

Core Voters or Local Allies? Presidential Discretionary Spending in Centralized and Decentralized Systems in Latin America

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Abstract

Starting in the late 1990s, traditional opposition parties in Latin America started to capture presidencies. Some of these parties have dramatically shifted resources to core voters as promised, while others have been slower to realize their campaign agendas. I argue this difference depends on presidents' incentives which differ between centralized and decentralized systems. All presidents want their parties to be re-elected, but when local officials are powerful and often opposed to the president, presidents worry that local rivals will steal credit for the provision of goods. This mechanism deters presidents from targeting their voters directly. Instead, presidents in decentralized systems compensate by delivering more goods where local officials are co-partisans, even if the plurality of voters did not support the president there. Resource allocation should thus depend on partisan control of local office in decentralized systems. In centralized systems it should depend on voters' support for the president, even if the local mayor opposed the president. I demonstrate this pattern across 12 years and 100,000 municipalities in Argentina, Brazil, Mexico, and Venezuela. My analysis draws on observational data, as well as on in-depth interviews with current or former presidents, governors, and several mayors.

Keywords: Latin America — decentralization — discretionary spending — Bayesian inference — prior elicitation — resource diversion

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Introduction

On this paper I examine how presidents decide to disburse resources to municipalities when contending with powerful opposition mayors. I argue that the level of decentralization conditions presidential decisions in Latin America to spend resources with core voters either directly or via co-partisan mayors. When decentralization is high, mayors are influential among local voters. As presidents cannot trust that opposition mayors will behave as good agents, the least risky strategy a president can pursue is to drive resources to co-partisan mayors who have less interest in hurting the president, as doing so could mean hurting themselves as well. In more centralized countries, by contrast, where mayors are weak, presidents can build direct linkages with voters, thereby choosing to target municipalities with core presidential voters, regardless of the party affiliations of the local officials.

Presidents in Latin American democracies are powerful actors (Mainwaring, 1993; Mainwaring and Shugart, 1997*a*). They enjoy vast discretion over resource allocation (Hallerberg, Scartascini and Stein, 2009), and have extensive agenda-setting power (Carey and Shugart, 1998; Alemán and Calvo, 2006; Amorim Neto, 2006; Raile, Pereira and Power, 2010; Shugart and Carey, 1992*b*; Baldez and Carey, 1999; Cox and Morgenstern, 2001). It is reasonable then that traditional opposition parties, eager to implement their own policies, set their sights on winning the top electoral prize of the presidency aiming to set their policies of change.

But even the most powerful Latin American presidents are not dictators. They must contend with national-level legislatures in which their parties almost never enjoy majority control (Shugart and Carey, 1992*a*; Mainwaring and Shugart, 1997*b*; Cheibub, 2002; Cheibub, Przeworski and Saiegh, 2004). They also compete with subnational governments, often from the opposition, that have been empowered by a wave of politi-

cal, fiscal, and administrative decentralizing reforms that has swept Latin America over the past 30 years. Some of these parties have dramatically shifted resources to core voters as promised, while others have been slower to realize their campaign agendas. As economic decentralization has evolved, expenditures at the subnational level have increased (Manor, 1999), and the administration of major public services, such as education, health, transportation, and sanitation, has been transferred to localities (Bardhan and Mookherjee, 2006). As political decentralization has matured, local governments have been granted enhanced constitutional responsibilities over policy and have been elected locally (Treisman, 2007), leading to stronger local politicians in several countries.

As a consequence, voters are paying closer attention to local politics and have become more aware of the need to hold local politicians accountable to ensure the delivery of public services. Politicians, in turn, increasingly treat local offices as important stages for building their careers (Montero and Samuels, 2004), and they invest more time to keep their influence over the localities strong. This combination of presidential turnover and decentralization produces a setting in which longtime opposition leaders who finally win the presidency almost inevitably face dozens of commanding state governors and hundreds or even thousands of powerful municipal mayors who are affiliated with traditional ruling parties. This vertical version of divided government can seriously hamper a president's ability to implement her¹ agenda, to claim political credit for popular policy changes, and to mobilize voters to support herself and her party in future elections.

Presidents can find it difficult to change policies on the ground if they must delegate the implementation of those policies to local brokers. Moreover, even if a president does manage to distribute resources to voters, she must compete with locally elected officials to claim credit for the largesse. If those officials are not co-partisans, the president

¹For simplicity I will refer to all presidents in the feminine (she), but will refer to all mayors in the masculine (he), although there are many male and female politicians in both offices.

might be a victim of her own success – essentially strengthening support for local opponents by disbursing resources to local voters. Finally, local office holders are also important players in local elections for national offices. Governors and mayors are key local mobilizers on behalf of candidates for the national legislature and indeed for the presidency itself. A president may wish to increase her party’s legislative strength and also to enhance her own reelection prospects or the prospects of her chosen successor. Both causes are damaged when other parties dominate local offices, effort is difficult to observe, and promises to reward effort are not always credible (Lucardi and Rosas, 2013). Capturing the top prize of the presidency after a period of decentralization is necessary but not sufficient for a party interested in policy change.

