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**RETHINKING THE POLITICAL ECONOMY OF
DECENTRALIZATION: HOW ELECTIONS AND PARTIES
SHAPE THE PROVISION OF LOCAL PUBLIC GOODS**

Raúl A. Ponce-Rodríguez*
Charles R. Hankla**
Jorge Martinez-Vazquez***
Eunice Heredia-Ortiz****

* *Universidad Autónoma de Ciudad Juárez*

** *Georgia State University*

*** *Georgia State University and GEN*

**** *Development Alternatives Inc., DAI*



Rethinking the Political Economy of Decentralization: How Elections and Parties Shape the Provision of Local Public Goods

Raúl A. Ponce-Rodríguez

Department of Economics
Universidad Autónoma de Ciudad Juárez

Charles R. Hankla

Department of Political Science
Georgia State University

Jorge Martinez-Vazquez

Department of Economics
Georgia State University

Eunice Heredia-Ortiz¹

Development Alternatives Inc., DAI

As more and more of the world's states devolve power and resources to sub-national governments, decentralization has emerged as one of the most important global trends of the new century. Yet there is still no consensus concerning the benefits of decentralization and how to design institutions that can realize these benefits. In this paper, we investigate the political conditions under which the decentralization of authority will improve the delivery of public goods. Building off Oates' "decentralization theorem" to include inter-jurisdictional spillovers, we develop a new theory suggesting that the interaction of democratic decentralization (the popular election of sub-national governments) and party centralization (the power of national party leaders over sub-national office-seekers) will produce the best service delivery outcomes. To test this argument empirically, we develop a new dataset of sub-national political institutions. Our analyses, which examine educational and health service delivery in 135 countries across 30 years, provide support for our theoretical expectations.

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1. Introduction

As more and more of the world's states devolve power and resources to sub-national governments, decentralization has emerged as one of the most important global trends of the new century. Yet there is still no consensus concerning the benefits of decentralization and how to design institutions that can realize these benefits. In this paper, we investigate the political institutions under which the decentralization of authority will improve the delivery of public goods.

We begin with Oates' (1972) decentralization theorem, in which he shows formally that the decentralized provision of local public goods will be more efficient. This theorem has influenced virtually all of the modern literature in decentralization, and it is the cornerstone of many of the arguments supporting decentralization programs today.

But Oates' theorem has a weakness: it makes the assumption that local public goods have no interjurisdictional spillovers. Unfortunately, in the real world, these goods often have cross-border effects, raising the risk that local officials may be unwilling to pay for their efficient provision because some of the benefits are "wasted" on the citizens of other constituencies. To take an example, will regional or local governments be ready to construct health centers and schools that citizens of neighboring jurisdictions may use? Such public goods may be efficient and to the benefit of a nation in the aggregate, but local officials may be unwilling to pay for them if they cannot internalize all of the credit.

In this paper, then, we ask whether the hypothesized advantages of empowering sub-national governments will still hold even when public goods are assumed to spill over across jurisdictions. We develop an argument, described conceptually here and presented formally in Ponce et al. (2015a, 2015b), showing that, under certain political conditions, decentralization can

still maximize the efficiency of public goods provision even when spillovers are present. More specifically, we contend that local public goods will best be provided when democratic decentralization is combined with party centralization. In democratically decentralized systems, subnational governments are elected by their citizens, ensuring the accountability mechanisms necessary to incentivize the provision of desired public goods. In party centralized systems, however, these local elections are contested by national parties that are controlled by central elites. Under these circumstances, national interests seep into local policy-making, increasing the motivation of local governments to provide efficient levels of public goods, even when their benefits might spill across jurisdictions.

To test these arguments empirically, we make use of a new dataset of sub-national political institutions created for this project. Up to this point, scholars interested in sub-national political institutions have been forced to focus on single cases (especially the United States) or to assume that national-level political institutions are replicated at the sub-national level. Our new dataset allows us to examine how the structure of sub-national political institutions influences educational and health outcomes (our proxies for public goods provision) in 135 countries across 30 years. This empirical analysis, to our knowledge the broadest quantitative exploration of sub-national politics in the literature, provides solid support for our theoretical expectations.

The rest of the paper is organized as follows. Section two reviews the pertinent literature. Section three discusses the basic intuition behind our analysis. Section four presents our empirical analysis and our results. Section five concludes.

2. *Review of the Literature*

Among economists, most modern research on decentralization can be traced back to Tiebout's landmark 1956 study, which argued that a decentralized system of public service delivery maximizes efficiency by allowing government services to vary according to the preferences of citizens in different jurisdictions. Oates in his 1972 formulation of the decentralization theorem picked up on this idea and qualified it by assuming away interjurisdictional spillovers. Ever since then, scholars have spent significant time critiquing and testing the proposition that decentralization improves governance.

To take a few examples from this expansive literature, Breton (2002), Treisman (2007), Lockwood (2002), and Besley and Coate (2003) examine whether central governments could themselves target public goods delivery to regional preferences, while Bardhan (2002) and Manor (1999) express skepticism that individuals will move to regions that provide the policies they prefer. Treisman (2000, 2007) and Tanzi (2002) assert that decentralization increases opportunities for corruption, while Shah (2003) and Manor (1999) worry that it can be counter-productive if sub-national civil servants are not sufficiently professionalized.

More recently, another group of scholars, most notably Brennan and Buchanan (1980) and Weingast (1995), have developed a somewhat different logic for the benefits of decentralization. Instead of allocative efficiency, these researchers emphasize the utility of decentralization in generating a healthy competition among jurisdictions. Those that are most efficient at public goods delivery will attract new citizens, they argue, whereas those that govern poorly will find their populations and tax bases shriveled. Of course, this contention, like the arguments made by Tiebout and Oates, has attracted its share of critics, especially among those who fear that decentralization could produce an inequitable distribution of goods (Prud'Homme

1995), exacerbate regional enmities (Treisman 1999, von Braun and Grote 2002), or lead to local elite capture (Bardhan and Mookherjee, 2000). Many scholars are also concerned about the possible negative impact of decentralization for a country's fiscal balances. For example, Treisman (2000) and Wibbels (2000) find an empirical connection between federalism and inflation.

Despite the critics, most scholarship in political science and economics, following in the tradition of Tiebout, Oates, and Weingast, has viewed decentralization positively. On the empirical side, however, evidence for the proposed link between decentralization and efficiency has been mixed. Among the skeptics, Davoodi and Zou (1998) believe that devolving power to sub-national governments slows economic growth in developing countries, Parry (1997) is skeptical that decentralization in Chile has improved educational outcomes, and, more recently, Malesky, Nguyen, and Tran (2014) find that public service provision mostly improved after the abolition of district-level representative councils in Vietnam. On the positive side, Lewis (1998) associates improved water delivery with decentralization in Kenya and Habibi et al. (2003) point to evidence that strong sub-national government reduced infant mortality in Argentina. Studies of Bolivia (Faguet and Sanchez 2008), Argentina (Habibi et al. 2003), and Indonesia (Simatupang 2009), as well as cross-national quantitative analyses (Heredia 2006), also point to improved educational outcomes with decentralization.²

A reasonable summary, then, is that most scholars continue to see decentralization as a route to improving the delivery of public goods, but with a number of significant caveats (see Hankla 2009). If the benefits of decentralization are indeed conditional on other factors, something that many scholars suspect, it could help account for the mixed empirical findings outlined above. Thus far, however, the literature has spent little time considering how political

² This literature is comprehensively evaluated in Martinez-Vazquez, Lago-Peñas, and Sacchi (2015).

institutions might matter in mediating the effects of devolving power to sub-national governments.

Political scientists have long investigated the implications of different institutional configurations for the delivery of public goods, but their efforts have focused almost exclusively on national governments. Most scholars in this area agree, at least implicitly, that the political institutions likely to produce positive outcomes are those which expose leaders to popular democratic pressures while insulating them from particularistic interest groups (e.g. O'Halloran 1994, Haggard and Kaufman 1995, Hallerberg and Marier 2004).

That said, scholars have explored the impact of political party organization on policy outcomes (one of the central concerns of this article) less thoroughly than other institutions. The little research that has considered party organization has linked a more centralized structure (with empowered national elites) to improved public goods provision. Hankla (2006) and Nielson (2003), for example, argue that democracies with centralized political parties are more likely to adopt free trade policies, and Hallerberg and Marier (2004) find a connection between centralized parties and balanced budgets in Latin America. Similarly, Hicken and Simmons (2008) argue that that education spending undertaken by decentralized parties is more particularistic and less effective. These scholars argue that party centralization shifts power from local elites, who might be tempted to shore-up their support with particularistic goods, to national party leaders, who have electoral incentives to consider the aggregate national interest.

While the research relating party structures to public goods generally concerns the national level, some scholars have investigated the causal relationship between party and party system centralization on the one hand and the empowerment of sub-national governments on the other (e.g. Chhibber and Kollman 2004; Dickovic 2011). Others have addressed the question of

whether and how party structures can contribute to (or undermine) the stability of federalism (e.g. Filippov, Ordeshook, and Shvetsova 2004; Myerson 2006).

All of these scholars have improved our understanding of how partisan and sub-national institutions interact, but their focus has not been on connecting particular sub-national political institutions with public goods provision. Indeed, there are very few systematic studies in the literature that make this connection, but it is worth highlighting four influential analyses here. First, Riker, in his 1964 study, suggests that decentralized parties could be both a driver of democratic decentralization and a protector of the benefits of federalism. Second, Wibbels argues in his 2005 book that the presence of centralized parties facilitates the efforts of national leaders to push sub-national governments into market reforms. Third, Hecock (2006) finds a positive relationship between sub-national political competition and educational spending in Mexico. Finally, and perhaps most related to our own work, Enikolopov and Zhuravskaya (2007) conclude, after a cross-national empirical study, that devolving fiscal authority to sub-national governments is more likely to improve public goods (in this case, education) delivery when parties are centralized.

Despite some overlap, however, there are a number of significant differences between our argument and those set forth by these scholars. For example, Riker is primarily concerned with the causal relationship between party and democratic decentralization, rather than with the combinations of the two that would best generate public goods. Wibbels (2005), for his part, focuses on party centralization as a means of national control within a decentralized political system, and not on the incentives such structures create for internalizing externalities. In a similar vein, Hecock (2006) is more interested in the level of partisan competition than in the questions of party organization that we study here.

