sources do not include every single municipality and there have been changes in municipal boundaries due to mergers or municipal splits. In a small number of cases, this makes it hard to match historical and contemporary municipalities. In order to partially address this, we consider both municipal and provincial family lists, given that matching provinces historically is less problematic.

[23] Correlates of the various centrality measures are reported in Table A.4. We find that (i) male-headed households, (ii) households with a more educated head, (iii) households who have lived in the village for longer and, (iv) household with more female members tend to be more central. We flexibly control for these characteristics in the empirical analysis. We also recognize that assorting through marriage affects the structure of the family network. This does not, however, imply that assorting on wealth through marriage mechanically makes wealthier households more central: to the extent that assorting on wealth is present, it affects both tails of the wealth distribution, i.e., poorer households also marry poorer households.

receive from the municipal government. As pointed out by Kramon and Posner (2013), politicians might use different targeting strategies for different services. Focusing on the full set of services ensures that our conclusions provide a more comprehensive test of politicians' behavior. On average households receive 0.77 services from the municipal government. About 49% of households do not receive any and, conditional on receiving at least one, households receive 1.6 services on average. The full set of descriptive statistics is available in Tables 1 and A.2-A.3.

4 Empirical Results

In this Section we start by showing that, consistent with the theory discussed in Section 2, households with high betweenness centrality receive more services from their municipal government. We then deal with possible endogeneity concerns, and we show that the results are robust to controlling for other centrality measures and for distance to a number of local politicians. We end with the presentation of heterogeneity results that provide an additional test of our theory.

4.1 Betweenness Centrality and the Receipt of Public Services

We start by testing whether households with high betweenness centrality receive more public services. We estimate equations of the form:

$$Y_{ivm} = \alpha C_{ivm} + \beta X_{ivm} + \rho_{vm} + \epsilon_{ivm} \tag{9}$$

where α is the parameter of interest, Y_{ivm} is the number of services the household i receives from the municipal government in village v in municipality m, C_{ivm} is the percentile rank of household i in the betweenness distribution of municipality m, and X_{ivm} is a vector of observable household characteristics used as controls. ρ_{vm} is an unobservable affecting all households in village v and ϵ_{ivm} is an idiosyncratic error term. Standard errors are clustered at the municipal-

level since it is the level at which network variables are computed.[24]

We start by estimating equation (9) with only municipal fixed effects (Column 1 of Table 2). Estimation results indicate that households with higher betweenness centrality receive more public services from the municipal government. We then use village fixed effects (Column 2) to control for one potentially important confound, namely, that more central households reside in villages that are more centrally located within the municipality and that the cost of providing services is lower there. This also rules out issues about endogenous location. In addition to controlling for location-specific determinants of service provision, village fixed effects also purge the coefficient of betweenness centrality from network characteristics that vary systematically across villages – such as average density or clustering. Results are unchanged.

Next we worry that betweenness centrality is correlated with household characteristics that are themselves correlated with the likelihood of receiving services from the government. To investigate whether this accounts for our results, we add various measures of household composition and household wealth as controls (Column 3).[25] Point estimates get smaller but they remain statistically significant. Another possible concern is that the results may be driven by characteristics of the household head, such as education. To account for this possibility, we add characteristics of the household head as controls. The estimates remain basically unchanged (Column 4).[26] Results also remain unaffected when we further control for the household's head occupation (Column 5).

[24]To show that our main results are unaffected by spatial correlation in errors across municipalities, we provide in Tables A.5 and A.12 similar regressions with standard errors clustered at the provincial level.

[25]The exact list is as follows: number of girls below one, between one and 5 and between 6 and 14; number of boys below one, between one and 5 and between 6 and 14; number of women between 15 and 29, between 30 and 49 and above 50; number of men between 15 and 29, between 30 and 49 and above 50. This is meant to capture that some services are targeted to households with members in certain age groups but the point estimates are unaffected if we control for household size directly instead (Table A.6). We also include a dummy for whether the household is classified as poor and the household predicted per capita income.

[26]The exact list of control variables is as follows: education attainment, gender, marital status, age and number of years the individual has lived in his village of current residence.

The point estimates suggest that moving from the bottom to the top of the betweenness distribution increases the number of services received by 0.029 units – or 3.7% of the mean number of services. This is equivalent to 35% of the effects of the household head having graduated from primary school, as opposed to not having enrolled in school at all. Those effects, while small, are in the same ballpark as the literature on the effects of centrality and political connections. For example, Battaglini and Patacchini (forthcoming) find that a one standard deviation increase in their preferred centrality measure increases interest group's contributions to congressmen by USD 16,000. This is about 1.7% of mean contribution. In our case, a one standard deviation increase in betweenness centrality increases the number of services received by 1% of the mean. The magnitude of this effect is similar to that reported by Gagliarducci and Manacorda (2016), who find that family connections to an elected politician increase earnings by 3.5% in Italy.

The reader may wonder why the regressions presented in Table 2 tend to have low R^2. This can be explained by a number of factors. First, several services covered in our analysis are subject to eligibility criteria, implying that mayors do not have full discretion on their allocation. Since we only have limited information about eligibility, much of the variation in eligibility across households is captured by the error term, and this mechanically reduces the R^2. What our results indicate is that incumbents use some of the discretion they have to distort the allocation of benefits towards high betweenness households. Secondly, with a sample as large as ours, overfitting is minimal. Any coefficient heterogeneity across municipalities tends to reduce fit quality compared to a regression estimated on a much smaller sample. For instance, if we run one regression per municipality with the same control variables, the average R2 across all municipalities is 0.12. Other factors that mechanically reduce the R^2 are the fact that the dependent variable only takes a few integer values with a high proportion of zeroes, and the fact that the R^2 reported in the Tables is net

of village fixed-effects.

To better understand the pattern of association between centrality and public services, we further test whether betweenness centrality operates through the intensive or the extensive margin. In Column 2 of Table A.7, the dependent variable is a dummy equal to one if the household received at least one service. In Column 3 of Table A.7, we run the same regressions but restrict the sample to households that receive at least one service. We think of Column 2 as capturing the extensive margin and Column 3 as capturing the intensive margin. We find that betweenness centrality is associated with more public services along both margins.[27]

To allow for non-linearity in betweenness centrality, we re-estimate equation (9) with a more flexible functional form. We take the set of controls included in Column 5 and add 99 different dummies capturing percentiles of the betweenness distribution (the lowest percentile is the excluded category). The point estimates (and associated 95% confidence intervals) are displayed in Figure 1. They increase up to the 40 percentile and tend to stabilise after that, although the largest point estimate remains the top percentile. The Figure implies that moving from the bottom to the top of the betweenness distribution increases the number of services received by 0.086, which is equivalent to 11% of the mean number of services.

For completeness, we replicate our analysis for each service separately (Table A.8). For the seven most common services, households with a higher betweenness measure are more likely to receive them. There are four services for which betweenness centrality is not significant, but this may be due to insufficient power. Indeed, these services tend to be less common: less than one percent of households receive them and they are not provided at all in a number of municipalities. If we look at services separately, point estimates for between-

[27] We have so far included the 'Other' category as one possible service that citizens receive from their municipal government. However, this category may include more than one service. We check that our findings are robust to excluding that category from the dependent variable. Results are basically unchanged (see Panel B of Table A.7).

ness translate to 5.1% of the mean for Philhealth, 2.8% of the mean for rice assistance, 4.3% of the mean for day-care, 2.7% of the mean for feeding assistance, 8.2% of the mean for microcredit, 8.7% of the mean for livelihood assistance, and 4.9% of the mean for scholarships.