Should a newly inaugurated president allocate resources to localities governed by hostile mayors, even when those mayors might divert the resources or steal the credit? Or should she allocate resources to her few local allies, even though this would mean not rewarding her own supporters in municipalities governed by opposition mayors? The literatures on distributive politics and Latin American studies have long investigated the predictors of discretionary resource allocations. This paper contributes to this literature by assessing the influence of political institutions, such as decentralization level and federalism, on the presidential strategies in Argentina, Brazil, Mexico, and Venezuela. Specifically, I focus on the trade-offs implied by the distributive choices presidents make when multiple elected officials in decentralized countries have conflicting interests and amplifying the scope of the analysis by comparing results across countries. To estimate the importance of decentralization and partisan relationships for presidential allocations, I systematically integrate qualitative and quantitative empirical work in a Bayesian model. Fiscal data is in a statistical model with parameters that are informed by priors from interviews with presidents, mayors, and bureaucrats in these four countries.

Importantly, I am able to show that funds are targeted at presidential voters in

centralized countries (Argentina and Venezuela), no matter the partisanship of the local elected officials, but are mostly sent to municipalities with local elected allies in decentralized countries (Brazil and Mexico), whether or not most voters in those municipalities supported the president's own election. Regions lacking either supportive voters or local allies receive little funds in either centralized or decentralized settings.

I organize the paper as follows. In section 1 I describe how the combination of decentralization and party turnovers produced a new political scenario in Latin America. In Section 2, I present a distributive theory of discretionary presidential allocations to municipalities as a function of the level of decentralization and the political alliances between presidents and mayors. In Section 3, I discuss the data, how I operationalize my variables, and the Bayesian approach I used. I also detail the importance of prior elicitation for my results. In section 4 I present the findings of the Bayesian model of presidential resource allocation, and in section 5 I conclude.

Decentralization and Party Turnover in Latin America

The last three decades witnessed a significant rise in the scope of local democracy throughout the developing world, with increasing devolution of authority to local governments (Bardhan and Mookherjee, 2006). Latin American countries were the first in the world to implement the decentralization reforms that transferred responsibilities, resources, and political authority from central to local levels of government (Camdessus, 1999). Almost all countries in the region undertook (1) significant increases in the devolution of revenues and expenditures from national to local governments,² (2) the

²Data from the World Bank shows that in Mexico subnational expenditures as the percentage of total expenditures in the country rose 17 percent between 1986 and 1997. The same indicator for Brazil shows an increase of 11 percent from 1980 and 1997. In Argentina the overall level of fiscal resources managed at the subnational level increased 17 percent in the time span of 1978 and 1998. Venezuela's subnational governments access to resources increased 6 percent between 1990 and 2001.

transfer of public service responsibilities from central government to localities,³ and (3) the direct election of local politicians to govern municipalities and states (Rodden, 2006; Falletti, 2010).

Existing classifications of decentralization levels vary extensively, because decentralization is a multidimensional concept (Treisman, 2000). The metrics depend on the question being asked and on the time frame under analysis. A decentralized system means here that mayors have great local powers; therefore, I use evidence from the World Bank about the relationship between the national government and municipalities to order the countries under investigation. Data from there suggest that municipalities in Brazil and Mexico have higher autonomy than municipalities in Argentina and Venezuela (see Table 1). The index of budget allocation from the Inter-American Development Bank that measures the extent to which budget allocations effectively follow the spending levels outlined in the approved budget also suggests that the presidents in Brazil and in Mexico have less autonomy in changing the budget, whereas the presidents of Argentina and Venezuela have more discretionary allocation power.