Moreover, in contrast to Enikolopov and Zhuravshaya's important and well-executed 2007 study, we consider here the interaction between party centralization and democratic decentralization rather than that between party centralization and fiscal decentralization, and so our theory is significantly different. To be more specific, Enikolopov and Zhuravshaya do not consider, as we do, whether sub-national governments are elected, but focus instead on whether they are fiscally empowered. This is certainly an important factor, but previous work has indicated that the accountability that comes with democratic elections is very likely necessary to improve governance outcomes (i.e. Manor 1999). For that reason, we choose to examine the significant cross-national variation in sub-national democracy that exists in the world, making the assumption that democratically decentralized governments are also fiscally decentralized.³

On the empirical side, we believe that our dataset, which measures party decentralization not only more directly but also at the sub-national level, hews more closely to theory. Enikolopov and Zhuravshaya do not observe political centralization directly but rather use two proxies: *i*) the age of the main parties (the older the more centralized), and *ii*) the fractionalization of the party system (the higher the less centralized). While these proxies were undoubtedly the best indicators available to them at the time, they are quite problematic. There is little reason to believe, for example, that party age should correlate closely to party centralization. Party centralization is largely a function of a country's specific political institutions, including its electoral system, its degree of federalism, and its candidate nomination procedures, rather than a result of its political development. For instance, many scholars, beginning with Riker in 1964, have classified America's two major parties as decentralized because of their lack of party unity at the national level and because primaries determine their

³ The reverse case – that fiscally decentralized systems are generally democratically decentralized – is not likely to hold, as the prominent contemporary cases of Vietnam and China clearly show.

nomination decisions. These parties are, of course, among the oldest in the world. By contrast, many new democracies have centralized parties that are dominated by a highly charismatic leader.

A country's party system fractionalization, its effective number of parties, is also a problematic proxy for its party centralization. The reason is that fractionalization is measured at the *party system* level, not the party level. It is entirely possible, and indeed common, for decentralized parties to form a low fractionalized party system, and for centralized parties to join together in a highly fractionalized party system. The United States is an example of the first contrary case, while Mexico, the Netherlands, and many other countries fall into the second. As a result, it is clear that a higher number of effective parties does not necessarily lead to more decentralized parties, as Enikolopov and Zhuravshaya assume. Our new dataset, which measures party (de)centralization using the power of national party leaders to nominate candidates for sub-national office, is coded at the sub-national party level and therefore represents a much more direct measure of the underlying concepts.

To summarize, then, the purpose of our paper is to merge insights from the decentralization literature with scholarship on institutions, all to identify the political conditions needed for realizing the benefits of decentralization. We turn to developing our theory in the next section.

3 *Theory*

In developing our theory, we address the implications of different institutional configurations for local public goods provision in the presence of interjurisdictional spillovers.⁴

More specifically, we consider four cases:

- (1) countries that are **democratically decentralized** (i.e. they have democratically elected sub-national governments) and **party decentralized** (i.e. national leaders lack the power to select candidates for these sub-national elections);
- (2) countries that are **democratically centralized** (i.e. they have no elected sub-national governments) but **party decentralized** (i.e. national leaders lack the power to nominate candidates for constituency elections to the national legislature);
- (3) countries that are **democratically decentralized** (i.e. they have elected sub-national governments) but **party centralized** (i.e. national party leaders select candidates for sub-national elections); and
- (4) countries that are **democratically centralized** (i.e. they have no elected sub-national governments) and **party centralized** (i.e. national party leaders nominate candidates to constituency elections for the national legislature).

We argue, first, that democratic decentralization produces incentives for politicians to provide citizens with the bundle of public goods that they desire. It can do so through two primary mechanisms: accountability and information. Elected subnational governments are accountable to their local constituents, and therefore have an incentive to provide the goods and services that these citizens desire, on pain of being voted out of office (see von Braun and Grote

⁴ We develop this argument formally for plurality electoral systems in Ponce et al. (2015a) and for proportional electoral systems in Ponce et al. (2015b). For space reasons, we limit ourselves here to a conceptual summary of our theoretical argument, but one that we believe can stand on its own reasonably well. For more development of the arguments, please see the above cited papers.

2002). They are also likely to have more information about what these preferences are than officials in far-away national capitals. As a result, in keeping with the basic logic of the decentralization theorem, polities with elected sub-national governments are more likely to target public services to the needs and preferences of their constituents, allowing bundles of goods to vary across constituency. Of course, having these governments democratically elected is the key to ensuring that they are responsive to citizen desires (Bird and Vaillancourt 1998, Manor 1999).

Second, we contend that party centralization has the contrasting benefit of increasing the chances that any externalities from local public goods will be internalized. When democratically decentralized systems are party centralized, local elections will be contested mainly by parties which compete nationally. Countries with non-partisan local elections, as well as those with local elections contested primarily by regional parties or independents, will not, therefore, meet our definition of party centralized systems. Additionally, party centralized systems will be characterized by national parties that are internally centralized, meaning that national party elites will have control over the nomination of candidates for sub-national office (see Carey and Shugart 1995). When both of these conditions are met, namely that national parties dominate local elections and are themselves internally centralized, the parties can serve as a conduit for linking the national and the local, as described below.

We have already noted that a common concern about democratic and fiscal decentralization is that local governments will under-provide public goods with beneficial spillovers beyond their constituencies. This is because such governments are unable to internalize and profit from the political rewards of providing these goods optimally. The “rational” policy is instead to ignore the benefits that arise in other jurisdictions and/or to free-ride on the expenditures of neighboring governments; in either case the production of public

goods will not be optimal. A number of basic public services, such as primary health, general education, water treatment and environmental protection, are likely to generate spillover effects and may not receive sufficient financing from local governments when parties are decentralized.⁵

When parties are centralized, however, sub-national elected leaders do have incentives to provide more public goods with benefits that spillover into neighboring constituencies. National party leaders will be interested in generating optimal levels of public goods with spillover effects because they are concerned with their party's prospects in the country as a whole. In centralized parties, these national leaders have significant powers, not least nomination powers over sub-national politicians, and therefore can push them to optimally supply these goods. Not only that, but local officials in party centralized systems are likely to harbor the desire to move up within their own parties and, eventually, to acquire national office. They will thus have one eye on the national implications of their local policies, and are therefore less likely to eschew public goods with spillovers.

To summarize, sub-national leaders in systems with democratic decentralization and party centralization have two masters whose interests are sometimes in competition, namely party chiefs in the national capital and local voters in their constituencies. Without the former, these leaders cannot be nominated and without the latter they cannot be elected. These competing loyalties produce incentives both to provide differentiated local public goods and to spend more money on goods with spillover effects. As a result, our argument is that systems that mix democratic decentralization with party centralization will have the best outcomes from the perspective of the optimal supply of local public goods, other things equal. Systems that are centralized in both ways lack sufficient incentives to differentiate and target goods to local

⁵ In the theory and practice of fiscal federalism, these externalities justify the use of conditional grants from the central to subnational governments.

preferences, and systems that are decentralized in both dimensions have little incentive to generate optimal levels of public goods with geographical externalities.

A final question is whether countries that mix centralization and decentralization in the reverse way, those with no locally elected governments but with decentralized parties, might be able to produce the same beneficial results. We think not. Even if politicians elected to the national legislature from local districts have incentives to concern themselves with local preferences, their ability to force the central government to differentiate tax and spending bundles for their constituents will be limited. Moreover, theoretical models developed by Lockwood (2002) and Besley and Coate (2003) indicate that, while central governments may provide different constituencies with different bundles of public goods, a more decentralized approach to decision-making is likely to produce more efficient differentiation. In any case, such systems are empirically very rare, and so we do not focus on them in the statistical analysis that we present below.

5 *Empirical Analysis*

In this section we test our hypothesis that political institutions affect the efficiency with which local public goods are provided. More specifically, we evaluate the key expectation stemming from our theory that the combination of democratic decentralization and party centralization will lead to the best delivery of local public goods, other things equal.⁶ To do this, we make use of a series of quantitative models of all electorally competitive countries from

⁶ Our formal treatments of the theory, found in Ponce et al. (2015a, 2015b), indicate that, in the presence of interjurisdictional spillovers, democratic decentralization is optimal for the provision of public goods when parties are centralized, as argued above. They also indicate that, under certain limited conditions, democratic decentralization can be efficient even when parties are decentralized (i.e. when primaries are open or open list proportional systems are organized centrally). At the sub-national level, however, we are unable to differentiate empirically between types of primaries and whether open list systems are more or less decentralized. For that reason, we compare centralized and decentralized parties in the aggregate. If our arguments are correct, an aggregate comparison of centralized and decentralized parties should reveal the expected differential effects.

1976 to 2006, contingent on data availability. Our most expansive model considers 2237 observations and 135 countries, to our knowledge the broadest examination of sub-national political institutions in the literature.

We employ five different measures of educational outcomes and three different measures of health outcomes to operationalize our dependent variable, the provision of public goods at the sub-national level. Education and health measures are often used in the empirical literature to denote public goods provision at the sub-national level (see, for example, Enikolopov and Zhuravskaya 2007 and Faguet and Sanchez 2008). Our specific measures come from World Bank (2010) and include *Primary School Completion Rate*, *Primary School Teachers* as a proportion of youth population, *Children out of School* as a proportion of youth population, *Primary Enrollment Rate*, *Primary School Ratio of Girls to Boys*, *Children Receiving DPT Immunizations*, *Public Health Expenditures*, and *Infant Mortality*. Note that, for robustness, these variables include indicators of both policy input (i.e. *Public Health Expenditures*) and final policy outcome (i.e. *Infant Mortality*). Indeed, in order to determine whether our theory operates through increased spending or increased policy efficiency, we divide our health policy analyses into one model that considers inputs and two that measure outputs. Consistent with the literature, these latter models make use of a policy outcome as the dependent variable and also control for spending. Note that we are unable to construct our education model in this way because educational spending data are much sparser. We discuss how our eight dependent variables are coded and provide some summary statistics in Table 1.

Insert Table 1 here

We select educational and health outcomes as our dependent variables because they allow us to examine both allocative efficiency gains (i.e. differentiation based on local preference – the

main hypothesized benefit of decentralization as reflected in the decentralization theorem) and the degree to which public goods are provided in the face of spillovers (our hypothesized benefit of centralized parties). Why should this be so? First, our indicators of educational and health provision are subject to strong extra-jurisdictional spillover effects. All inhabitants of a country benefit from the educational attainment of their fellow citizens — in general, greater knowledge accumulation leads to reduced crime and economic improvements that spill outside the limits of any single jurisdiction. Another source of spillover effects occurs with population mobility — local residents may move outside a jurisdiction after receiving their education, and residents of neighboring jurisdictions may sometimes register for schools not provided in their own locales. For these reasons, the provision of education, as measured by our indicators, can be associated with a greater willingness on the part of local leaders to provide public goods in the presence of spillovers. The same is likely to be the case with the provision of basic health services such as vaccination. In many countries, basic health is under the authority of sub-national governments, and it is a common occurrence for citizens to cross jurisdictional boundaries in pursuit of care. In addition, as with education, there are clear national spillover effects associated with immunization rates, for example, and more generally with a healthier population.