We also check the robustness of the results to the way betweenness centrality enters the regressions. So far we have been using the percentile rank of the betweenness centrality of household i in municipality m. In Column 1 of Table A.9 we use the non-normalized betweenness measure instead. In Column 2 betweenness is standardized to have mean and variance one. We also normalize the betweenness measure to have mean zero and variance one in each municipality (Column 3) or in each village (Column 4). In all cases we reject the null at the one percent level or less. Our results therefore do not depend on the specific way by which we constructed the betweenness regressor.

So far we have used links brought by all household members older than 15 year old. We may, however, want to restrict the analysis to links associated with the household head and his/her spouse, because those links are likely to be the most salient. Our results are nonetheless robust to using the betweenness of the household head or of his/her spouse (Column 1-3 of Table A.10). They are also robust to taking the maximum of the two (Column 4), the average (Column 5), or the minimum (Column 6).

Our data has a large mass of zeros and we worry that estimating our regressions through OLS rather than negative binomial could affect our results. Our main issue is a computational one: with more than 3 million observations and more than 15,000 fixed effects we are unable to maximise the likelihood function. We proceed in three steps to reduce concerns that our results are driven by our choice of estimator. First, we show that the fixed effects do not make a large difference in our OLS regressions (Columns 1 and 2 of Table A.11). Second, we show that, without village fixed effects the negative binomial results yields a point estimate on betweenness centrality of .039, similar to the OLS and sig-

nificant at the 1% level - Column 4 of Table A.11). Finally, we run regressions (both OLS and Negative Binomial) with village-level averages of all controls. In both cases the point estimates are of the same sign and magnitude as the ones obtained previously (Columns 3 and 5 of Table A.11). We obtain similar results using Tobit regressions with left censoring at 0 and right censoring at 11 (Columns 6-7 of Table A.11). Taken together those results are consistent with the argument that our results are unlikely to be driven by our choice of estimator.

4.2 Betweenness Centrality, Unobserved Variables and Endogeneity Concerns

Before turning to alternative interpretations of our findings, we first need to address possible concerns over misspecification, missing variables, and endogeneity of betweenness.

We start by implementing a more demanding specification using a saturated model. This means that we include a full set of dummies for each distinct value of each control variable included in vector X. The results of this much more flexible specification (Column 1 of Table 3) are almost identical to those obtained previously.

Second, we worry that our results may be generated by the correlation between services rendered, betweenness, and family characteristics – particularly lineage (rather than household) size. To address this issue, we use the NHTS data to compute measures of lineage composition, education, and occupation. When we control for the resulting variables in addition to the household-level variables that were included in Column 5 of Table 2, our results remain basically unchanged.

Third, we check that our results are not merely capturing the fact that elite families are more central and better able to secure public services. Using data from the Department of Agrarian reform, we are able show that our results are robust to controlling for a household's family land ownership (Column 3). In

Column 4 we use historical records to identify lineages that were influential in the late Spanish colonial period; this does not affect our findings. In Tables A.13-A.16 we control for an even broader range of land ownership variables and colonial elite statusi, with no noticeable effect on our findigns. We also experiment with excluding all landed elite and all colonial elite lineages from the sample. Again, our results are basically unchanged.

Fourth, while we control for a large number of household and head characteristics, we worry that our results may be driven by characteristics of the household head's spouse. In Column 5 of Table 3, we further control for the spouse's gender, age, education levels and occupation. Again, our results are basically unchanged.

Fifth, in Column 6 of Table 3 we combine all the controls from Columns 1 to 5. Again, this does not affect our results.

Sixth, we recompute all the centrality measures using only family links between individuals older than 45 years of age – i.e., excluding marriage links involving individuals younger than 45 years of age. The rationale behind this approach is that, to the extent that marriage links are endogenous, marriage links formed a long time ago are less likely to be the result of current political conditions (Cruz, Labonne and Querubin, 2017). We find that our results are robust to using centrality measures calculated on this restricted family network (see Column 1 of Table 4). We also obtain similar results if instead we use the centrality measures obtained on the restricted network as instrument for centrality on the full network (Column 3 of Table 4). As a further check, we show that results are robust to excluding all households whose head is older than 45 (Columns 2 and 4 of Table 4). On that restricted sample, all the links used to compute centrality measures are inherited from older relatives and are thus least likely to suffer from reverse causality. We also verify that all the robustness checks reported in Table 3 are robust to using centrality measures from the over-45 network (Table A.18).

Seventh, we follow Bellows and Miguel (2009) and attempt to quantify the relative importance of omitted variable bias by looking at coefficient stability across specifications. Comparing Column 1 of Table 2 to Column 6 of Table 3, we see the point estimate of betweenness falls by .038 (from 0.067 to 0.029). Under the same assumptions as Oster (2017), targeting based on unobservables would have to be 1.76 times larger than targeting based on the very comprehensive set of controls that we considered in order for omitted variable bias to account for our finding.

Eighth, drawing inspiration from Bellows and Miguel (2009) we identify a subsample where endogeneity of betweenness is least likely to be an issue, namely, the subsample of households where the household head is single. In this sample, betweenness depends only on inherited lineage and not on who the head chooses to marry. Our results remain unchanged (Table A.17). To summarize, we find that the coefficient on betweenness centrality is largely unchanged across all these robustness checks. This gives us confidence that we are not confounding the effect of betweenness centrality with the effect of wealth/elite status or with the effect of other family characteristics.

4.3 Is Betweenness Centrality Proxying for Other Centrality Measures?

Next we investigate whether politicians channel favors to individuals who are central in an information diffusion sense. The purpose of this investigation is to verify that the conditional association between betweenness centrality and public services is not spurious, i.e., driven by a form of centrality other than the one emphasized in our theoretical model.

To illustrate, it is possible that politicians target trusted individuals who can reach the maximum number of people through their network of influence. If we translate this concept in terms of network structure, target beneficiaries should be those who can spread influence to the largest possible number of voters. What centrality measure this translates to depends on how far influence travels.

If influence is limited to one-on-one contact, the most influential individuals are those with many social links, that is, with a high degree. If influence percolates through the social network and is amplified by a social feedback multiplier – e.g., 'buzz' or 'trending' effects – then an influential broker is someone with a high Katz or eigenvector centrality (Jackson, 2010).

To test these possibilities, we re-estimate equation (9) with additional measures of centrality included as regressors. As before, for each measure we use the percentile rank of household i in municipality m. We start with Katz centrality. As there is no guidance on how to chose the decay parameter in influence transmission (α) we report results with various values of α. Columns 1-2 of Table 5 display the results with a decay factor of .21. Results with decay factors ranging from .01 to .91 in .1 increments are available in Tables A.19 and A.20.[28] Next we control for eigenvector centrality (Columns 3-4). We also control for the size of neighbourhood of distance 1 (i.e., degree) in Columns 5-6 and the size of neighbourhood of distance 1 to 4 (Columns 7-8). In columns 9-10 we control for all centrality measures at the same time.

Adding diffusion based centrality measures leaves the coefficient of betweenness unaffected, in magnitude as well as significance level.[29] This confirms that betweenness is not simply proxying for other centrality measures: its predictive power on the allocation of goods and services from the municipal government comes in addition to considerations of information diffusion, as proxied by centrality measures.[30]

[28] Katz centrality measures can also be seen as proxying for within-village variation in clustering that is not captured by village fixed effects. Indeed, having a more densely clustered network neighbourhood implies a higher Katz centrality – with different decay parameters weighting the cumulative effect of clustering at different distances.