Beyond these indicators, there is some agreement in the federalism and fiscal authority literatures in designating Brazil as the most decentralized country in Latin America, followed by Mexico, Argentina, and Venezuela (Diaz-Cayeros, 2006; Harbers, 2010). The cases of Brazil and Venezuela are the easiest ones to defend because by all

³In Mexico, some schools were transferred to provinces (states) in 1983, and the whole education system was devolved to the localities in 1992 (Cook, 2004). In 1995 the Mexican congress reformed the fiscal coordination law (Diaz-Cayeros, 2006), and approved a new budget line directing resources to states and municipalities. In 1997, popular elections were held for the first time to elect the mayor of Mexico City (Cabrerero and Carrera, 2000). In Argentina, a new distribution of taxes (*coparticipacion*) gave provinces (states) a higher level of revenue-sharing in 1987 (Eaton, 2004, 2001). In 1992, secondary schools were transferred to provinces (Barry, 2005; Feldfeber and Ivanier, 2003; Filmus, 1997), and in 1996 the mayor of Buenos Aires was elected by direct vote for the first time (Eaton, 2004; Levitsky, 2003). In Brazil, the 1988 constitution decentralized the health care system (Arretche, Kaufman and Nelson, 2004; Kaufman, Nelson et al., 2004), provided higher levels of revenue-sharing for states and municipalities (Lee Alston, Melo and Pereira, 2009), and recognized municipal autonomy. In 1996 the Brazilian educational system was also decentralized to states and municipalities. In Venezuela, the main reform happened in 1989 when mayors and governors started being elected, and the revenues of localities were raised (Escobar-Lemmon, 2003; Penfold-Becerra, 1999, 2004).

	Brazil	Mexico	Argentina	Venezuela
Subnational Share of Revenues (A)	33%	21%	19%	6%
Subnational Share of Expenditures (B)	44%	29%	41%	13%
Degree of Local Autonomy (A/B)	0.75	0.72	0.46	0.46

Table 1: *Intergovernmental Balance of Power in Argentina, Brazil, Mexico and Venezuela. Data suggest that municipalities from Brazil and Mexico have higher autonomy than municipalities in Argentina and in Venezuela. Data from the World Bank (2001).*

metrics proposed in the literature, these countries anchor in the extremes. The cases of Argentina and Mexico are harder, because subnational units have different degrees of power in reference to the national government. On one hand, governors in Argentina and Mexico are more powerful than mayors, but less so than presidents (Siavelis and Morgenstern, 2012). Mayors, on the other hand, have more discretion over budget and policies in Mexico than in Argentina (Falleti, 2010). As I discuss here data at the municipal level, and I am interested in assessing the influence of decentralization on electoral outcomes from the perspective of relationships between presidents and mayors, it seems reasonable to classify Mexico as more decentralized than Argentina.

Regardless of the degree of decentralization achieved in any country, presidents are still the ‘center of gravity’ of the political systems in the region (Haggard and McCubbins, 2001; Shugart and Carey, 1992*b*; Mainwaring and Shugart, 1997*a*; Carey and Shugart, 1998; Samuels and Shugart, 2010; Amorim Neto, 2007). They dominate national-level decisions over expenditures in most Latin American countries. On average, the share of total federal spending that is under the president’s discretion varies from 6 to 25 percent. In Argentina, these investments average \$18 billion per year between 2003 and 2010; in Brazil in the same period, \$187 billion; in Mexico, \$120 billion; and in Venezuela, \$35 billion. Presidents have exclusive discretion over budget allocation, enjoy varying levels of decree power, and appoint cabinet members responsible

for economic decisions. Thus, although presidents have lost some power because of the decentralization reforms (Falleti, 2005), they still control an important share of fiscal and political decisions (Eaton, 2004; Gibson and Calvo, 2000; Tommasi et al., 2001). This is especially true during periods of rapid growth, when revenues are abundant and much higher than what governments were expecting (Jones, 2001).

The political importance of decentralization has become especially salient with the inaugurations of presidents from traditional opposition parties, an increasingly frequent occurrence over the past fifteen years. Before these partisan turnovers, Latin American governments were vertically unified despite decentralization, with the same groups in charge both nationally and locally. The political parties controlling the presidency in the first decades after democratization were either inheritors of the authoritarian regime alliances or groups that had at least not opposed the authoritarian regimes and hence were not particularly interested in wholesale policy changes. It was only the arrival of vertically divided governments — after the rise of opposition parties to the presidency and the continuity of traditional ruling parties in the localities — that revealed the importance of decentralization in the region.