Our educational and health indicators also capture allocative efficiency effects. Improved political accountability resulting from democratic decentralization provides decentralized governments greater incentives to act in accordance with the needs and preferences of their constituents. While most constituencies will prize superior educational outcomes, different sorts of practices are likely to produce these outcomes in different locales. For example, in one jurisdiction, limited resources might best be channeled into increasing the number of teachers, whereas in another improved educational materials might be the focus. As a result, we believe

that superior educational provision likely reflects (other things equal) an ability on the part of officials to consider local preferences and conditions. In a similar way, while all citizens are likely to favor high quality health services, scarce local resources may, for example, be more efficiently used on medical centers in one constituency and on medicines in another. Positive health outcomes are therefore more likely to obtain, we believe, when local governments can target their resources to the differing needs of their constituents.⁷

On the right side of the equation, our theory requires that we consider both the existence of elected sub-national governments and the level of party decentralization at the sub-national level. We develop an original dataset of sub-national political institutions to capture both of these measures, which we code for all countries between 1975 and 2007, where data are available. As part of this dataset, we code for the presence of elections, the structure of legislative-executive relations, the electoral system, the extent to which the national party system is replicated, and the centralization of parties at both the highest sub-national level and the municipal level (defined as the lowest level of sub-national government).

To operationalize party centralization, we code candidate nomination powers as conceived by Carey and Shugart (1995) and supplement those data with a measure of the local presence of national parties. From our original dataset, then, we create two key independent variables to include in the model. Our first dummy variable, labeled *Democratic*

⁷ The literature also bears out our use of educational and health outcomes to measure allocative efficiency and the internalization of spillovers. For example, two papers (Faguet and Sanchez 2005 and Solé-Ollé and Esteller-Moré 2005) conclude that decentralization leads to better adjustment between investment patterns and local demands (in Bolivian municipalities in the first instance and Spanish provinces in the second). Similarly, in a more recent paper, Arze del Granado, Martínez-Vázquez, and McNab (2012) analyze the effects of decentralization on the composition of public expenditures for a large panel of countries and conclude that decentralization of public goods delivery is usually accompanied by an increase in educational expenditures. This finding asserts that decentralization, via greater responsiveness of public officials and preference matching, can increase allocative efficiency by altering the composition of public expenditures. And an analysis by Cerniglia and Longaretti (2013) shows that the targeting of educational services to the specific preferences of different jurisdictions can contribute to more rapid human capital accumulation and accelerated growth.

Decentralization, Party Centralization, is coded “1” when (1) there are municipal elections, and (2) more than 75% of municipal council seats are held by national parties, and (3) national party leaders exercise centralized power over municipal party nomination (i.e. party centralization is coded “0” above).⁸ Our second, labeled *Democratic Decentralization, Party Decentralization*, is coded “1” when (1) there are municipal elections, and either (2) 75% or fewer of municipal council seats are held by national parties, or (3) national party leaders do not control party nomination in municipal elections. Our omitted reference category, of course, is systems with no democratic decentralization at all. To our knowledge, this article is the first to consider party system nationalization and party centralization simultaneously in a large empirical model.

Our operationalization of municipal elections is fairly permissive, requiring only that multiparty or competitive non-party elections are held. It is also worth noting that, although our dataset includes information on both regional and municipal institutions, we focus on municipalities (defined as the lowest sub-national authority) in this analysis. We believe that this level of government, in the aggregate, is most likely to matter for the educational and health outcomes that we consider.

Beyond our key theoretical indicators, we control for potentially confounding political factors by including three additional variables, also coded as part of our original dataset. The first of these is *Municipal Plurality*, coded “1” when municipal council elections are held using a plurality (as opposed to a proportional or mixed) electoral system. The second is *Municipal Directly Elected Executive*, coded “1” when municipal executives are directly elected and not

⁸ Note that the extent of local party system nationalization can vary by municipality within individual countries, and that party centralization can vary by party within individual countries. There tends, all the same, to be a great deal of commonality in party system nationalization and party structure within a country, allowing for relatively straightforward coding in most cases. That said, when we encountered mixed cases, we went with what appeared to be the most common institutional structure in the country. In addition, in cases where all the available evidence pointed to national party domination of local elections, we assumed that more than 75% of seats were held by these parties, even if detailed data were not available. Those country-years coded “1” on the primary dummy variable are listed in Table 2, and we are very open to feedback by country experts on the accuracy of the coding.

removable (except through impeachment or election recall) by the municipal councils. While there is little research on the impact of these institutions at the municipal level, previous research on electoral and executive institutions at the national level indicates strong unitary executives (elected and subject to reasonable legislative oversight) may produce better public outcomes than dominant legislatures (see, for example, Mukherjee 2003; Egger, Koethenbueger and Smart 2010; and Sabatini 2003). And, although this finding is still quite contested, proportional electoral systems may have certain benefits over simple plurality systems (see, for example, Lijphart 1977). Our third political control variable is coded “1” when elections are held at the regional, or highest sub-national, level. Elected government at this intermediate level, when it exists, may have an independent impact on public goods delivery. For all of the political variables, of course, democratically centralized systems are among those coded “0”.

We also include in the model a series of economic and social control variables, namely GDP per capita in purchasing power parity, fertility rate, population density, total population, decade dummies, and, in some cases, world region dummies. The data for all of our economic and social indicators are taken from World Bank (2010). As our theoretical model assumes elections, we also restrict our models to countries that are minimally electorally competitive at the national level, using a six out of seven on the *Legislative Index of Electoral Competitiveness* from the Database of Political Institutions as our cut-off (Beck et al. 2001). Summary statistics on all of our variables are presented in Table 1, and a complete listing of all country-years coded “1” on our primary *Democratic Decentralization, Party Centralization* variable is presented in Table 2.

To ensure the robustness of our empirical tests, we estimate three separate models for each dependent variable. Our primary models use a random effects framework with AR1

autocorrelation correction, decade dummies, and world region dummies. To avoid any chance of bias arising from the assumption of random effects, we also estimate fixed effects models as our first robustness test. These models, like those above, make use of decade dummies and an AR1 correction. They are, of course, more robust to omitted variable bias than the random effects models, but they also consider only the less important cross-temporal variation present in our data. Our final robustness tests make use of the Arellano-Bond System Generalized Method of Moments (GMM) estimator (see Roodman 2009). This approach allows us to address any potential reverse causality in the models by instrumenting endogenous variables with their differences and lags.⁹ It also corrects for panel effects, autocorrelation, and (with robust standard errors) heteroskedasticity. We present the results of our eight primary models in Table 3, of our fixed effects models in Table 4, and of our Arellano-Bond models in Table 5.

Insert Tables 3, 4, and 5 here

5.1 Results

The empirical results provide strong support for our hypotheses. Taking first the primary models in Table 3, the *Democratic Decentralization, Party Centralization* variable is statistically significant in six of the eight estimations and in the expected direction but not significant in the other two. Given that these eight models differ significantly in their dependent variables and in the number and identity of the observations they include, the consistency of the results is quite striking. The *Democratic Decentralization, Party Decentralization* variable is statistically significant only in the *Children Out of School* model, where its coefficient is much lower than

⁹ We identify three variables – *Fertility, Logged GDP per capita, and Logged Population Density* as potentially endogenous.

the coefficient of the *Democratic Decentralization, Party Centralization* variable.¹⁰ In all of the remaining models, the variable is in the expected direction but not statistically significant. These results support our expectations that combining municipal elections with centralized parties produces the best service delivery outcomes, and that combining municipal elections with decentralized parties is still generally superior to having no democratic decentralization at all (the omitted reference category).¹¹ And the size of these predicted effects is also worthy of consideration. Model 1, for instance, indicates that the combination of democratic decentralization and party centralization causes an increase in primary school enrollment of more than two percent, or a little less than one-tenth of a standard deviation. The effect of this institutional combination on the percentage of children out of school is even greater, reducing it by about one-fifth of a standard deviation.

Moreover, the results are only slightly weaker when rerun using fixed effects and Arellano-Bond. In the fixed effects models, shown in Table 4, the *Democratic Decentralization, Party Centralization* variable is statistically significant in five of the eight estimations, and the *Democratic Decentralization, Party Decentralization* in two (and nearly so in a third). It is

¹⁰ When *Democratic Decentralization, Party Centralization* is statistically significant and *Democratic Decentralization, Party Decentralization* is not, we can be confident that the combination of democratic decentralization and party centralization produces better outcomes than the residual category of no local elections. As expected, however, such results provide no evidence of any differential effect when local elections occur under decentralized parties. Such a finding is clearly supportive of our arguments, but it is distinct from a finding that the effects of *Democratic Decentralization, Party Centralization* and those of *Democratic Decentralization, Party Decentralization* are statistically significantly different from one another. We tested this hypothesis for the models in Table 1 and found that the effects of *Democratic Decentralization, Party Centralization* were indeed significantly greater than those of *Democratic Decentralization, Party Decentralization* in two models (*Primary Enrollment Rate* and *Public Health Expenditures*) and that they were nearly so (between 10% and 20% probability) in two others (*Infant Mortality* and *Children Out of School*).

¹¹ Some readers may wonder about the impact of fiscal decentralization on our models. Might the relationships we identify only matter when local governments have the financial power to deliver public goods? To evaluate this possibility, we estimated the random effects models with only fiscally decentralized countries and years, defined as those observations where both revenue and expenditure decentralization exceeded 10% of total government amounts (as reported in the IMF's Government Financial Statistics). Because this approach severely limited our total observations, due largely to missing data, we did not report these as our primary models. The results are robust for most of the dependent variables, but they do become insignificant for *Primary Enrollment Rate* and *Public Health Expenditures*, and fall to just below the 10% significance mark for *Infant Mortality*. These changes are likely due to the dramatic lowering of the number of observations we are able to include in these models.

worth noting that in two of the five models with significant results (*Children Out of School* and *Primary School Teachers*), there is no evidence that democratically decentralized countries with centralized parties outperform those with decentralized parties. Such evidence is, however, present in the remaining three models (*Primary Completion Rate*, *Primary Enrollment Rate*, and *Public Health Expenditures*). It is likely that the slightly weaker results produced by these models result from their focus only on cross-temporal changes in the independent variables of interest. Finally, in the Arellano-Bond models, shown in Table 5, the *Democratic Decentralization, Party Centralization* variable is statistically significant in seven of the eight estimations, and the *Democratic Decentralization, Party Decentralization* in six. In all but one of these cases, the impact of the *Democratic Decentralization, Party Centralization* variable is greater than that of the *Democratic Decentralization, Party Decentralization* variable, as expected, although the difference is less great than in the primary models. It is also worth noting that we find significant effects for two of the dependent variables, *Primary Ratio of Girls to Boys* and *DPT Immunization*, which were not significant in Tables 3 and 4. Overall, the Arellano-Bond models provide evidence for the hypothesis that local elections and centralized parties are best, but this evidence is somewhat weaker than that found in Table 3. However, these models do demonstrate clearly the benefits of democratic decentralization relative to the complete absence of local elections.