[29] As a final robustness checks, we show that our main results are robust to excluding observations from the Autonomous Region of Muslim Mindanao. The likelihood that two individuals sharing the same names are related is lower in the ARMM. In addition, social conflict is more prevalent there and this might have affected data quality. The results are robust to this change (Table A.22).

[30] We also note that, if we estimate equation (9) separately for each municipality, controlling for both betweenness and Katz centrality, we find that their coefficients are negatively correlated across municipalities: in some municipalities betweenness matters more, and in others Katz centrality matters more. This offers suggestive evidence that municipalities differ in the relative weight that incumbents place on information diffusion versus preventing withdrawal of sup-

4.4 Is Betweenness Centrality Proxying for Distance to Politicians?

So far we have shown that households with high betweenness centrality receive more services from the municipal government. This finding is consistent with the theoretical model presented in Section 2, and it suggests that incumbents attempt to build support by providing municipal services to key individuals in order to facilitate cascades of electoral support in the family network.

We now seek to rule out a specific alternative interpretation for our finding, namely, that local politicians are themselves more central (Cruz, Labonne and Querubin, 2017) and we are capturing the fact that politicians are targeting their relatives. As discussed in Section 3, we have computed distance measures (up to network distance 5) between each household and the elected officials. We now include a dummy for each of these distances to our estimated model. Results are presented in Table 6. They show that our findings are robust to controlling for the distance between household i and municipal politicians. In Column 1, we flexibly control for distance to the mayor. In line with findings by Cruz, Labonne and Querubin (2017) and Fafchamps and Labonne (2017), we find that households closer to the mayor receive more public services.[31] Even though the point estimate of the betweenness variable is smaller in magnitude, we can still confidently reject the null. In Column 2 we control for the distance to the vice-mayor. In Column 3 we include both distances jointly. In all cases, we include a full set of dummies for each value of the distance variables. The results on betweenness are robust to the inclusion of these additional controls. We therefore conclude that the role of betweenness is not merely due to the fact that incumbents target their relatives.

A related concern is that, by virtue of being associated with an opposition

port. Exploring this cross-municipality variation is left for further research.

[31] Those results suggest that homophily is important in our study area, but it is has been discussed elsewhere and is not the focus of this paper. We do, however, control for social distance to local politicians throughout our analysis, and we indeed find that relatives of politicians are significantly more likely to receive public services allocated at the municipal level. These results mirror those of Folke, Persson and Rickne (2017) for Sweden and of Fafchamps and Labonne (2017) for jobs in the Philippines.

candidate, relatives of losing candidates may be less likely to receive services from the municipal government (Fafchamps and Labonne, 2017). If this were the case, our estimates would be downward biased. In Table 6 we use social distance to all candidates in the 2007 elections. In Column 4 we include distance to the runner-up in the mayoral race. In Column 5 we do the same for the vice-mayoral electoral race and, in Column 6, we control for both distances. We find that our results regarding betweenness are robust to controlling for social proximity to losing candidates as well as electoral winners.

4.5 Further Corroboration

We have documented that households with high betweenness centrality receive more public services. We have shown that this result holds if we control for social distance to politicians and for diffusion measures of centrality, and is robust to other confounds. This is consistent with the idea that incumbent politicians direct favors to secure the allegiance of individuals who are in the best position to block support cascades in their favor. We now provide additional indirect evidence consistent with this argument.

We start by showing that the correlation between public services and betweenness is weaker for close relatives of either the incumbent or the runner-up. We expect betweenness centrality to matter less for households that are close to the incumbent because, by the nature of the family network, their allegiance is likely to be already secured. On the other hand, unrelated individuals may be less easily trusted. For these reasons, we expect the coefficient of betweenness to be largest for individuals at intermediate social distance from the incumbents, i.e., distance 2 or 3 in our social network.[32] Since, in our data, there is variation in betweenness at each level of distance to the incumbent, we can potentially test this hypothesis.[33]

[32]For instance, at such intermediate social distance, intermediaries can introduce the politician to the local community (Hollnsteiner, 1963).

[33]The standard deviation of our betweenness measure is .22 for households that are distance zero to the incumbent, .24 for households that are distance two to the incumbent, .27 for house-

We estimate equation (9) with a separate betweenness measure for each value of the distance to the incumbent mayor elected in 2007. The results, presented in Column 1 of Table 7, are consistent with our hypothesis, thereby providing supportive evidence that our earlier findings reflect incumbents' desire to enlist the help of high betweenness individuals to establish and maintain political coalitions among local families.

A similar logic, albeit in reverse, should apply to relatives of the incumbent's opponents: they are unlikely to switch allegiance in order to serve the political ambitions of the incumbent, hence there is little point in trying to secure their support. We examine whether the coefficient of betweenness centrality is weaker for the close relatives of candidates who ran in 2007 but did not get elected. To this effect we estimate equation (9) with a separate betweenness measure for each value of the distance to unsuccessful mayoral candidates in the 2007 elections. Results, presented in Column 2 of Table 7, conform to expectations.

As a final effort to provide supportive evidence for our findings, we also investigate the relationship between betweenness centrality and lesser political actors at the municipality and village (sub-municipality) level. Our theory predicts that betweenness centrality is an important source of political power. If this is true, lesser political actors – such as candidates for municipal councils and elected village heads (Cruz, Labonne and Querubin, 2017) – should also have high betweenness. Indeed, their ability to block the transmission of support for candidates with whom they are not aligned should enable them to secure resources from candidates for higher office. In a clientelistic setting, this makes them more appealing patrons and citizens are more likely to vote for them.

We start by establishing that such political families are indeed more cen-

holds that are distance two to the incumbent, .27 for households that are distance three to the incumbent, .26 for households that are distance four to the incumbent and .30 for households that are distance five or more to the incumbent.

tral (Column 1 of Table 8). On average families of village heads captains are 0.15 percentage-points higher in the distribution of betweenness centrality in their municipality while families of council members are 0.10 percentage-points higher. Those patterns are again consistent with our theory.

We also see (Column 2) that direct relatives of the village head receive 0.034 more municipal services and direct relatives of local councillors receive 0.018 more services. Betweenness nonetheless still predicts the receipt of public services once we exclude the direct relatives of village heads and local councillors (Column 3). This suggests that village heads and local councillors are not the only politically influential individuals in the municipality; there are other key players who can be identified by their high betweenness centrality.

5 Conclusion

We have investigated whether households that are better able to block support cascades for the incumbent receive more public services. We argue that if the objective of local politicians is to maximise support in a context where political support is reinforced by cascading support in social networks, they should target favors towards household that have high betweenness centrality in the municipal network of family ties in order to secure their allegiance.

We use an unusually rich dataset on family networks and the distribution of public services at the local level to test these ideas. We find that individuals with high betweenness centrality receive more local public services than others. This result arise both at the extensive and intensive margin. It is robust to the inclusion of many control variables, including household characteristics predictive of eligibility to government programs, family characteristics, detailed measures of landownership, historical elite status, and the distance to different categories of incumbent politicians at the municipality level. We also find our main finding to be robust to controlling for other measures of network centrality. To provide further corroboration, we look for other indirect evidence that our interpreta-

tion of the results is correct. We find that the predictive power of betweenness is lessened for close relatives of both the incumbent and opposition politicians – probably because their allegiance is either guaranteed or cannot be bought by favors. We argue that, taken as a whole, the evidence strongly supports the hypothesis that incumbent municipal politicians offer favorable access to local public services to secure the allegiance of individuals and households most susceptible of blocking the cascading of support and electoral influence across local families.