The first major ideological shift in a Latin American presidential election occurred in 1998 when Hugo Chávez (*Partido Socialista Unido de Venezuela, PSUV*) was elected president of Venezuela. He was followed in 2000 by Ricardo Lagos (*Concertación*) in Chile and Vicente Fox (*Partido Acción Nacional, PAN*) in Mexico. Brazil was next; the *Partido dos Trabalhadores* (PT) won the presidency under the leadership of Luis Inácio Lula da Silva. Then, Nestor Kirchner (*Frente por la Victoria, FPV*), the new Peronist, won the presidency of Argentina in 2003 after a decade of presidential instability because of economic outcomes in the country.⁴ Evo Morales of Bolivia in 2005,

⁴Although Menem and Kirchner were both running under the PJ label in the presidential election of 2003, they had very distinct ideological platforms. The differences between both factions of the PJ were so radical that it led to the division of the party between the classic *peronistas* (PJ) and the new *kirchneristas* (FPV) (Malamud, De Luca and Alessandro, 2011).

and Rafael Correa of Ecuador in 2006 followed. The rise of these alternative leaders was associated with a broadening of social and economic policy options in Latin America. Unlike the 1980s and the 1990s, when candidates often campaigned for office on vaguely reformist platforms but then governed as before (Stokes, 2002), the post-1998 wave of new presidents — mostly from the left — brought a new era of policy experimentation in which governments expanded their developmental, redistributive, and social welfare roles. These transitions changed not only who governed Latin Americans, but also how they pursued such changes.

Although these turnovers produced much reordering at the central level of government, historical political machines were still in place in the lower levels of government. Elected presidents did not have a range of allies to give them political and electoral support. In Brazil, Lula's party governed less than 3 percent of the municipalities (18 percent of the population) in 2002. In Venezuela, Chávez's party governed less than 18 percent of the municipalities (24 percent of voters). In Mexico, Fox's party controlled 27 percent of the municipalities in 2000, which represented 35 percent of the total population. In Argentina, the situation was a little bit better, as Kirchner's *Frente por la Victoria* (FPV) had the support of roughly 40 percent of municipalities in 2003 (45 percent of the population). Given the earlier description, Lula had the weakest party in a country where local politicians had the most power. Kirchner, by contrast, had the strongest party in a country where local politicians did not matter very much.

How did these presidents govern in the face of local opposition and under varied levels of decentralization? What should be the allocative strategy of a politician interested in policy change? My answer, as I detail in the next section, is that presidents allocate resources *directly* to voters when mayors have small influence locally (in centralized systems), but presidents allocate public goods *indirectly* to voters when mayors are powerful players (in decentralized settings). In the first case, the presence of pres-

idential voters is the most important factor in determining the pattern of presidential allocation; in the second case, the effect of having a loyal local mayor carries more weight in the president's discretionary calculus.

Presidential Discretionary Spending in Decentralized Systems

There has recently been a spirited debate about how political parties allocate targetable goods to optimize their electoral prospects.⁵ In one of the most influential papers, Dixit and Londregan (1996) show that when parties have no special relationship with any group, their allocations are driven by the density of swing voters in each constituency group — as in the Lindbeck and Weibull (1987) model. As larger and larger asymmetries in the parties' abilities to deliver benefits arise, however, the parties' allocations are driven more and more by the core voter logic of promising benefits to those groups to which the party can most effectively deliver benefits — as in the Cox and McCubbins (1986) model. The logic behind this model depends solely on the preferences and behavior of local voters.

My work contributes to this debate by incorporating the role of elected brokers in multi-tier systems in to the explanation of how distributions take place. Valenzuela (1977), Calvo and Murillo (2011), Stokes et al. (2012) and Weitz-Shapiro (2012), among others, have shown the importance of brokers in the distribution of government goods in several countries, but their notion is different from the one I use here. For those authors, brokers are local *nonelected* intermediaries hired to provide targeted benefits and solve problems for their followers. Mayors are far from this definition, they also care about their political careers and depend essentially on voters' support to build those careers. In other words, mayors want to be accountable to their voters too. My notion

⁵For a good summary of the debate see Golden and Min (2013).

of the role of local politicians is more similar to that of Borges (2011), for whom local politicians are powerful political brokers. The decentralized organization of national parties allowed subnational rulers to rely on their increased powers over policy making to strengthen regional party machines and to maximize their autonomy from central actors and institutions (Hagopian, Gervasoni and Moraes, 2009).

Politics in federal systems are tied to multiple and legitimate governments headed by presidents, governors, and mayors. Any consideration of the distribution of resources, therefore, needs to take into account that all such players have interconnected interests in benefiting from investments, and also in blaming oppositions for bad performance. In a decentralized system, we should expect to observe strong local politicians who are independent agents, able to get credit for outcomes produced by other politicians, and able to mobilize voters using such influence. In centralized systems, by contrast, we should find weak local politicians, agents who are dependent on presidential acquiescence to get credit for local outcomes supplied by the central government. Whether mayors are strong or weak, in turn, should determine the presidential strategy for targeting spending (Hallerberg, Scartascini and Stein, 2009).