Does the available evidence support a spending or an efficiency explanation for the superior performance of party centralized, democratically decentralized systems? The presence of local elections is clearly associated both with increased spending on health and with better immunization and infant mortality outcomes. The evidence for the additional benefit of centralized parties is, however, clearer in the spending models (though it also appears in the

infant mortality fixed effects model). So, it seems likely that local elections are incentivizing increased public good spending *and* increased efficiency of delivery, and that centralized parties are at a minimum raising spending (though they may also have an efficiency impact). Finally, note that there is strong evidence linking increased spending with best policy outputs in health.

Which control variables matter for educational and health outcomes? Perhaps the most interesting finding is that municipalities with plurality electoral systems tend to provide public service delivery that is inferior to those with proportional or multimember systems. This effect, which is consistent with previous findings related to national-level institutions, is particularly robust with respect to the number of children out of school and total health expenditures, but it also shows up elsewhere. More surprisingly, there is evidence, albeit much weaker, that systems with directly elected mayors may show inferior performance as well.

Among the economic and social control variables, perhaps the most robust finding is the strong association between low fertility and high GDP per capita on the one hand and positive health and educational outcomes on the other. The only major exception to this rule is the link between per capita income and inferior outcomes that appears in several of the Arellano-Bond models. This surprising finding is likely due to this model's incorporation of a first differences equation; countries that are already rich may see fewer improvements in health or education indicators.

Population density also tends to be associated with positive outcomes, although less universally than low fertility; countries with high density levels are likely to experience greater ease of service delivery than highly ruralized economies. The effects of total population are more mixed and tend to vary with each indicator. Perhaps the most surprising finding among the control variables, however, relates to the regional elections dummy. It is sometimes, though not

always, associated with negative outcomes in the random and fixed effects models, and more robustly associated with positive outcomes (as expected) in the Arellano-Bond models. This difference indicates that the variable may be highly correlated with some of the endogenous variables in the GMM model, and that the differential treatment of these variables affects their predicted impact. In any case, the results here are too mixed to draw any definitive conclusions about the impact of regional elections on public goods delivery.

What can we say to summarize the results? The strongest implication of our theoretical model—yielding the strong decentralization theorem—is the welfare dominance of democratic decentralization with party centralization. The benefits of combining democratic decentralization with party centralization are well borne out in our empirical analyses. The *Democratic Decentralization, Party Centralization* variable is statistically significant and in the expected direction in eighteen of the twenty-four models, and it is either stronger or more statistically significant than the *Democratic Decentralization, Party Decentralization* in all but three of these eighteen. While this difference between the two variables is only sometimes statistically significant, it is highly consistent across a variety of indicators. Given the difficulty of measuring educational and health outcomes, particularly in the developing world, and given the complexity and specificity of local politics in different countries, the robustness of the results provided here is notable. With a reasonable degree of certainty, we therefore conclude that the combination of local elections and national parties is superior for public goods delivery (other things equal), and that the existence of decentralized locally elected government, even when national parties are not present, is in any case superior to a fully centralized system.

6 Conclusion

In this paper, we examine which types of political institutions may be necessary to deliver the gains from decentralization predicted by much of the literature. We contend that decentralization will produce the best service delivery outcomes when centralized, national parties compete for office in locally elected governments. Democratic decentralization, we argue, provides the accountability and information necessary for the efficient creation of local public goods, while party centralization incentivizes the provision of such goods even when their benefits spill across jurisdictional boundaries.

To test our argument empirically, we create a large dataset on sub-national political institutions and use it to estimate a series of cross-national empirical analysis of educational and health outcomes. Our dataset is, to our knowledge, the first to compile measures of sub-national political institutions across a large set of countries. Our empirical findings provide strong support for our hypothesis. They show that the combination of municipal elections and party centralization tends to produce the best educational and health outcomes.

Our ultimate goal in this paper is to understand better how the growing prevalence of decentralization, mitigated by the structure of local political institutions, may impact the everyday lives of citizens around the world. We find that political institutions, which are typically ignored in the economics literature on fiscal decentralization that begins with Oates' (1972) decentralization theorem, may significantly influence the efficiency of decentralized systems. Our results also show the potential of merging political science and economics into broader approaches to explore the interconnected dynamics of decentralized governance.

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Table 1: Summary Statistics

Variable	Computation Method and Source	Mean	Range	Expectations
Primary School Completion Rate	The ratio of total primary school graduates to the total population of relevant age. (Source: World Bank)	81.7	10.0 to 125	Dependent Variable
Children Out of School	The ratio of primary aged children not enrolled in school to the total population under age 14. (Source: World Bank)	4.36	0 to 29.4	Dependent Variable
Primary School Teachers	The ratio of primary school teachers to the total population under age 14. (Source: World Bank)	1.60	.113 to 4.34	Dependent Variable
Primary School Enrollment	The ratio of total enrollment in primary school, regardless of age, to the total population of primary school age. (Source: World Bank)	99.3	17.9 to 158	Dependent Variable
Primary School Ratio of Girls to Boys	The ratio of girls to boys enrolled in primary school. (Source: World Bank)	95.6	48.3 to 122	Dependent Variable
Children Receiving DPT Immunizations	The percentage of children aged 12 to 24 months who have received adequate DPT vaccination. (Source: World Bank)	79.3	1 to 99	Dependent Variable
Public Health Expenditure	Total public expenditure on health as a percentage of GDP (Source: World Bank)	3.46	0 to 14.1	Dependent Variable
Infant Mortality	Number of infants dying before one year of age per 1000 live births (Source: World Bank)	38.2	2.2 to 154	Dependent Variable
Democratic Decentralization, Party Centralization (Lagged)	Coded "1" when (1) there are municipal elections, and (2) more than 75% of municipal council seats are held by national parties, and (3) national party leaders control party nomination in municipal elections. (Source: Original Dataset)	.456	Dummy	Positive (but the sign for this and all variables below should be reversed for Children Out of School and Infant Mortality)
Democratic Decentralization, Party Decentralization (Lagged)	Coded "1" when (1) there are municipal elections, and either (2) 75% or fewer of municipal council seats are held by national parties, or (3) national party leaders do not control party nomination in municipal elections. (Source: Original Dataset)	.303	Dummy	Insignificant or Positive with a smaller sign than Democratic Decentralization, Party Centralization
Municipal Plurality (Lagged)	Coded "1" when (1) there are municipal elections, and (2) a plurality system is used to elect the municipal assembly. (Source: Original Dataset)	.241	Dummy	Uncertain (Negative?)
Municipal Directly Elected Executive (Lagged)	Coded "1" when (1) there are municipal elections, and (2) the municipal mayor or other executive is directly elected and cannot be removed by the municipal council. (Source: Original Dataset)	.309	Dummy	Uncertain (Positive?)
Fertility (Lagged)	Lagged average births per woman (Source: World Bank)	3.29	1.08 to 7.74	Negative
Logged GDP per capita (Lagged)	Lagged Logged GDP per capita ppp (Source: World Bank)	8.59	5.71 to 10.8	Positive
Logged Population Density (Lagged)	Lagged logged people per square kilometer (Source: World Bank)	4.00	.366 to 8.76	Positive
Regional Elections (Lagged)	Coded "1" when competitive elections are held at the regional level (Source: Original Dataset)	.437	Dummy	Uncertain (Positive?)
Logged Population (Lagged)	Lagged logged total population (Source: World Bank)	16.1	12.3 to 20.8	Uncertain
Legislative Electoral Competitiveness (Lagged)	Lagged Legislative Index of Electoral Competitiveness (Source: Database of Political Institutions)	N/A	1 to 7	Used to restrict dataset to countries with multiple parties in the national legislature (scoring 6 or 7)

*Table 2: Countries Coded “1” on Democratic Decentralization, Party Centralization
(Note: Only electorally competitive country-years included; coded “1” for 1975-2006 unless otherwise stated)*

Albania (1992-2006), Argentina (1975, 1984-2006), Austria, Azerbaijan (2000-2006), Benin (2002-2006), Bolivia (1995-2006), Bosnia (2003-2006), Botswana, Bulgaria (1991-2006), Burkina Faso (1995-2006), Burundi (2005-2006), Cambodia (2002-2006), Cameroon (1996-2006), Republic of Congo (1994-1997, 2003-2006), Costa Rica, Croatia (1993-2006), Denmark, Dominican Republic, Ecuador (1980-96), Egypt (1996-2006), El Salvador (1983-2006), Equatorial Guinea (2000-2006), Estonia (1993-2006), Fiji (1975-1987, 1994-1997), Finland, France, Gabon (1997-2006), Gambia (1975-1994, 1997-2006), Georgia (1993-1994, 1998-2006), Greece, Guatemala (1995-2006), Guinea (2005-2006), Guyana (1994-2006), Haiti (1991, 1995-1997, 2001-2003, 2006), Honduras (1982-2006), Hungary (1991-2006), Israel, Italy, Ivory Coast (2001-2006), Jamaica (1975-1983, 1987-2006), South Korea (1995-2006), Latvia (1994-2006), Lebanon (1998-2006), Lesotho (2005-2006), Lithuania (1995-2006), Macedonia (1996-2006), Madagascar (1995-2006), Malawi (2000-2005), Mali (1993-2006), Mexico, Moldova (1995-2006), Mongolia (2001-2006), Morocco (1997-2006), Mozambique (1998-2006), Namibia (1992-2006), Nepal (1992-2001), Nicaragua (1990-2006), Niger (2004-2006), Panama (1985-2006), Paraguay (1991-2006), Peru (1981-2006), Portugal (1977-2006), Romania (1992-2006), Russia (2000-2006), Senegal (1990-2006), Sierra Leone (2004-2006), Slovak Republic (1993-2006), Slovenia (1994-2006), Spain (1979-2006), Sri Lanka (1975-1990), Sweden, Taiwan (1993-2006), Tanzania (1996-2006), Thailand (1976, 1980-2006), Trinidad, Tunisia (1995-2006), Ukraine (1998-2006), United Kingdom, Uzbekistan (2000-2006), Venezuela, Yemen (2001-2006), Yugoslavia (1993-2001), Zambia (1992-2006), Zimbabwe (1984-2006)