The reader may wonder about the external validity of our findings: what do we learn from our results that would apply elsewhere? The first observation to make is that we study municipal elections. Because of the logistical difficulty of gathering voter support in elections at the regional or national level, politicians are likely to employ different mobilization techniques, such as the use of civic organizations (e.g., unions, churches, parties). They are also more likely to rely on marketing tools and the media. Secondly, we study a country at a moment in time when elections are contested and there is no single dominant party. We do not anticipate a similar emphasis on influential individuals in countries with a single or dominant party. Third, unlike other parts of the world, the country we study has largely escaped identity politics. Political parties in the Philippines tend to be political machines with little or no ideological foundation. In fact, it is common for politicians to switch allegiance from one party to another between elections. If voters can easily be mobilized through identity politics, politicians may prefer that method because it is likely to be cheaper, from the politicians' point of view, than seeking support through a coalition of local families. By the same reasoning, democracies where political parties are less clientelistic and compete in programmatic terms may have less need for the coalitions documented here. We therefore expect our findings to apply principally to electoral democracies with sufficient competition between clientelistic politicians at the local level. Such democracies are commonly found in many countries across the

world.

References

Akbarpour, Mohammad, Suraj Malladi and Amin Saberi. 2018. "Diffusion, Seeding, and the Value of Network Information." *Stanford University, mimeo* .

Alesina, Alberto and Paola Giuliano. 2011. "Family Ties and Political Participation." *Journal of the European Economic Association* 9(5):817–839.

Alesina, Alberto and Paola Giuliano. 2014. Family Ties. In *Handbook of Economic Growth*, ed. Philippine Aghion and Steven Durlauf. North Holland pp. 177–215.

Ballester, Coralio, Antoni Calvo-Armengol and Yves Zenou. 2006. "Who's Who in Networks. Wanted: The Key Player." *Econometrica* 74(5):1403–1417.

Banerjee, Abhijit, Arun Chandrasekhar, Esther Duflo and Matthew Jackson. 2016. "Gossip: identifying central individuals in a social network." *NBER Working Paper 20422* .

Bardhan, Pranab and Dilip Mookherjee. 2005. "Decentralizing antipoverty program delivery in developing countries." *Journal of Public Economics* 89:675–704.

Bardhan, Pranab and Dilip Mookherjee. 2006. "Pro-Poor Targeting and Accountability of Local Governments in West Bengal." *Journal of Development Economics* 79(2):303–327.

Battaglini, Marco and Eleonora Patacchini. forthcoming. "Influencing Connected Legislators." *The Journal of Political Economy* .

Bellows, John and Edward Miguel. 2009. "War and Local Collective Action in Sierra Leone." *Journal of Public Economics* 93(11-12).

Besley, Timothy, Rohini Pande, Lupin Rahman and Vijayendra Rao. 2004. "The Politics of Public Good Provision: Evidence from Indian Local Governments." *Journal of the European Economic Association* 2(2-3):416–426.

Besley, Timothy, Rohini Pande and Vijayendra Rao. 2012. "Just Rewards? Local Politics and Public Resource Allocation in South India." *World Bank Economic Review* 26(2):191–216.

Bloch, Francis. 2016. Targeting and Pricing in Social Networks. In *The Oxford Handbook of the Economics of Networks*, ed. Y. Bramoulle, B.W. Rogers and A. Galeotti. Oxford University Press.

Burt, R.S. 1992. *Structural Holes: The Social Structure of Competition*. Cambridge, MA: Harvard University Press.

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

Chandrasekhar, Arun and Randall Lewis. 2011. "Econometrics of Sampled Networks." *mimeo, Stanford University* .

Cruz, Cesi. forthcoming. "Social Networks and the Targeting of Illegal Electoral Strategies." *Comparative Political Studies* .

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.

Cruz, Cesi, Philip Keefer and Julien Labonne. 2018. "Buying Informed Voters: New Effects of Information on Voters and Candidates." *mimeo, University of British Columbia* .

Dixit, Avinash and John Londregan. 1996. "The Determinants of Success of Special Interests in Redistributive Politics." *The Journal of Politics* 58(04):1132–1155.

Dixit, Avinash and John Londregan. 1998. "Ideology, tactics and efficiency in redistributive politics." *Quarterly Journal of Economics* 113(2):497 – 529.

Dziubiński, Marcin Konrad and Sanjeev Goyal. 2017. "How do you defend a network?" *Theoretical Economics* 12(1):331–376.

Fafchamps, Marcel and Julien Labonne. 2017. "Do Politicians' Relatives Get Better Jobs? Evidence from Municipal Elections." *Journal of Law, Economics, & Organizations* 33:268–300.

Folke, Olle, Torsten Persson and Johanna Rickne. 2017. "Dynastic Political Rents? Economic Benefits to Relatives of Top Politicians." *The Economic Journal* 127(605):F495–F517.

Gagliarducci, Stefano and Marco Manacorda. 2016. "Politics in the Family: Nepotism and the Hiring Decisions of Italian Firms." *IZA DP No. 9841* .

Galasso, Emanuela and Martin Ravallion. 2005. "Decentralized Targeting of an Antipoverty Program." *Journal of Public Economics* 89(4):705–727.

Galeotti, Andrea and Sanjeev Goyal. 2009. "Influencing the influencers: a theory of strategic diffusion." *The RAND Journal of Economics* 40(3):509–532.

Gealogo, Francis Alvarez. 2010. Looking for Claveria's Children: Church, State, Power, and the Individual in Philippine Naming Systems during the Late Nineteenth Century. In *Personal Names in Asia. History, Culture and History*, ed. Zheng Yangwen and Charles J-H MacDonald. Singapore: NUS Press pp. 37–51.

Golden, Miriam and Brian Min. 2013. "Distributive Politics Around the World." *Annual Review of Political Science* 16(1):73–99.

Goyal, Sanjeev and Adrien Vigier. 2014. "Attack, Defence, and Contagion in Networks." *The Review of Economic Studies* 81(4):1518–1542.

Goyal, Sanjeev, Hoda Heidari and Michael Kearns. forthcoming. "Competitive contagion in networks." *Games and Economic Behavior* .

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.

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

Jackson, Matthew O., Brian W. Rogers and Yves Zenou. 2017. "The Economic Consequences of Social-Network Structure." *Journal of Economic Literature* 55(1):49–95.

Kerkvliet, Benedict J.T. 1996. Contested Meaning of Elections in the Philippines. In *The Politics of Elections in Southeast Asia*, ed. R.H Taylor. Cambridge University Press.

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* 11:461–474.

Lee, Lung-Fei, Xiaodong Liu, Eleonora Patacchini and Yves Zenou. 2012. "Criminal Networks: Who is the Key Player?" *CEPR Discussion Paper No. DP8772* .

Mayzlin, Dina. 2016. Managing social interactions. In *The Oxford Handbook of the Economics of Networks*, ed. Y. Bramoulle, B.W. Rogers and A. Galeotti. Oxford University Press.

Niehaus, Paul, Antonia Atanassova, Marianne Bertrand and Sendhil Mullainathan. 2013. "Targeting with Agents: Theory and Evidence from India's Targeted Public Distribution System." *American Economic Journal: Economic Policy* 5(1):206–38.

Oster, Emily. 2017. "Unobservable Selection and Coefficient Stability: Theory and Evidence." *Journal of Business & Economic Statistics* 0(0):1–18.

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.

Scott, James. 1998. *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, Conn.: Yale University Press.