As described earlier, federal resources can be targeted geographically to promote policy goals (Treisman, 1996; Besley et al., 2003; Evans, 2006) and voter support for the incumbent party in national elections (Ames, 2001; Pereira and Mueller, 2004; Amorim Neto, 2006; Hidalgo and Nichter, 2013). To the extent that voters respond to targeted spending, a president can use budgetary discretion to gain votes for herself or her designated successor. But in a decentralized system, federal transfer spending also improves reelection odds for incumbent mayors in targeted municipalities. The political benefits of transfer spending thus accrue not just to the president, but also to an array of local politicians who may or may not share the president's party and political goals.

This creates a dilemma: by targeting her own core voters and pursuing social policy

goals, the president may be supporting the reelection goals of her political rivals at the local level. This dilemma looms larger when the scope of the presidential party's power is narrow at the municipal level. Under decentralization, a president needs to rely on loyal local agents to implement policy changes and to receive credit for what she does for her voters. Lack of information, more typical in decentralized settings, may allow a different party at a different level of government to claim the credit. This confusion might lead voters to reward the wrong party (Bruhn and De La O, 2009). As a credible credit claimer, a mayor not allied with the president has incentives to make voters believe that his political party is responsible for the improvements they observe in the region. This is a real threat to the president, as she is then expending resources to produce opponents for herself. Thus, although a president can do a good job trying to implement the agenda she was elected on, she may face the political preferences of rivals, who are not willing to work as agents for presidents with whom they disagree about policy. If mayors are disloyal agents, they can also put at risk their own political careers, as voters might see them as also responsible for not improving their welfare.

The best way to guarantee that a local politician will act as a president's agent is to make sure he also benefit from advertising the president's name, publicizing the president's services, and mobilizing voters to support the president's party in subsequent elections (Kiewiet and McCubbins, 1991). Therefore, a local agent is more likely to be loyal when he is a member of the presidential party. Co-partisans have much less incentive to blame each other because negative effects will have spillovers for both. In addition, co-partisans have incentives to build party brands and reputation, which will lead to spillover effects over both offices (Scully, 1995; Cox and McCubbins, 1993; Kitschelt, 2010). By contrast, when local politicians are weak players who do not influence electoral or policy outcomes, another solution for presidents is to bypass mayors and use discretionary powers to build direct linkage with voters instead (Fox, 1994;

Dickovick, 2006). In this case, presidents do not need to create incentives for mayors to act as if they were acting in the name of the president. Presidents just need to make sure municipalities with core voters are receiving sufficient federal investments.

Although decentralization can be considered a general trend in the whole region, cases like Argentina, Venezuela and Chile are still considerably centralized. Local politicians in these countries cannot credibly free-ride on federal resources to extract electoral advantages. Voters know that presidents are responsible for allocations, and that mayors make very small contributions to the outcomes they see (Americas Barometer, 2012). Consequentially, local politicians have much lower leverage in influencing voters' choices. Voters do not see them as providers of benefits, and, therefore, mayors cannot threaten presidential popularity by obscuring presidential responsibility as the outcome providers. In this setting, responsibilities are clearer, and presidents can convert investments into votes more easily (Duch and Stevenson, 2010; Powell and Whitten, 1993; Samuels, 2004).

The argument formulated here has a clear empirical implication that could be contrasted against a model of the data. In the following sections, I test the hypothesis that *in more decentralized countries, where mayors have more influence over policy implementation and over voters, presidents should allocate proportionally more resources to municipalities governed by co-partisan mayors. By contrast, in less decentralized countries, where mayors are weak, presidents should allocate resources where core partisan voters reside, regardless of mayoral partisanship.*

Understanding Presidents' Allocative Strategies

This paper is a comparative study of four countries, which together account for more than 70 percent of the population of Latin America — Argentina, Brazil, Mexico, and

Venezuela. I assess fiscal spending in 104,860 municipality-years in these four countries. Within Latin America, several commonalities and differences make Argentina, Brazil, Mexico, and Venezuela particularly suitable for comparison. These features, combined, provide a good set of cases with which to explore the reasons for the diverging impact of decentralization level on the spending strategy of Latin American presidents.

First, because these are the largest countries in the region, it is reasonable to assume that relationship between levels of government and among subnational units are politically relevant (Willis, Garman and Haggard, 1999; Escobar-Lemmon, 2003; Falloti, 2005). Second, these four countries have similar government structures, each with three tiers of government. Third, two major institutional differences among Argentina, Brazil, Mexico, and Venezuela allow for controls to the main argument. With regard to the degree of autonomy of subnational officials at the beginning of the presidents' terms, those in Brazil and Mexico had high levels of autonomy established prior to the inaugurations of traditional opposition parties, whereas the subnational officials of Argentina and Venezuela had lower levels of autonomy in comparison to their central governments. And in terms of their political party systems, the Venezuelan president was elected with large majorities nationally and locally, whereas the presidents in Argentina, Brazil, and Mexico lacked local support from the beginning of their terms. Hence, the four cases vary along these two important institutional variables.