Table 3: Results of the Primary Models
(Random Effects Models with AR1 Correction, World Region Dummies, and Decade Dummies)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Y= Primary Completion Rate (N=1548, 128 countries)	Y= Children Out of School (N=1522, 128 countries)	Y= Primary School Teachers (N=1746, 133 countries)	Y= Primary Enrollment Rate (N=2237, 135 countries)	Y= Ratio of Girls to Boys in Primary School (N=1843, 133 countries)	Y=DPT Immunizations (N=1506, 135 countries) Efficiency Model	Y=Infant Mortality (N=1507, 135 countries) Efficiency Model	Y=Public Health Expenditures (N=1617, 135 countries) Spending Model
Democratic Decentralization, Party Centralization (Lagged)	2.02** (.972)	-1.13*** (.254)	.037* (.021)	2.67*** (.666)	.258 (.333)	1.20 (1.08)	-.668** (.285)	.253*** (.082)
Democratic Decentralization, Party Decentralization (Lagged)	.677 (1.29)	-.619* (.339)	.036 (.029)	.414 (.858)	.040 (.457)	.019 (1.43)	-.172 (.402)	.040 (.119)
Municipal Plurality (Lagged)	1.31 (1.16)	.753** (.299)	-.019 (.026)	-.079 (.793)	-.104 (.415)	1.20 (1.14)	.204 (.312)	-.193** (.096)
Municipal Directly Elected Executive (Lagged)	-1.98** (1.00)	.318 (.273)	-.010 (.023)	.078 (.728)	-.625* (.376)	-.969 (1.14)	.264 (.331)	-.085 (.094)
Fertility (Lagged)	-8.55*** (.719)	1.91*** (.202)	-.148*** (.020)	-5.04*** (.631)	-4.09*** (.333)	-9.01*** (.834)	10.2*** (.417)	-.155* (.084)
Logged GDP per capita (Lagged)	4.75*** (1.08)	-1.05*** (.300)	.319*** (.032)	3.14*** (1.02)	1.34** (.536)	-2.24** (.934)	-7.04*** (.500)	.323*** (.102)
Logged Population Density (Lagged)	.964 (.871)	-.228 (.239)	.017 (.032)	3.27*** (1.04)	.623 (.565)	1.56** (.690)	-5.34*** (.752)	-.116 (.093)
Regional Elections (Lagged)	-.788 (.988)	.652*** (.243)	-.022 (.019)	-1.82*** (.629)	-.414 (.344)	.074 (1.05)	-.238 (.283)	.064 (.087)
Logged Population (Lagged)	.094 (.745)	-.282 (.208)	-.018 (.028)	.772 (.902)	-.580 (.487)	-.101 (.628)	-1.54** (.680)	-.015 (.083)
Public Health Expenditure (Lagged)						1.13*** (.287)	-.342*** (.079)	
R ²	.713	.648	.637	.290	.531	.567	.862	.479

***p<.01, **p<.05, *p<.10, ^ap<.20. All tests are 2-tailed. Standard errors are in parenthesis.

Table 4: Results of the First Robustness Checks
(Fixed Effects Models with AR1 Correction and Decade Dummies)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Y= Primary Completion Rate (N=1420, 122 countries)	Y= Children Out of School (N=1394, 119 countries)	Y= Primary School Teachers (N=1613, 129 countries)	Y= Primary Enrollment Rate (N=2102, 133 countries)	Y= Ratio of Girls to Boys in Primary School (N=1710, 128 countries)	Y=DPT Immunizations (N=1371, 135 countries) Efficiency Model	Y=Infant Mortality (N=1372, 135 countries) Efficiency Model	Y=Public Health Expenditures (N=1482, 135 countries) Spending Model
Democratic Decentralization, Party Centralization (Lagged)	1.82* (1.08)	-.650** (.255)	.037* (.021)	1.99*** (.633)	-.244 (.301)	.609 (1.30)	-.186 (.148)	.262*** (.089)
Democratic Decentralization, Party Decentralization (Lagged)	1.96 ^a (1.47)	-.741** (.354)	.054* (.030)	.743 (.819)	.039 (.412)	.729 (1.87)	.066 (.213)	.001 (.136)
Municipal Plurality (Lagged)	1.07 (1.29)	.731** (.305)	-.028 (.026)	.319 (.744)	-.027 (.370)	.865 (1.42)	.056 (.163)	-.159 ^a (.104)
Municipal Directly Elected Executive (Lagged)	-.351 (1.15)	.114 (.287)	-.023 (.024)	.299 (.702)	-.403 (.343)	-.976 (1.54)	.112 (.174)	-.071 (.108)
Fertility (Lagged)	-6.61*** (1.05)	1.85*** (.314)	-.095*** (.035)	-4.29*** (1.02)	-2.38*** (.535)	-9.62*** (1.75)	1.22*** (.430)	-.279** (.138)
Logged GDP per capita (Lagged)	7.30*** (1.43)	-.871* (.468)	.334*** (.040)	6.61*** (1.30)	1.26** (.637)	1.52 (2.15)	-2.01*** (.400)	.634*** (.173)
Logged Population Density (Lagged)	-2.67 ^a (1.89)	-.736 (.663)	.045 (.065)	.402 (2.47)	1.73 (1.39)	5.32 (4.35)	-7.19*** (2.03)	.088 (.361)
Regional Elections (Lagged)	-1.25 (1.12)	.426* (.239)	-.021 (.020)	-2.02*** (.594)	-.154 (.307)	-1.48 (1.28)	-.091 (.147)	.043 (.094)
Logged Population (Lagged)	3.21*** (.972)	.625* (.334)	-.071** (.029)	3.33*** (1.02)	5.09 (.524)	4.80*** (1.70)	4.59*** (.565)	-.109 (.138)
Public Health Expenditure (Lagged)						.517 (.366)	-.051 (.042)	
R ²	.611	.496	.607	.162	.056	.428	.233	.346

***p<.01, **p<.05, *p<.10, ^ap<.20. All tests are 2-tailed. Standard errors are in parenthesis

Table 5: Results of the Second Robustness Checks
(Arellano-Bond System GMM Models with Robust Standard Errors and Decade Dummies)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Y= Primary Completion Rate (N=1303, 120 countries)	Y= Children Out of School (N=1303, 117 countries)	Y= Primary School Teachers (N=1533, 130 countries)	Y= Primary Enrollment Rate (N=2103, 133 countries)	Y= Ratio of Girls to Boys in Primary School (N=1647, 127 countries)	Y=DPT Immunizations (N=1504, 135 countries) Efficiency Model	Y=Infant Mortality (N=1507, 135 countries) Efficiency Model	Y=Public Health Expenditures (N=1507, 135 countries) Spending Model
Democratic Decentralization, Party Centralization (Lagged)	2.41*** (.907)	-.770*** (.279)	.003 (.009)	3.58*** (.915)	1.02*** (.312)	3.86*** (1.45)	-.853*** (.283)	.162** (.066)
Democratic Decentralization, Party Decentralization (Lagged)	1.99* (1.08)	-.716** (.288)	-.009 (.012)	3.10*** (1.07)	.893*** (.330)	3.03* (1.75)	-.938*** (.314)	.140* (.080)
Municipal Plurality (Lagged)	-.076 (.875)	.117 (.110)	-.004 (.006)	-2.19*** (.809)	-.343* (.198)	-.085 (1.04)	.166 (.167)	-.058 ^a (.042)
Municipal Directly Elected Executive (Lagged)	-.552 (.540)	.046 (.099)	-.001 (.007)	.248 (.579)	-.171 (.155)	-.994 (.909)	.030 (.147)	-.022 (.042)
Fertility (Lagged)	-2.18*** (.742)	.339** (.136)	-.007 ^a (.005)	-.516 (.454)	-.229 (.200)	-4.52*** (.718)	.410*** (.138)	.131*** (.042)
Logged GDP per capita (Lagged)	-1.37** (.582)	.283** (.129)	.023 ^a (.014)	-1.65*** (.614)	-.103 (.215)	-4.95*** (.982)	.700*** (.146)	.238*** (.074)
Logged Population Density (Lagged)	-.061 (.293)	-.030 (.035)	-.003 (.003)	.071 (.250)	.014 (.074)	.724* (.432)	-.121* (.068)	.014 (.024)
Regional Elections (Lagged)	.908 ^a (.612)	-.225** (.114)	-.004 (.010)	1.06* (.599)	.259 ^a (.180)	.830 (.975)	-.174 (.156)	.073* (.041)
Logged Population (Lagged)	.170 (.209)	-.038 (.052)	.001 (.003)	.136 (.235)	-.155** (.073)	.007 (.360)	-.025 (.054)	-.017 (.018)
Public Health Expenditure (Lagged)						1.75*** (.531)	-.127 ^a (.081)	

***p<.01, **p<.05, *p<.10, ^ap<.20. All tests are 2-tailed. Robust standard errors are in parenthesis

Appendix – For Online Publication

Rethinking the Political Economy of Decentralization: How Elections and Parties Shape the Provision of Local Public Goods

Raúl A. Ponce-Rodríguez

Department of Economics
Universidad Autónoma de Ciudad Juárez

Charles R. Hankla

Department of Political Science
Georgia State University

Jorge Martínez-Vázquez

Department of Economics
Georgia State University

Eunice Heredia-Ortiz

Development Alternatives Inc., DAI

Lemma 1 *Local public goods with and without spillovers are Pareto efficient for an economy with a majoritarian electoral system, single member districts, a democratically centralized government, and a centralized party system. All parties converge in providing a uniform local public good across districts, $g_c^{*zi} = g_c^{*z,-i} = g_c^* \forall z$ satisfying*

$$\int_{\forall e^i} h^i(e^i) \frac{\partial \mu^i}{\partial G^i} de^i + k^i \int_{\forall e^{-i}} h^{-i}(e^{-i}) \frac{\partial \mu^{-i}}{\partial G^{-i}} de^{-i} = \left\{ \frac{1}{N} \right\} \sum_{\forall i,-i} \int_{\forall e^i} h^i(e^i) \frac{\partial \mu^i}{\partial x^i} de^i \quad (A.1)$$

Proof

The parties' problem is $Max \delta_c^z(\mathbf{g}_c^z, \xi_c^z) = \pi_c^z(\rho_c^z)$ subject to $g_c^{zi} = g_c^{z,-i} = g_c^z$. We impose the equality restriction in the objective function of party z . The first order conditions is $\frac{\partial \delta_c^z}{\partial g_c^z} = \frac{\partial \phi_c^z}{\partial g_c^z} =$