Zenou, Yves. 2016. Key players. In *The Oxford Handbook of the Economics of Networks*, ed. Y. Bramoulle, B.W. Rogers and A. Galeotti. Oxford University Press.

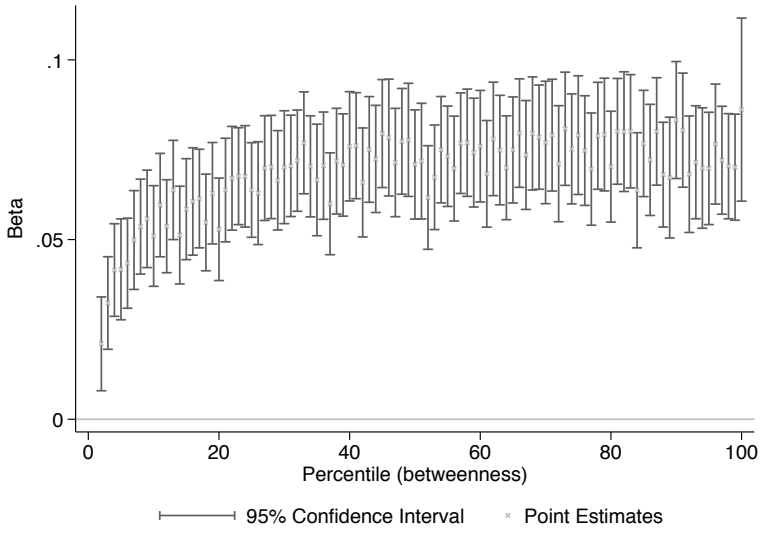

Figure 1: Point estimates for each different percentile of the betweenness distribution

Table 1: Descriptive Statistics

Variable Name	Observations (1)	Mean (2)	Std. Dev. (3)
Nb services received	3,260,162	0.78	(1.02)
Received at least one service	3,260,162	0.49	(0.50)
Betweenness	3,260,162	0.02	(0.04)
Betweenness (Head)	3,232,422	0.02	(0.03)
Betweenness (Spouse)	2,587,801	0.01	(0.02)
Eigenvector	3,260,162	0.24	(0.27)
Katz (0.01)	3,260,162	6.66	(7.25)
Katz (0.11)	3,260,162	3.68	(3.51)
Katz (0.21)	3,260,162	2.46	(1.90)
Katz (0.31)	3,260,162	1.84	(1.41)
Katz (0.41)	3,260,162	1.46	(1.18)
Katz (0.51)	3,260,162	1.21	(1.03)
Katz (0.61)	3,260,162	1.06	(0.94)
Katz (0.71)	3,260,162	0.65	(0.85)
Katz (0.81)	3,260,162	0.94	(0.85)
Katz (0.91)	3,260,162	0.87	(0.85)
Degree/Neighborhood (1)	3,260,162	100.11	(152.69)
Neighborhood (2)	3,260,162	1,135.12	(1361.73)
Neighborhood (3)	3,260,162	3,000.45	(2390.40)
Neighborhood (4)	3,260,162	2,231.57	(1904.82)
Distance Mayor	3,260,162	2.27	(1.09)
Distance Losing Mayoral Candidate	3,260,162	2.53	(1.42)
Distance Vice-Mayor	3,260,162	2.24	(1.04)
Distance Losing Vice-Mayoral Candidate	3,260,162	2.56	(1.41)
Distance Barangay Captain	3,260,162	1.13	(0.94)
Distance Councilor	3,260,162	1.45	(0.90)

Notes: Authors' calculations.

Table 2: Betweenness and Receipt of Government Services

	(1)	(2)	(3)	(4)	(5)
Between	0.067***	0.064***	0.037***	0.029***	0.029***
	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)
Fixed effects	Municipal	Village	Village	Village	Village
Observations	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162
R-squared	0.000	0.000	0.057	0.063	0.065

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include municipal fixed effects (Column 1) and village fixed effects (Column 2-5). In Columns 3-5, regressions control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor and the household predicted per capita income. Regressions control for the household's head gender, marital status, age, education and length of stay in the village of current residence (Columns 4-5). Regressions control for the household's head occupation (Column 5). The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table 3: Robustness Checks and Alternative Estimation Strategies

		Extra Controls:				
	Non-Parametric	Family Characteristics	Land Ownership	Colonial Elite	Spouse Characteristics	All Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Between	0.028***	0.029***	0.034***	0.035***	0.027***	0.029***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Observations	3,260,162	3,260,162	2,433,163	2,421,078	2,645,316	1,701,110
R-squared	0.073	0.065	0.075	0.073	0.059	0.077

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. In Column 1, the regression includes separate dummies for each value of each control variable (except predicted per capita income). In Column 2, the regression controls for the size, education levels and occupation of the household's family (defined as shared family name in the municipality). In Column 3, the regression controls for the share of municipal land that the household's family owns. In Column 4, the regression controls for a dummy equal to one if the household's family was classified a colonial elite during the Spanish occupation. In Column 5, regression control the household head's spouse gender, age, education and occupation. In Column 6, the regression control for all variables included in Columns 1-5. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table 4: Betweenness and Receipt of Government Services - Use over 45 year old network

	(1)	(2)	(3)	(4)
	OLS		IV	
Between (45 year old network)	0.029***	0.031***		
	(0.003)	(0.003)		
Between			0.031***	0.033***
			(0.002)	(0.002)
Observations	3,258,106	1,753,612	3,205,629	1,725,465

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. In Columns 2 and 4, we exclude from the sample all households whose head is older than 45. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table 5: Controlling for other centrality measures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Katz (.21)	0.024***	0.021***							0.016***	0.016***
	(0.002)	(0.002)							(0.002)	(0.002)
Eigenvector			0.026***	-0.012					-0.025*	-0.020
			(0.004)	(0.011)					(0.014)	(0.014)
Neighbour (1)					0.028***	-0.021	0.023***	-0.017	0.029***	-0.011
					(0.003)	(0.019)	(0.006)	(0.018)	(0.009)	(0.017)
Neighbour (2)							0.020***	0.016**	0.034***	0.027***
							(0.008)	(0.008)	(0.010)	(0.009)
Neighbour (3)							0.006**	0.006**	0.004	0.004
							(0.003)	(0.003)	(0.003)	(0.003)
Neighbour (4)							0.027***	0.027***	0.022***	0.022***
							(0.004)	(0.004)	(0.004)	(0.004)
Between		0.027***		0.040***		0.050***		0.044**		0.041**
		(0.003)		(0.010)		(0.018)		(0.019)		(0.018)
R-squared	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065

Notes: Results from household-level regressions. Observations: 3,260,162. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table 6: Controlling for distance to politicians

	(1)	(2)	(3)	(4)	(5)	(6)
Between	0.017***	0.014***	0.011***	0.009***	0.009***	0.008**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Distance to winning candidate for:						
Mayor	Yes	No	Yes	Yes	Yes	Yes
Vice-Mayor	No	Yes	Yes	Yes	Yes	Yes
Distance to losing candidate for:						
Mayor	No	No	No	Yes	No	Yes
Vice-Mayor	No	No	No	No	Yes	Yes
Observations	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162
R-squared	0.065	0.065	0.065	0.065	0.065	0.065

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation.
The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table 7: Heterogeneity - distance to mayoral candidates (2007)

	(1)	(2)
Distance to:	Winning Candidates	Losing Candidate
Betweenness*		
Distance 0	0.012	-0.016
	(0.022)	(0.019)
Distance 1	0.003	-0.000
	(0.005)	(0.005)
Distance 2	0.012***	0.011***
	(0.004)	(0.004)
Distance 3	0.023***	0.019***
	(0.006)	(0.007)
Distance 4	0.012	0.009
	(0.015)	(0.013)
Distance 5+	-0.018	0.014**
	(0.012)	(0.006)
Observations	3,260,162	3,260,162
R-squared	0.065	0.065