What follows is based on information collected from five months of fieldwork research carried out in Argentina, Brazil, Mexico, and Venezuela. The primary data analyzed include fiscal and electoral data; and more than 70 in-depth interviews conducted with academics, politicians, and public officials from the national and subnational levels of government in the four countries. To evaluate how presidents distribute resources to geographic areas in the country, I compare municipal and national executive election results to municipal-level observations of transfers allocations from 2003 to 2010 in

Brazil, from 2000 to 2011 in Mexico, from 2003 to 2011 in Argentina, and from 2000 to 2011 in Venezuela.

In Brazil, I study the allocation pattern of Lula's administration. The terms of both mayors and president are four years, but they are staggered, with municipal elections taking place at presidential midterms. Hence, in every municipality, the combination of mayoral partisanship and presidential vote shares changes every two years. Presidential elections were held in 2002 and 2006, with municipal elections in 2000, 2004, and 2008. In Mexico, I analyze the distribution patterns of the *Partido Acción Nacional* (PAN) under the leadership of Vicente Fox (2000–2006) and Felipe Calderón (2007–2011). States control the schedule of mayoral elections, so they occur at various times during a presidential term. The president has a single six-year term, whereas mayors have single four-year terms. National elections were held in 2000 and 2006, whereas most of the municipal elections were held in 2000, 2004, and 2008.

In Argentina, I analyze most of the years in the Kirchner era (2003–2011). In Argentina, national and local elections are concurrent, and office changes happen every four years. The president is allowed to run for reelection once, whereas mayors have no term limits. National and local elections took place in 2003, 2007, and 2011. Finally, in Venezuela, I focus on Chávez's governments (2000–2012). The electoral rules changed considerably during the time period under assessment here, but most often, the president and mayors were allowed to serve two consecutive terms. National elections took place in 2000, 2006, and 2012, whereas local elections occurred in 2000, 2004, 2008, and 2012.

Measuring Municipalities' Federal Investments per Capita

The municipality is the unit of analysis for the investments made by the central governments in Argentina, Brazil, Mexico, and Venezuela. The dependent variable is annual

	Brazil	Mexico	Argentina	Venezuela
Percentage of Zero Spending	74.1	35.6	2.7	1.8
Average	15.2	101.9	24.78	142.87
Standard Deviation	75.9	64.9	36.2	282.75
Minimum	0.00	0.00	0.00	0.00
Maximum	3,532.3	983.9	367.3	8,119.6
Municipality-Year Obs.	44,512	32,370	23,946	4,032

Table 2: *Spending per capita by Country (in Dollars). The first row contains the percentage of municipalities that did not receive federal investments. The second presents the average amount of investments per capita disbursed by the national government to municipalities.*

per capita investments of the central government in the municipality. First, I convert the data from nominal national currencies to real 2003 U.S. dollars, using the World Bank database on historical exchange rates and correcting for the official inflation reported by each country. I included transfers that refer to investments in constructing new buildings, new roads, new schools, and new hospitals or the maintenance of them. Resources come from different sources, but they are all discretionary amounts invested by the national government to create infrastructure in general.⁶ Descriptive statistics

⁶Data for Brazil comes from SigaBrasil. The information about budget investments of national companies (e.g., Petrobras) is not included. Formally, I analyze expenses called ‘investments’ according to the budget classification. The information for Mexico comes from the INEGI. The investments relate to the Mexican fiscal and social security budget. Data related to oil and minerals is not included, but only the investments the president allocates to municipalities on a discretionary basis. Formally, I analyze expenses called ‘aportaciones’ and ‘inversion pública federal’ according to the budget classification. The data for Argentina were provided by the Finance Ministry and contains all discretionary federal investments made by the national government in municipalities throughout the period. The ‘co-participación’ is excluded from the raw data, and most of the disbursements are related to the infrastructure improvement program created in 2003 by the national government: *inversiones en obras públicas*. The data also contain resources invested in housing building (*política nacional de viviendas*) and in road construction. Most of the investments were taken from the *banco de proyectos de inversión pública - BAPIN*, which contains national disbursements in form of direct investments to municipalities. The discretionary resources that the Venezuelan president controls are under the umbrella of several small national funds called *FONDEN*, *FIDES*, *LAEE*, *Fondo de Compensación Interterritorial*, and *Créditos Adicionales*. These resources are given to municipalities in order to improve infrastructure and other necessary public institutions. The information was provided by the ONAPRE, the office that administers Venezuelan budgetary information of the country.

for each country are presented in Table 2. Plots with temporal trajectories of municipal investments are provided in Appendix A. Brazil has the highest percentage of municipalities that did not receive national investments over the years. By contrast, Venezuela has the highest average of national spending across the four countries, followed by Mexico, and Argentina.