$\sum_{\forall i,-i} \int_{\forall e^i} h^i(e^i) \frac{\partial F_c^{zi}(\Psi_c^{zi})}{\partial \Psi_c^{zi}} \frac{\partial v^{zi}}{\partial G^{zi}} \frac{\partial G^{zi}}{\partial g_c^z} de^i = 0 \quad \forall g_c^{*z} > 0$. The parties' policies converge, $g_c^{*z} = g_c^{*,-z} = g_c^*$, in probabilistic voting models with homogeneous parties (see Coughlin 1992) hence $f_c^{zi}(0) = f_c^{z,-i}(0) \in \mathbb{R}_+ \quad \forall i, \forall z$. Therefore the first order condition becomes $\sum_{\forall i,-i} \int_{\forall e^i} h^i(e^i) \frac{\partial v^i}{\partial G^i} \frac{\partial G^i}{\partial g_c} de^i = 0$. Use $\frac{\partial v^i}{\partial G^i} \frac{\partial G^i}{\partial g_c} = (1 + k^{-i}) \frac{\partial \mu^i}{\partial G^i} - \left(\frac{1}{N} \right) \frac{\partial \mu^i}{\partial x^i}$ and $\frac{\partial v^i}{\partial G^{-i}} \frac{\partial G^{-i}}{\partial g_c} = (1 + k^i) \frac{\partial \mu^{-i}}{\partial G^{-i}} - \left(\frac{1}{N} \right) \frac{\partial \mu^{-i}}{\partial x^{-i}}$ to show that the uniform local public good g_c^* satisfies

$$\int_{\forall e^i} h^i(e^i) \frac{\partial \mu^i}{\partial G^i} de^i + k^i \int_{\forall e^{-i}} h^{-i}(e^{-i}) \frac{\partial \mu^{-i}}{\partial G^{-i}} de^{-i} = \left\{ \frac{1}{N} \right\} \sum_{\forall i,-i} \int_{\forall e^i} h^i(e^i) \frac{\partial \mu^i}{\partial x^i} de^i \quad (A.2)$$

■

Lemma 2 *Party centralization in a system of local governments leads to a set of Pareto efficient local public goods with and without spillovers $\mathbf{g}_{cL}^* = [g_{cL}^{*i}, g_{cL}^{*-i}]$. At the political equilibrium, $g_{cL}^{*i} \forall i, \forall z$ satisfies the following:*

$$\int_{\forall e^i} h^i(e^i) \frac{\partial \mu^i}{\partial G^i} de^i + k^{-i} \int_{\forall e^{-i}} h^{-i}(e^{-i}) \frac{\partial \mu^{-i}}{\partial G^{-i}} de^{-i} = \left\{ \frac{1}{N} \right\} \int_{\forall e^i} h^i(e^i) \frac{\partial \mu^i}{\partial x^i} de^i \quad (A.3)$$

Proof

In the local election of district i party z selects $g_{cL}^{*zi} \in \arg \max \pi_{cL}^z = \pi_{cL}^z(\rho_{cL}^{zi}, \rho_{cL}^{z,-i})$. The first order condition for an interior maximizer with $g_{cL}^{*zi} > 0$ is $\frac{\partial \pi_{cL}^z}{\partial \rho_{cL}^{zi}} \frac{\partial \rho_{cL}^{zi}}{\partial g_{cL}^{zi}} + \frac{\partial \pi_{cL}^z}{\partial \rho_{cL}^{z,-i}} \frac{\partial \rho_{cL}^{z,-i}}{\partial g_{cL}^{zi}} = 0$. By

definition $\rho_{cL}^{zi} = \phi_{cL}^{zi} - \phi_{cL}^{-zi}$ and the sum of the expected proportion of the votes for parties z and $-z$ is 1, that is, $\phi_{cL}^{zi} + \phi_{cL}^{-zi} = 1 \forall i$ therefore $\frac{\partial \rho_{cL}^{zi}}{\partial g_{cL}^{zi}} = 2 \frac{\partial \phi_{cL}^{zi}}{\partial g_{cL}^{zi}}$ for $g_{cL}^{*zi} \forall i, \forall z$. Then $\frac{\partial \phi_{cL}^{zi}}{\partial g_{cL}^{zi}} =$

$$\int_{\forall e^i} h^i(e^i) f_{cL}^{zi} \left\{ \frac{\partial \mu^i}{\partial G^i} - \left(\frac{1}{N} \right) \frac{\partial \mu^i}{\partial x^i} \right\} de^i \quad \text{and} \quad \frac{\partial \phi_{cL}^{z,-i}}{\partial g_{cL}^{zi}} = k^i \int_{\forall e^{-i}} h^{-i}(e^{-i}) f_{cL}^{z,-i} \frac{\partial \mu^{z,-i}}{\partial G^{z,-i}} de^{-i}. \quad \text{The}$$

convergence of the parties' policies $g_{cL}^{*zi} = g_{cL}^{*-zi} = g_{cL}^{*i}, \forall z, -z \in i$ implies $f_{cL}^{zi}(0) = f_{cL}^{z,-i}(0) \in \mathbb{R}_+, \rho_{cL}^{zi} = \rho_{cL}^{z,-i} = 0 \forall i, \forall z$. Define $\Theta^i = \frac{\partial \pi_{cL}^z(0)}{\partial \rho_{cL}^{z,-i}} / \frac{\partial \pi_{cL}^z(0)}{\partial \rho_{cL}^{zi}} = 1, \forall i$ therefore

$\frac{\partial \pi_{cL}^z}{\partial \rho_{cL}^{zi}} \frac{\partial \rho_{cL}^{zi}}{\partial g_{cL}^{zi}} + \frac{\partial \pi_{cL}^z}{\partial \rho_{cL}^{z,-i}} \frac{\partial \rho_{cL}^{z,-i}}{\partial g_{cL}^{zi}} = 0$ is equivalent to

$$\int_{\forall e^i} h^i(e^i) \frac{\partial \mu^i}{\partial G^i} de^i + k^{-i} \int_{\forall e^{-i}} h^{-i}(e^{-i}) \frac{\partial \mu^{-i}}{\partial G^{-i}} de^{-i} = \left\{ \frac{1}{N} \right\} \int_{\forall e^i} h^i(e^i) \frac{\partial \mu^i}{\partial x^i} de^i \quad (\text{A.4})$$

■

Theorem 1 “Strong Decentralization Theorem”. *The provision of local public goods with and without inter-regional spillovers by a system of local governments welfare-dominates their centralized provision when party systems are centralized.*

Proof

It is simple to verify that conditions (2), (4) and (6) imply $\hat{\mathbf{g}}^* = \mathbf{g}_{cL}^* \neq \mathbf{g}_c^*$ for $\hat{\mathbf{g}}^*, \mathbf{g}_{cL}^*, \mathbf{g}_c^* \in \mathbb{R}^2$: $\hat{\mathbf{g}}^* = [\hat{g}^{*i}, \hat{g}^{*-i}]$, $\mathbf{g}_{cL}^* = [g_{cL}^{*i}, g_{cL}^{*-i}]$ and $\mathbf{g}_c^* = [g_c^{*i}, g_c^{*-i}]$. By the strict concavity of $NSW = \sum_{\forall i, -i} \int_{\forall e^i} h^i(e^i) v^i(e^i, G^i) de^i$ on the constrained policy space \exists feasible $\mathbf{g}^0 = [g^{i0}, g^{-i0}]$, $\mathbf{g}^1 = [g^{i1}, g^{-i1}]$, $\Omega \in [0, 1]$: $\Omega = \frac{1}{g^{i1} - g^{i0}} = \frac{1}{g^{-i1} - g^{-i0}}$ and $\mathbf{g}^\Omega = \Omega \mathbf{g}^1 + (1 - \Omega) \mathbf{g}^0$ such that $NSW(\mathbf{g}^\Omega) > \{ \Omega NSW(\mathbf{g}^1) + (1 - \Omega) NSW(\mathbf{g}^0) \}$. Note $\Omega NSW(\mathbf{g}^1) + (1 - \Omega) NSW(\mathbf{g}^0) = NSW(\mathbf{g}^0) + \Omega \{ NSW(\mathbf{g}^1) - NSW(\mathbf{g}^0) \}$ which implies $NSW(\mathbf{g}^\Omega) - NSW(\mathbf{g}^0) > \Omega \{ NSW(\mathbf{g}^1) - NSW(\mathbf{g}^0) \}$. We take $\lim_{\{g^{i1} - g^{i0}\}_{\forall i} \rightarrow 0} \Omega \{ NSW(\mathbf{g}^1) - NSW(\mathbf{g}^0) \} = \frac{\partial NSW(\mathbf{g})}{\partial g^i} + \frac{\partial NSW(\mathbf{g})}{\partial g^{-i}}$ to show

$$NSW(\hat{\mathbf{g}}^*) - NSW(\mathbf{g}) > \frac{\partial NSW(\mathbf{g})}{\partial g^i} + \frac{\partial NSW(\mathbf{g})}{\partial g^{-i}} \quad (\text{A.5})$$

Without loss of generality, set $\mathbf{g}^\Omega = \hat{\mathbf{g}}^* = [\hat{g}^{*i}, \hat{g}^{*-i}]$, where \hat{g}^{*i} and \hat{g}^{*-i} are global maximizers of NSW and \mathbf{g}^0 is some feasible $\mathbf{g} = [g^i, g^{-i}]$: $\mathbf{g} \neq \hat{\mathbf{g}}^*$ then it is satisfied that $\frac{\partial NSW(\hat{\mathbf{g}}^*)}{\partial g^i} = \frac{\partial NSW(\hat{\mathbf{g}}^*)}{\partial g^{-i}} = 0 \quad \forall \hat{g}^{*i} > 0 \quad \forall i \Rightarrow NSW(\hat{\mathbf{g}}^*) > NSW(\mathbf{g}) \quad \forall g^i \neq \hat{g}^{*i}, \forall i$. Therefore conditions (2), (4) and (6) mean $\mathbf{g}_{\text{cL}}^* = \hat{\mathbf{g}}^*$ and $\mathbf{g}_{\text{c}}^* \neq \hat{\mathbf{g}}^*$ and hence $NSW(\mathbf{g}_{\text{cL}}^*) > NSW(\mathbf{g}_{\text{c}}^*)$. ■

Lemma 3 *For economies with a decentralized party system and democratic centralization a uniform and Pareto efficient local public good $g^i = g^{-i} = g_d^{*z} \quad \forall z$ is provided such that it satisfies the following:¹*

$$\begin{aligned} & \sum_{\forall i, -i} \alpha^{zi} \int_{\forall e^i} h^i(e^i) v_g^{zi}(g_d^{*z}) de^i \\ &= -\gamma^z \left(\sum_{\forall i, -i} \int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \tilde{v}_g^{zi}(g_d^{*z}) d\tilde{e}^i \right) - \sigma_\omega^z \end{aligned} \quad (\text{A.6})$$

Where $v_g^{zi} = \{\partial \mu^{zi} / \partial G^i\} - \left\{ \frac{1}{N} \right\} \{\partial \mu^{zi} / \partial x^i\} \quad \forall zi$. Moreover, $\alpha^{zi} \in (0, 1)$:

$$\alpha^{zi} = \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \Big/ \sum_{\forall i, -i} \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \quad (\text{A.7})$$

$$\gamma^z = \frac{\partial \Pi_d^z}{\partial \tilde{\rho}_0^z} \Big/ \sum_{\forall i, -i} \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \quad (\text{A.8})$$

γ^z is a weighted rate of substitution between marginal changes in the parties' plurality in the primary and the general election, and

$$\sigma_\omega^z = \sum_{\forall i, -i} \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \sigma_l^{zi} \left(\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}, \frac{\partial \Psi_l^{zi}}{\partial g_d^z} \right) \Big/ \sum_{\forall i, -i} \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \quad (\text{A.9})$$

¹ Note that equations (A.6) to (A.9) are conditions (8) to (11) in the paper.