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence, occupation and distance to winning candidates for mayor and vice-mayor in the 2007 elections. In Column 2, the regression also controls for distance to losing candidates for mayor in the 2007 elections. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table 8: Local political actors

	(1)	(2)	(3)
Dep. Var.	Betweenness	Nb Services	
Village head	0.151***	0.034***	
	(0.003)	(0.005)	
Councilor	0.109***	0.018***	
	(0.004)	(0.006)	
Between		0.011***	0.012***
		(0.003)	(0.003)
Between * Village head		-0.031***	
		(0.006)	
Between * Councilor		-0.023***	
		(0.009)	
Observations	3,260,168	3,260,162	2,456,077
R-squared	0.454	0.065	0.064

Notes: Results from household-level regressions. The dependent variable is the household percentile rank in the municipal betweenness distribution (Column 1). The dependent variable is the number of services the household receives from the municipal government (Columns 2-3). Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence, occupation and distance to winning candidates for mayor and vice-mayor in the 2007 elections. In Column 2, the regression also controls for distance to losing candidates for mayor in the 2007 elections. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

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Table A.1: Correlation Centrality Measures

	Between	Katz with decay factor:					Neighborhood			
		.01	.21	.41	.61	.81	1	2	3	4
Betweenness	1									
Katz (.01)	0.772	1								
Katz (.21)	-0.0087	-0.0078	1							
Katz (.41)	-0.0810	-0.112	0.0682	1						
Katz (.61)	-0.0921	-0.120	0.0109	0.130	1					
Katz (.81)	-0.0924	-0.119	0.0113	0.112	0.154	1				
Neighbor. (1)	0.659	0.851	-0.0189	-0.0933	-0.101	-0.102	1			
Neighbor. (2)	0.301	0.660	0.0104	-0.0817	-0.0905	-0.0907	0.795	1		
Neighbor. (3)	-0.0970	0.208	0.0767	-0.0116	-0.0224	-0.0200	0.250	0.636	1	
Neighbor. (4)	-0.353	-0.254	0.0243	0.0603	0.0689	0.0725	-0.251	-0.129	0.535	1
Eigenvector	0.804	0.869	0.00576	-0.0965	-0.112	-0.111	0.695	0.466	0.0405	-0.383

Notes: Correlation between the various centrality measures used in the paper. Authors' calculations.

Table A.2: Extra Descriptive Statistics (1)

Variable Name	Observations (1)	Mean (2)	Std. Dev. (3)
Nb Girls (0-1)	3,260,162	0.05	(0.23)
Nb Girls (1-5)	3,260,162	0.29	(0.56)
Nb Girls (6-14)	3,260,162	0.52	(0.81)
Nb Boys (0-1)	3,260,162	0.06	(0.24)
Nb Boys (1-5)	3,260,162	0.31	(0.58)
Nb Boys (6-14)	3,260,162	0.55	(0.84)
Nb Men (15-29)	3,260,162	0.65	(0.84)
Nb Men (30-49)	3,260,162	0.53	(0.54)
Nb Men (50+)	3,260,162	0.28	(0.47)
Nb Women (15-29)	3,260,162	0.62	(0.75)
Nb Women (30-49)	3,260,162	0.50	(0.53)
Nb Women (50+)	3,260,162	0.29	(0.49)
Female headed	3,260,162	0.13	(0.34)
Age (HH head)	3,260,162	44.45	(14.84)
Length of residence	3,260,162	21.59	(17.94)
Poor	3,260,162	0.53	(0.50)
Predicted p.c. income	3,260,162	17,221	(11488)

Notes: Authors' calculations.

Table A.3: Extra Descriptive Statistics (2)

Variable Name	Observations (1)	Mean (2)	Std. Dev. (3)
Household head education			
No Grade Completed	3,260,162	10.48	(30.63)
Kinder or Daycare	3,260,162	0.55	(7.37)
Grade 1	3,260,162	3.47	(18.31)
Grade 2	3,260,162	4.76	(21.29)
Grade 3	3,260,162	6.35	(24.39)
Grade 4	3,260,162	7.62	(26.53)
Grade 5	3,260,162	6.75	(25.09)
Grade 6	3,260,162	20.57	(40.42)
1st Year High School	3,260,162	3.43	(18.21)
2nd Year High School	3,260,162	4.89	(21.57)
3rd Year High School	3,260,162	3.74	(18.97)
4th Year High School	3,260,162	13.84	(34.53)
1st Year College	3,260,162	1.94	(13.80)
2nd Year College	3,260,162	2.95	(16.92)
3rd Year College	3,260,162	1.21	(10.94)
4th Year College	3,260,162	0.82	(9.03)
College Graduate	3,260,162	6.39	(24.45)
Above (MA/PhD)	3,260,162	0.24	(4.92)
Household head occupation:			
Special Occupations	3,260,162	1.58	(12.45)
Officials, Managers, Supervisors	3,260,162	2.42	(15.38)
Professionals	3,260,162	1.80	(13.31)
Technicians, Associate Professionals	3,260,162	0.69	(8.29)
Clerks	3,260,162	0.40	(6.29)
Service, Shop, Market Sales Workers	3,260,162	4.36	(20.41)
Farmers, Forestry Workers, Fishermen	3,260,162	52.15	(49.95)
Trades, Related workers	3,260,162	2.48	(15.54)
Plant, Machine Operators, Assemblers	3,260,162	2.48	(15.55)
Laborers, Unskilled Workers	3,260,162	20.54	(40.40)
None	3,260,162	11.10	(31.42)
Share of municipal land owned	2,433,163	0.29	(2.02)
Land area	2,433,163	26,600	(123630)
Landowning status:			
Landowner	2,433,163	16.95	(37.52)
Top 50% Landowner	2,433,163	9.89	(29.85)
Top 25% Landowner	2,433,163	5.41	(22.63)
Top 10% Landowner	2,433,163	2.27	(14.90)
Top Landowner	2,433,163	0.21	(4.56)
Spanish Elite (municipal)	1,335,986	2.06	(14.22)
Spanish Elite (provincial)	2,421,078	4.62	(21.00)
Taft Elite (municipal)	507,125	2.38	(15.25)
Taft Elite (provincial)	1,206,938	6.23	(24.16)

Notes: Authors' calculations.