Operationalizing Municipal Political Profiles

		Mayor Party Affiliation	
		Rival	Co-partisan
Presidential Electoral Support	Not Most Voted	Opposition District	Opposition District with Ally
	Most Voted	Core District with a Rival	Core District

Figure 1: *Municipal Political Profiles*

My main explanatory variable is the *municipal political profile*, which is a categorical variable that combines information about voters’ preferences as expressed in presidential and mayoral elections. The variable has four mutually exclusive categories: (1) municipalities in which the plurality of voters supported the current president in the presidential election and also elected a mayor from the president’s party (core districts), (2) municipalities in which the plurality of voters supported the president but did not elect a mayor from the president’s party (core districts with rivals), (3) municipalities in which the plurality of voters did not support the president but did elect a mayor from the president’s party (opposition districts with allies), and (4) municipalities in

which the plurality of voters did not support either the president or her party's mayoral candidate in the most recent round of elections (opposition districts) — see Figure 1.

The first dimension distinguishes voters' choices in the national election. If a plurality of voters in a municipality voted for the president, the municipality was coded as containing the president's core voters (=1); otherwise, I code it as in opposition to the president (=0). The second dimension identifies mayors' affiliations having as a reference the president's party (=1) or others (=0). In the way I operationalized this variable, it varies by municipality and by year.

Figure 2 presents the aggregated political profiles of municipalities by country. Overall, presidents receive the plurality of the votes in the majority of the municipalities. In Argentina and in Brazil, for example, approximately 70 percent of the municipalities voted mostly with the president in the national elections. In Mexico, the percentage is smaller, 50 percent, but still significant for a party that was in the opposition for 70 years. In Venezuela, President Hugo Chávez received the plurality of the votes in almost all municipalities. Interestingly, the majority of these municipalities in the four countries were governed by mayors from parties different from those of the president. In Brazil, where presidents have been governing with coalitions since re-democratization, the percentage of municipalities with opposition-party mayors but with president's core voters is close to 60 percent.

The representation in Figure 2 fails, however, to capture the longitudinal variation of the municipal political profiles. In Brazil, Lula obtained the plurality of votes in the majority of the municipalities in his first election, but his party was not able to accomplish even nearly the same outcome. However, the number of municipalities governed by the PT did more than double between 2002 and 2010, increasing from 200 to roughly 500 (see Figure B.1 in Appendix B). The number of municipalities that both opposed Lula and elected opposition mayors, by contrast, dwindled substantially,

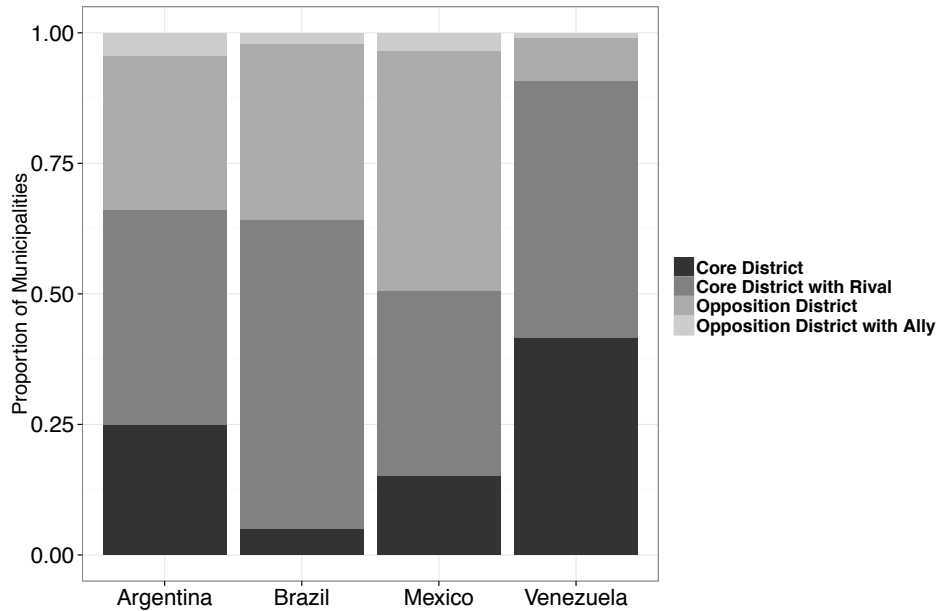


Figure 2: *Municipal Political Profiles by Country (2000-2011). Overall, presidents receive the plurality of the voters in the majority of the municipalities. However, the majority of these municipalities in the four countries were governed by mayors from parties different from those of the president.*