Where σ_w^z is a weighted covariance between the marginal probability of voting for party z in the nationwide general election, $\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}$, and the change in well being of voters from an increase in the provision of the local public good $\frac{\partial \Psi_l^{zi}}{\partial g^z}$.

Proof

For an economy with party decentralization and a single government, party z designs public spending to maximize $\Pi_d^{jz}(\tilde{\rho}_0^{jz}, \rho_l^{jz})$ subject to $g_d^{zi} = g_d^{z,-i} = g_d^z$. We impose the equality restriction in the objective function of party z . The first order condition for the party's problem is

$$\frac{\partial \Pi_d^z}{\partial \tilde{\rho}_0^z} \frac{\partial \tilde{\phi}_0^z}{\partial g_d^z} + \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \frac{\partial \phi_l^z}{\partial g_d^z} = 0 \quad \forall g_d^{*z} > 0, \forall z, \forall i \quad (\text{A.10})$$

By definition $\tilde{\phi}_0^z = \sum_{\forall i, -i} \tilde{\phi}_0^{zi}$, $\phi_l^z = \sum_{\forall i, -i} \phi_l^{zi}$ for $l = 1, 2$. The sum of the expected votes for parties z and $-z$ in both the primary and the general election is one then $\tilde{\phi}_0^z + \tilde{\phi}_0^{-z} = 1$, and $\phi_l^z + \phi_l^{-z} = 1 \quad \forall l$. Since $g_d^{*zi} = g_d^{*z,-i} = g_d^{*z}$ then $\frac{\partial \tilde{\phi}_0^{zi}}{\partial g_d^z} = \int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \frac{\partial \tilde{\Psi}_0^{zi}}{\partial g_d^z} d\tilde{e}^i \quad \forall i$ and $\frac{\partial \phi_l^{zi}}{\partial g_d^z} = \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} \frac{\partial \Psi_l^{zi}}{\partial g_d^z} d\tilde{e}^i$ for $l = 1, 2, \forall i$. It follows that the first order condition is given by

$$\sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \left\{ \sum_{\forall i, -i} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} \frac{\partial \Psi_l^{zi}}{\partial g_d^z} d\tilde{e}^i \right\} = - \frac{\partial \Pi_d^z}{\partial \tilde{\rho}_0^z} \left\{ \sum_{\forall i, -i} \int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \frac{\partial \tilde{\Psi}_0^{zi}}{\partial g_d^z} d\tilde{e}^i \right\} \quad (\text{A.11})$$

From the definition of the covariance between A and B , $\sigma(A, B) = E[AB] - E[A]E[B]$. Re-define $A = \left\{ \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}}, \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} \right\}$ and $B = \left\{ \frac{\partial \tilde{\Psi}_0^{zi}}{\partial g_d^z}, \frac{\partial \Psi_l^{zi}}{\partial g_d^z} \right\}$ for $l = 1, 2$ to find:

$$\begin{aligned} & \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} \frac{\partial \Psi_l^{zi}}{\partial g_d^z} d\tilde{e}^i = \\ & \sigma_l^{zi} \left(\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}, \frac{\partial \Psi_l^{zi}}{\partial g_d^z} \right) + \left\{ \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} d\tilde{e}^i \right\} \left\{ \int_{\forall e^i} h^i(e^i) \frac{\partial \Psi_l^{zi}}{\partial g_d^z} d\tilde{e}^i \right\} \quad (\text{A.12}) \end{aligned}$$

Define $\frac{\partial \tilde{\Psi}_0^{zi}}{\partial g_d^z} = \tilde{v}_g^{zi} = \frac{\partial \tilde{\mu}^{zi}}{\partial c_d^z} - \frac{\partial \tilde{\mu}^{zi}}{\partial x^{zi}} \left(\frac{1}{N} \right)$ and $\frac{\partial \Psi_l^{zi}}{\partial g_d^z} = v_g^{zi} = \frac{\partial \mu^{zi}}{\partial c^z} - \frac{\partial \mu^{zi}}{\partial x^{zi}} \left(\frac{1}{N} \right) \quad \forall l$ and use (A.12) into (A.11) to show

$$\begin{aligned} & \sum_{\forall i,-i} \left\{ \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \int_{\forall e^i} h^i(e^i) \frac{\partial \Psi_l^{zi}}{\partial g_d^z} de^i \right\} = \\ & - \sum_{\forall i,-i} \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \sigma_l^{zi} \left(\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}, \frac{\partial \Psi_l^{zi}}{\partial g_d^z} \right) - \frac{\partial \Pi_d^z}{\partial \tilde{\rho}_0^z} \left\{ \sum_{\forall i,-i} \int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \tilde{v}_g^{zi} d\tilde{e}^i \right\} \end{aligned} \quad (\text{A.13})$$

Define $\alpha^{zi} \in (0,1): \sum_{\forall i,-i} \alpha^{zi} = 1$ where

$$\alpha^{zi} = \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i / \sum_{\forall i,-i} \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \quad (\text{A.14})$$

And

$$\gamma^z = \frac{\partial \Pi_d^z}{\partial \tilde{\rho}_0^z} / \sum_{\forall i,-i} \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \quad (\text{A.15})$$

And

$$\sigma_\omega^z = \sum_{\forall i,-i} \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \sigma_l^{zi} \left(\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}, \frac{\partial \Psi_l^{zi}}{\partial g_d^z} \right) / \sum_{\forall i,-i} \sum_{l=\{1,2\}} \frac{\partial \Pi_d^z}{\partial \rho_l^z} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \quad (\text{A.16})$$

Use (A.14), (A.15), and (A.16) into (A.13) to obtain the expression in (A.6)²

$$\begin{aligned} & \sum_{\forall i,-i} \alpha^{zi} \int_{\forall e^i} h^i(e^i) v_g^{zi}(g_d^{*z}) de^i \\ & = -\gamma^z \left(\sum_{\forall i,-i} \int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \tilde{v}_g^{zi}(g_d^{*z}) d\tilde{e}^i \right) - \sigma_\omega^z \end{aligned} \quad (\text{A.17})$$

² This is equivalent to expression (8) of Lemma 3 in the paper.

Lemma 4 For economies with a decentralized party system and democratic decentralization, local public goods $g_{dL}^{*zi} \forall i, -i$ are provided such that g_{dL}^{*zi} satisfies the following:

$$\int_{\forall e^i} h^i(e^i) v_{g_{dL}}^{zi}(g_{dL}^{*zi}) de^i = -\chi^{zi} \left(\int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \tilde{v}_{g_{dL}}^{zi}(g_{dL}^{*zi}) d\tilde{e}^i \right) - \sigma_{\omega}^{zi} \quad (\text{A.18})$$

Where

$$\chi^{zi} = \frac{\partial \pi_{dL}^{zi}}{\partial \tilde{\rho}_0^{zi}} \bigg/ \sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \quad (\text{A.19})$$

Where χ^{zi} is a weighted rate of substitution between marginal changes in the party's plurality in the district's primary and the general local election, and

$$\sigma_{\omega}^{zi} = \sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \sigma_l^{zi} \left(\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}, \frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{zi}} \right) \bigg/ \sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \quad (\text{A.20})$$

Where σ_{ω}^{zi} is a weighted covariance between the marginal probability that voter type e^i votes for party z in the local general election in district i , $\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}$, and the change in the well being of voters from an increase in the provision of the local public good $\frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{zi}}$.

Proof

In a federation with party decentralization, the spending policy of party z in district i is $g_{dL}^{*zi} \in \text{argmax} \pi_{dL}^{zi}(\tilde{\rho}_0^{zi}, \rho_l^{zi}) \forall l = \{1,2\}$.³ The first order condition of the party's problem is

$$\frac{\partial \pi_{dL}^{zi}}{\partial \tilde{\rho}_0^{zi}} \frac{\partial \tilde{\phi}_0^{zi}}{\partial g_{dL}^{zi}} + \sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \frac{\partial \phi_l^{zi}}{\partial g_{dL}^{zi}} = 0 \quad (\text{A.21})$$

From definition, $\tilde{\phi}_0^{zi} = \int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \tilde{F}_0^{zi}(\tilde{\Psi}_0^{zi}) d\tilde{e}^i$ and $\phi_l^{zi} = \int_{\forall e^i} h^i(e^i) F_l^{zi}(\Psi_l^{zi}) de^i$ for $l = \{1,2\}$. Obtain $\partial \tilde{\phi}_0^{zi} / \partial g_{dL}^{zi}$, $\partial \phi_l^{zi} / \partial g_{dL}^{zi} \forall l$, and re-arrange terms to re-express (A.21) as follows

$$\sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} \frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{zi}} de^i = -\frac{\partial \pi_{dL}^{zi}}{\partial \tilde{\rho}_0^{zi}} \int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \frac{\partial \tilde{\Psi}_0^{zi}}{\partial g_{dL}^{zi}} d\tilde{e}^i \quad (\text{A.22})$$

³ Since the policies of candidates $j \in zi$ and $j' \in zi$ converge, we re-define $g_{dL}^{*jzi} = g_{dL}^{*j'zi} = g_{dL}^{*zi}$.