Table A.4: Correlates of Centrality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var:	Between	Degree	Eigenvector	Katz (.01)	Katz (.21)	Katz (.41)	Katz (.61)	Katz (.81)
Nb men (15-29)	0.116***	0.085*	0.052	0.083*	0.652***	0.755***	0.824***	0.773***
	(0.044)	(0.044)	(0.042)	(0.043)	(0.024)	(0.024)	(0.024)	(0.025)
Nb men (30-49)	0.196**	0.120	0.047	0.104	1.185***	1.421***	1.610***	1.601***
	(0.088)	(0.090)	(0.090)	(0.088)	(0.059)	(0.056)	(0.056)	(0.058)
Nb men (50+)	-0.036	-0.129	-0.161	-0.164	1.490***	2.033***	2.384***	2.301***
	(0.158)	(0.158)	(0.150)	(0.154)	(0.090)	(0.097)	(0.098)	(0.097)
Nb women (15-29)	0.414***	0.390***	0.333***	0.385***	1.404***	1.600***	1.620***	1.605***
	(0.070)	(0.071)	(0.066)	(0.069)	(0.034)	(0.037)	(0.039)	(0.037)
Nb women (30-49)	0.756***	0.678***	0.562***	0.663***	2.140***	2.462***	2.516***	2.715***
	(0.104)	(0.106)	(0.100)	(0.104)	(0.045)	(0.046)	(0.048)	(0.049)
Nb women (50+)	1.262***	1.143***	0.986***	1.128***	3.588***	4.229***	4.366***	4.516***
	(0.179)	(0.179)	(0.168)	(0.176)	(0.063)	(0.061)	(0.066)	(0.069)
Household head:								
Education	0.085***	0.037**	0.009	0.032*	0.030**	-0.007	-0.019**	-0.000
	(0.012)	(0.015)	(0.023)	(0.017)	(0.013)	(0.008)	(0.008)	(0.008)
Female	-2.089***	-1.908***	-1.589***	-1.839***	-4.258***	-4.808***	-4.825***	-5.303***
	(0.162)	(0.161)	(0.151)	(0.160)	(0.099)	(0.104)	(0.112)	(0.110)
Age	-0.057***	-0.059***	-0.059***	-0.060***	-0.122***	-0.131***	-0.130***	-0.130***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)
length of residence	0.055***	0.059***	0.058***	0.060***	0.064***	0.030***	0.010***	0.007***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Nb Family Members	0.057***	0.057***	0.055***	0.056***	-0.000	-0.010***	-0.012***	-0.013***
	(0.006)	(0.006)	(0.005)	(0.006)	(0.001)	(0.001)	(0.001)	(0.001)
Poor	0.067	0.160***	0.243***	0.173***	0.694***	0.808***	0.924***	0.863***
	(0.053)	(0.059)	(0.076)	(0.063)	(0.054)	(0.047)	(0.046)	(0.044)
Observations	3,260,168	3,260,168	3,260,168	3,260,168	3,260,168	3,260,168	3,260,168	3,260,168
R-squared	0.407	0.414	0.401	0.405	0.009	0.022	0.028	0.030

Notes: Results from household-level regressions. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.5: Betweenness and Receipt of Government Services (province clustering)

	(1)	(2)	(3)	(4)	(5)
Between	0.067***	0.064***	0.037***	0.029***	0.029***
	(0.009)	(0.006)	(0.004)	(0.004)	(0.004)
Fixed effects	Municipal	Village	Village	Village	Village
Observations	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162
R-squared	0.000	0.000	0.057	0.063	0.065

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include municipal fixed effects (Column 1) and village fixed effects (Column 2-5). In Columns 3-5, regressions control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor and the household predicted per capita income. Regressions control for the household's head gender, marital status, age, education and length of stay in the village of current residence (Columns 4-5). Regressions control for the household's head occupation (Column 5). The standard errors (in parentheses) account for potential correlation within province. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.6: Robustness Checks (household size)

	(1)	(2)
Between	0.023***	
	(0.003)	
Between		0.023***
(over 45 networks)		(0.003)
Observations	3,260,162	3,258,106
R-squared	0.057	0.057

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the household size, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.7: Betweenness and Receipt of Government Services - Alternative Outcome Variables

	(1)	(2)	(3)
Dep. Var.	# Services	Get at least one service	# Services
Panel A: All services			
Between	0.029***	0.015***	0.019***
	(0.003)	(0.001)	(0.003)
Observations	3,260,162	3,260,162	1,596,536
R-squared	0.065	0.044	0.051
Panel B: Exclude the 'other' category			
Between	0.029***	0.016***	0.017***
	(0.003)	(0.001)	(0.003)
Observations	3,260,162	3,260,162	1,431,259
R-squared	0.070	0.054	0.049

Notes: Results from household-level regressions. In Column 1, the dependent variable is the number of services the household receives from the municipal government. In Column 2, the dependent variable is a dummy capturing whether the household receives at least one service. In Column 3, he dependent variable is the number of services the household receives from the municipal government (conditional on getting at least one). In Panel B, the service "other" is excluded from the calculations. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.8: All Services

	(1) Z-score	(2) philhealth	(3) rice	(4) day care	(5) feeding	(6) microcredit	(7) livelihood	(8) scholarship	(9) self emp.	(10) cash transfer	(11) housing	(12) other
Between	0.096***	1.414***	0.509***	0.335***	0.165***	0.208***	0.178***	0.092***	-0.031	0.039*	-0.026	0.044
	(0.011)	(0.136)	(0.091)	(0.066)	(0.061)	(0.043)	(0.038)	(0.029)	(0.021)	(0.022)	(0.026)	(0.069)
R-squared	0.049	0.051	0.034	0.049	0.029	0.007	0.006	0.013	0.006	0.002	0.001	0.003

Notes: Results from household-level regressions (Observations: 3,260,162). The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.9: Betweenness and Receipt of Government Services - Alternative Betweenness

	(1)	(2)	(3)	(4)
Between (raw)	0.082***			
	(0.023)			
Between (normalised)		0.003***		
		(0.001)		
Between (normalised - municipal)			0.003***	
			(0.001)	
Between (normalised - village)				0.003***
				(0.001)
Observations	3,260,162	3,260,162	3,260,162	3,260,162
R-squared	0.065	0.065	0.065	0.065

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. In Column 2, the measure of betweenness is normalised to be mean zero and standard deviation one. In Column 3, the measure of betweenness is normalised to be mean zero and standard deviation one in each municipality. In Column 4, the measure of betweenness is normalised to be mean zero and standard deviation one in each village. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.10: Betweenness and Receipt of Government Services - Alternative Betweenness

	(1)	(2)	(3)	(4)	(5)	(6)
Between (Head)	0.027***		0.029***			
	(0.003)		(0.003)			
Between (Spouse)		0.030***	0.033***			
		(0.003)	(0.003)			
Maximum (Head, Spouse)				0.041***		
				(0.004)		
Average (Head, Spouse)					0.061***	
					(0.005)	
Minimum (Head, Spouse)						0.038***
						(0.004)
Observations	2,619,921	2,586,647	2,561,662	2,644,906	2,561,662	2,644,906
R-squared	0.059	0.059	0.059	0.059	0.059	0.059

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head (and spouse) gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.11: Betweenness and Receipt of Government Services - Comparing Estimators

	OLS			Negative Binomial		Tobit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Between	0.029***	0.029***	0.036***	0.039***	0.046***	0.061***	0.074***
	(0.005)	(0.003)	(0.005)	(0.007)	(0.006)	(0.010)	(0.009)
Village fixed effects	No	Yes	No	No	No	No	No
Village level averages	No	No	Yes	No	Yes	No	Yes
Observations	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162
R-squared	0.081	0.065	0.145				

Notes: Results from household-level regressions (OLS in Columns 1-3, negative binomial in Columns 4-5 and Tobit with left censoring at 0 and right censoring at 11 in Columns 6-7). The dependent variable is the number of services the household receives from the municipal government. Regressions control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head (and spouse) gender, marital status, age, education, length of stay in the village of current residence and occupation. In Column 2 the regression include village fixed effects. In Columns 3, 5 and 7, the regressions control for the village-level average of the control variables listed above. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.12: Robustness Checks and Alternative Estimation Strategies (province clustering)

		Extra Controls:				
	Non-Parametric	Family Characteristics	Land Ownership	Colonial Elite	Spouse Characteristics	All Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Between	0.028***	0.029***	0.034***	0.035***	0.027***	0.029***
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
Observations	3,260,162	3,260,162	2,433,163	2,421,078	2,645,316	1,701,110
R-squared	0.073	0.065	0.075	0.073	0.059	0.077

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. In Column 1, the regression includes separate dummies for each value of each control variable (except predicted per capita income). In Column 2, the regression controls for the size, education levels and occupation of the household's family (defined as shared family name in the municipality). In Column 3, the regression controls for the share of municipal land that the household's family owns. In Column 4, the regression controls for a dummy equal to one if the household's family was classified a colonial elite during the Spanish occupation. In Column 5, regression control the household head's spouse gender, age, education and occupation. In Column 6, the regression control for all variables included in Columns 1-5. The standard errors (in parentheses) account for potential correlation within province. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.13: Betweenness and Receipt of Government Services - Controlling for Land Wealth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Between	0.034***	0.034***	0.032***	0.033***	0.033***	0.034***	0.034***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Land area	0.000						
	(0.000)						
Share land		0.004					
		(0.029)					
Landowner			0.007***				
			(0.002)				
Top 50% landowner				0.005			
				(0.003)			
Top 25% landowner					0.006*		
					(0.004)		
Top 10% landowner						0.008	
						(0.006)	
Top landowner							-0.009
							(0.013)
Observations	2,433,163	2,433,163	2,433,163	2,433,163	2,433,163	2,433,163	2,433,163
R-squared	0.075	0.075	0.075	0.075	0.075	0.075	0.075

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.14: Betweenness and Receipt of Government Services - Excluding Landed Elites

	(1)	(2)	(3)	(4)	(5)
Between	0.036***	0.035***	0.035***	0.034***	0.034***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Exclude :	Any Landowner	top 50%	top 25%	top 10%	top
Observations	2,020,772	2,192,583	2,301,476	2,377,894	2,428,082
R-squared	0.074	0.075	0.075	0.075	0.075

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.15: Betweenness and Receipt of Government Services - Controlling for Colonial elites

	(1)	(2)	(3)	(4)
Between	0.032***	0.035***	0.031***	0.032***
	(0.004)	(0.003)	(0.007)	(0.005)
colonial	-0.009	-0.007**	0.008	-0.005
	(0.008)	(0.004)	(0.009)	(0.004)
Colonial Measure: :	Spanish elite		Taft commission	
	Municipal	Provincial	Municipal	Provincial
Observations	1,335,986	2,421,078	507,125	1,206,938
R-squared	0.077	0.073	0.079	0.075

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.16: Betweenness and Receipt of Government Services - Excluding Colonial elites

	(1)	(2)	(3)	(4)
Between	0.032***	0.036***	0.031***	0.033***
	(0.004)	(0.003)	(0.007)	(0.005)
Exclude :	Spanish elite		Taft commission	
	Municipal	Provincial	Municipal	Provincial
Observations	1,308,400	2,309,162	495,043	1,131,793
R-squared	0.077	0.073	0.078	0.074

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.17: Betweenness and Receipt of Government Services (single household heads only)

	(1)	(2)	(3)	(4)	(5)
Between (household head)	0.037***	0.038***	0.031***	0.030***	0.031***
	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)
Fixed effects	Municipal	Village	Village	Village	Village
Observations	117,148	117,148	117,148	117,148	117,148
R-squared	0.000	0.000	0.075	0.085	0.090

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include municipal fixed effects (Column 1) and village fixed effects (Column 2-5). In Columns 3-5, regressions control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor and the household predicted per capita income. Regressions control for the household's head gender, marital status, age, education and length of stay in the village of current residence (Columns 4-5). Regressions control for the household's head occupation (Column 5). The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.18: Robustness Checks and Alternative Estimation Strategies (over 45 network)

		Extra Controls:				
	Non-Parametric	Family Characteristics	Land Ownership	Colonial Elite	Spouse Characteristics	All Controls
	(1)	(2)	(3)	(4)	(5)	(6)
Between	0.051***	0.029***	0.034***	0.034***	0.027***	0.030***
	(0.007)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Observations	3,205,629	3,258,106	2,455,745	2,443,665	2,643,528	1,726,158
R-squared	0.073	0.066	0.075	0.074	0.059	0.077

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. In Column 1, the regression includes separate dummies for each value of each control variable (except predicted per capita income). In Column 2, the regression controls for the size, education levels and occupation of the household's family (defined as shared family name in the municipality). In Column 3, the regression controls for the share of municipal land that the household's family owns. In Column 4, the regression controls for a dummy equal to one if the household's family was classified a colonial elite during the Spanish occupation. In Column 5, regression control the household head's spouse gender, age, education and occupation. In Column 6, the regression control for all variables included in Columns 1-5. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.19: Controlling for other centrality measures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Decay Factor:	.01		.21		.41		.61		.81	
Katz	0.028***	-0.012	0.024***	0.021***	0.016***	0.019***	0.012***	0.017***	0.010***	0.015***
	(0.003)	(0.015)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Between		0.041***		0.027***		0.031***		0.032***		0.031***
		(0.014)		(0.003)		(0.003)		(0.003)		(0.003)
Observations	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162
R-squared	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.20: Controlling for other centrality measures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Decay Factor:	.11		.31		.51		.71		.91	
Katz	0.027***	0.017***	0.020***	0.021***	0.012***	0.016***	0.005***	0.011***	0.008***	0.013***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Between		0.021***		0.030***		0.032***		0.031***		0.031***
		(0.003)		(0.003)		(0.003)		(0.003)		(0.003)
Observations	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162	3,260,162
R-squared	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.21: Betweenness and Receipt of Government Services - Exclude relatives of politicians

	(1)	(2)	(3)	(4)	(5)
Between	0.067***	0.063***	0.037***	0.030***	0.030***
	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	3,098,150	3,098,150	3,098,150	3,098,150	3,098,150
R-squared	0.000	0.000	0.057	0.063	0.065

Notes: Results from household-level regressions. All direct relatives of candidates for mayor and vice-mayor in 2007 are excluded from the sample. The dependent variable is the number of services the household receives from the municipal government. Regressions include municipal fixed effects (Column 1) and village fixed effects (Column 2-5). In Columns 3-5, regressions control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor and the household predicted per capita income. Regressions control for the household's head gender, marital status, age, education and length of stay in the village of current residence (Columns 4-5). Regressions control for the household's head occupation (Column 5). The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.

Table A.22: Robustness Checks - Excluding ARMM

	(1)	(2)	(3)	(4)	(5)
Between	0.034***			0.031***	0.008**
	(0.003)			(0.003)	(0.003)
Between		0.033***			
(Over 45 networks)		(0.003)			
Between (Head)			0.029***		
			(0.003)		
Between (Spouse)			0.033***		
			(0.003)		
Katz (.21)				0.026***	
				(0.002)	
Observations	2,590,132	2,610,275	2,561,662	2,590,132	3,260,162
R-squared	0.077	0.077	0.059	0.077	0.065

Notes: Results from household-level regressions. The dependent variable is the number of services the household receives from the municipal government. Regressions include village fixed effects and control for the number of men age 15-29, 30-49 and 50+, the number of women age 15-29, 30-49 and 50+, the number of boys age less than 1, 1-5 and 6-14, the number of girls age less than 1, 1-5 and 6-14, whether the household is classified as poor, the household predicted per capita income, for the household's head gender, marital status, age, education, length of stay in the village of current residence and occupation. In Column 3, the variables are entered separately for the household head and his/her spouse. In Column 5, the regression controls for distance to both the mayor and the vice-mayor. The standard errors (in parentheses) account for potential correlation within municipality. * denotes significance at the 10%, ** at the 5% and, *** at the 1% level.