From the definition of the covariance between A and B , $\sigma(A, B) = E[AB] - E[A]E[B]$. Re-define

$A = \left\{ \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}}, \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} \right\}$ and $B = \left\{ \frac{\partial \tilde{\Psi}_0^{zi}}{\partial g_{dL}^{zi}}, \frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{zi}} \right\}$ for $l = 1, 2$ to express the following

$$\int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} \frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{zi}} de^i = \sigma_l^{zi} \left(\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}, \frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{zi}} \right) + \left\{ \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \right\} \left\{ \int_{\forall e^i} h^i(e^i) \frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{zi}} de^i \right\} \quad (\text{A.23})$$

Where $\sigma_l^{zi} \left(\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}, \frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{zi}} \right)$ is the covariance between $\partial F_l^{zi} / \partial \Psi_l^{zi}$ and the voter's marginal wellbeing, $\partial \Psi_l^{zi} / \partial g_{dL}^{zi}$, due to a change in the provision of the local public good in district i . Use conditions $\frac{\partial \tilde{\Psi}_0^{zi}}{\partial g_{dL}^{zi}} = \tilde{v}_{g_{dL}^{zi}} = \frac{\partial \tilde{\mu}^{zi}}{\partial g_{dL}^{zi}} - \frac{\partial \tilde{\mu}^{zi}}{\partial x^{zi}} \left(\frac{1}{N} \right)$ and $\frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{zi}} = v_{g_{dL}^{zi}} = \frac{\partial \mu^{zi}}{\partial g_{dL}^{zi}} - \frac{\partial \mu^{zi}}{\partial x^{zi}} \left(\frac{1}{N} \right) \forall l$ and substitute (A.23) into (A.22) to establish

$$\int_{\forall e^i} h^i(e^i) v_{g_{dL}^{zi}} de^i = \frac{-\frac{\partial \pi_{dL}^{zi}}{\partial \tilde{\rho}_0^{zi}} \int_{\forall e^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \frac{\partial \tilde{\Psi}_0^{zi}}{\partial g_{dL}^{zi}} de^i - \sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \sigma_l^{zi}}{\sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i} \quad (\text{A.24})$$

Define

$$\chi^{zi} = \frac{\partial \pi_{dL}^{zi}}{\partial \tilde{\rho}_0^{zi}} / \sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \quad (\text{A.25})$$

And

$$\sigma_{\omega}^{zi} = \sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \sigma_l^{zi} \left(\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}, \frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{zi}} \right) / \sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i \quad (\text{A.26})$$

To express condition (A.24) as follows

$$\int_{\forall e^i} h^i(e^i) v_{g_{dL}^{zi}}(g_{dL}^{*zi}) de^i = -\chi^{zi} \left(\int_{\forall e^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \tilde{v}_{g_{dL}^{zi}}(g_{dL}^{*zi}) d\tilde{e}^i \right) - \sigma_{\omega}^{zi} \quad (\text{A.27})$$

Theorem 2 *In majoritarian democracies with a decentralized party system and open primaries, the strong decentralization theorem does not hold but the conventional decentralization theorem holds.*

Proof

For the economy with party decentralization and a system of local governments, the politically optimal policy for party z in each district is $g_{dL}^{*zi} > 0 \forall i, -i$ satisfying:

$$\int_{\forall e^i} h^i(e^i) v_g^{zi}(g_{dL}^{*zi}) de^i = -\chi^{zi} \left(\int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \tilde{v}_g^{zi}(g_{dL}^{*zi}) d\tilde{e}^i \right) - \sigma_\omega^{zi} \quad (\text{A.28})$$

Under open primaries, the distribution of preferences over policy of voters voting in the primary is the same as the distribution of preferences of voters voting in the general election. Therefore, $h^i(e^i) = \tilde{h}^i(\tilde{e}^i)$ and $v_{g_{dL}}^{zi}(g_{dL}^{*zi}) = \tilde{v}_{g_{dL}}^{zi}(g_{dL}^{*zi}) \forall z$. In this case, the parties' policies converge, therefore $\tilde{\Psi}_0^{zi} = \tilde{\Psi}_0^{-zi} = 0$, $\Psi_l^{zi} = \Psi_l^{-zi} = 0 \forall z, \forall l$, $\frac{\partial \tilde{F}_0^{zi}(0)}{\partial \tilde{\Psi}_0^{zi}} = c_0$ and $\frac{\partial F_l^z(0)}{\partial \Psi_l^{zi}} = c_1 \forall z, \forall l$ where

c_0, c_1 are positive constants. Hence $\sigma_l^{zi} \left(\frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}}, \frac{\partial \Psi_l^{zi}}{\partial g_{dL}^{*zi}} \right) = 0 \forall l \Rightarrow \sigma_\omega^{zi} = 0$ and

$\int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \tilde{v}_g^{zi}(g_{dL}^{*zi}) d\tilde{e}^i = \int_{\forall e^i} h^i(e^i) \tilde{v}_{g_{dL}}^{zi}(g_{dL}^{*zi}) de^i$. Moreover, $\tilde{\rho}_0^{zi} = 0$ and $\rho_l^{zi} = 0$ for $l = \{1,2\}$ leading to $\frac{\partial \pi_{dL}^{zi}(0)}{\partial \tilde{\rho}_0^{zi}} = \frac{\partial \pi_{dL}^{zi}(0)}{\partial \rho_l^{zi}} = c_2 \in \mathbb{R}_+ \forall z$ and the following conditions hold:

$$\int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i = c_1 \int_{\forall e^i} h^i(e^i) de^i = c_1 \in \mathbb{R}_+ \forall z, \quad (\text{A.29})$$

Since $\int_{\forall e^i} h^i(e^i) de^i = 1$ measures the proportion of voters in the local election, and

$$\chi^{zi} = \frac{\partial \pi_{dL}^{zi}}{\partial \tilde{\rho}_0^{zi}} \bigg/ \sum_{l=\{1,2\}} \frac{\partial \pi_{dL}^{zi}}{\partial \rho_l^{zi}} \int_{\forall e^i} h^i(e^i) \frac{\partial F_l^{zi}}{\partial \Psi_l^{zi}} de^i = c_2 / 2c_2c_1 = \text{constant} \quad (\text{A.30})$$

Use (A.29) and (A.30) into (A.28) and re-arrange terms to show that the first order condition for $g_{dL}^{*zi} \forall i, -i$ satisfies the following condition:

$$\int_{\forall e^i} h^i(e^i) v_g^{zi}(g_{dL}^{*zi}) de^i = 0 \Rightarrow g_{dL}^{*zi} = g_{dL}^{*i} \forall z, \forall i \quad (\text{A.31})$$

Now consider an economy with party decentralization in open primaries and a nationwide government. By (A.4) in Lemma 3, the characterization of the first order condition for this economy with $g_d^{*z} > 0$ is given by:

$$\begin{aligned} & \sum_{\forall i, -i} \alpha^{zi} \int_{\forall e^i} h^i(e^i) v_g^{zi}(g_d^{*z}) de^i \\ &= -\gamma^z \left(\sum_{\forall i, -i} \int_{\forall \tilde{e}^i} \tilde{h}^i(\tilde{e}^i) \frac{\partial \tilde{F}_0^{zi}}{\partial \tilde{\Psi}_0^{zi}} \tilde{v}_g^{zi}(g_d^{*z}) d\tilde{e}^i \right) - \sigma_\omega^z \end{aligned} \quad (\text{A.32})$$

In this equilibrium, the parties' policies also converge then $g_d^{*z} = g_d^*$ and following similar steps as those shown above imply that the first order condition in (A.32) can be expressed as follows:

$$\int_{\forall e^i} h^i(e^i) v_g^{zi}(g_d^*) de^i = - \int_{\forall e^{-i}} h^{-i}(e^{-i}) v_g^{z,-i}(g_d^*) de^{-i} \quad (\text{A.33})$$

Moreover, recall from condition (2) that $\hat{g}^{*i} > 0 \forall i$: $\hat{g}^{*i} \in \arg \max \int_{\forall e^i} h^i(e^i) v^i(e^i, G^i) de^i$ is the global maximizer of the aggregate well-being of residents of district i such that it is satisfied⁴

$$\int_{\forall e^i} h^i(e^i) v_g^i(\hat{g}^{*i}) de^i = 0 \quad \forall i \quad \hat{g}^{*i} > 0 \quad (\text{A.34})$$

Therefore

$$\int_{\forall e^i} h^i(e^i) v^i(\hat{g}^{*i}) de^i \geq \int_{\forall e^i} h^i(e^i) v^i(g^i) de^i \quad \forall g^i \neq \hat{g}^{*i} \quad (\text{A.35})$$

Without loss of generality, the heterogeneity of preferences of voters for public goods means $g^{*i} \geq g^{*-i}$.⁵ Moreover, condition (A.31) of Theorem 2 and condition (2) of proposition 1 imply that $g_{dL}^{*i} = \hat{g}^{*i} \forall i$, and the expressions in (A.33) and (A.34) imply $g_{dL}^{*-i} \leq g_d^* \leq g_{dL}^{*i}$. These outcomes and condition (A.35) means

$$\int_{\forall e^i} h^i(e^i) v^i(g_{dL}^{*i}) de^i + \int_{\forall e^{-i}} h^{-i}(e^{-i}) v^{-i}(g_{dL}^{*-i}) de^{-i} \geq \sum_{\forall i, -i} \int_{\forall e^i} h^i(e^i) v^i(g_d^*) de^i \quad (\text{A.36})$$

⁴ See that condition (A.34) is equivalent to condition (2).

⁵ The heterogeneity of preferences means that, in general, $g^{*i} \geq g^{*-i}$ or $g^{*i} \leq g^{*-i}$. For the purpose of our analysis, and without loss of generality, we assume $g^{*i} \geq g^{*-i}$.

Theorem 3 *The strong and the conventional decentralization theorems do not hold in majoritarian democracies with decentralized party systems and closed primaries.*

Proof

A party z seeking to form a central government in politically decentralized regimes with closed primaries selects $g_d^{*z} \in \operatorname{argmax} \Pi_d^z(\tilde{\rho}_0^z, \rho_1^z, \rho_2^z)$ subject to $g_d^{*zi} = g_d^{*z,-i} = g_d^{*z}$. Moreover $\hat{g}^{*i} \in \operatorname{argmax} \int_{\forall e^i} h^i(e^i) v^i(e^i, G^i) de^i \forall i$ where \hat{g}^{*i} is the policy that maximizes the nationwide surplus from the fiscal exchange associated with a local public good in district i . Condition (A.6) of Lemma 3 and condition (2) from proposition 1 imply that, in general, $g_d^{*z} \neq \hat{g}^{*i} \forall i$. Similarly, in a system of local governments with party decentralization and closed primaries, party z selects $g_{dL}^{*zi} \in \operatorname{argmax} \pi_{dL}^{zi} \forall i$. Condition (A.18) from Lemma 4 and condition (2) from proposition 2 show that, in general, $g_{dL}^{*zi} \neq \hat{g}^{*i} \forall i$. As a result, in general, the nationwide aggregate wellbeing of voters satisfies the following

$$\int_{\forall e^i} h^i(e^i) v^i(g_{dL}^{*zi}) de^i + \int_{\forall e^{-i}} h^{-i}(e^{-i}) v^{-i}(g_{dL}^{*z,-i}) de^{-i} \begin{matrix} \leq \\ > \end{matrix} \sum_{\forall i,-i} \int_{\forall e^i} h^i(e^i) v^i(g_d^{*z}) de^i \quad (\text{A. 37})$$

■