especially after 2006. In Mexico, the situation is very similar to that described for Brazil (see Figure B.2 in Appendix B). When President Fox was inaugurated in Mexico, his party, the PAN, had the plurality of the votes in the majority of the municipalities but did not govern the majority of the local offices. Fox was the plurality vote winner in 53 percent of the municipalities, and Calderón in 55 percent. By contrast, PAN controlled only 9 percent of mayorships in 2000, but 26 percent in 2007. The numbers show a substantial increase, but mainly in places where PAN was already doing well in the presidential elections.

Venezuela and Argentina present a distinct pattern of municipal political profiles over time. Both Chávez (Venezuela) and Kirchner (Argentina) were elected with the plurality of the votes in a large majority of the municipalities, but their parties won more mayoral races only in the two presidents' second terms in office. Chávez won the

plurality of the votes in 80 percent of the municipalities in 2000 and 92 percent in 2006. His party governed 27 percent of the municipalities in 2000 but six years later controlled 57 percent of the local offices. Importantly, as we can see in Figure B.3 in Appendix B, the major shift that led to this scenario happened after the 2006 presidential election when a large portion of the municipalities in Venezuela voted for Chávez and elected mayors from his party. In Argentina, the majority of the municipalities have always preferred the Kirchners, but not always their local allies (see Figure B.4 in Appendix B). As in Venezuela, it is only during the first term of President Cristina Kirchner, the inheritor of Nestor Kirchner's government, that the *Frente por la Victoria* (FPV) controlled the majority of the municipalities in the country. In 2003, the FPV had 14 percent of the local offices in Argentina. In 2008, this number rose to 48 percent. In terms of votes, the Kirchners' governments were also able to increase their dominance in the municipalities. The number of municipalities in which the FPV had the plurality of the voters increased from 58 percent in 2003 to 79 percent in 2009.

Accounting for Alternative Explanatory Factors

There is broad consensus among scholars that low-income voters are more susceptible to 'selling' their votes in exchange for material goods and are apt to vote for the government that provided such outcomes (Gervasoni, 1998; Brusco, Nazareno and Stokes, 2004; Reinikka and Svensson, 2004). If one believes in the argument that incumbent parties want to extract the highest returns from pork and patronage, then presidents should allocate resources to localities in which poor voters are abundant and voters need infrastructure investment. To account for variations in the level of development across municipalities and states I used measurements of *poverty rate* and *GDP per capita* for

each municipality.⁷

There exists a rich literature on how Conditional Cash Transfer programs produced significant changes in voting patterns across Latin American countries (Rawlings and Rubio, 2003; Hunter and Power, 2007; Zucco, 2008; De La O, 2012; Zucco and Power, 2013; Zucco, 2013). To adjust for that, in each country I controlled for the number of families that received *Conditional Cash Transfers* from the national government.⁸ This is necessary as a way to control for the other tools that presidents in Latin America have to target voters directly, bypassing other politicians.

Another set of scholars have argued that presidents in Latin America, and particularly in Brazil, use their distributive powers for legislative coalition building (Amorim Neto, 2002; Snyder and Samuels, 2001; Arretche and Rodden, 2004; Auston and Mueller, 2006; Zucco, 2009; Nunes, 2010). According to this view, federal politicians have incentives to distribute federal resources favoring certain municipalities that help maintaining their political power. Given that the votes of legislators are essential to advance the presidential agenda, national politicians might favor municipalities in which coalition partners have constituents. Given this setting, one should expect that presidents have strong incentives to allocate public goods based on strategic calculations to obtain legislative support (Sørensen, 1995; Gibson and Calvo, 2000; Jones and Hwang, 2005; Giraudy, 2007; Bonvecchi, 2009).

I include a control variable to account for the relative importance of each municipal-

⁷The data for Mexico comes from the database SIMBAD of INEGI and from the CONAPO. The information for Venezuela comes from the INE. The poverty and economic indicators for Argentina's municipalities were collected directly in the 'Centro de Estudios para la Producción' from the 'Ministerio de Industria', and from the 'Sistema de Información Estadística Local (SIEL)' in the INDEC. Data for Brazil is from IPEADATA and FIRJAN. The municipal level of poverty for Brazil is only available for 2003. Therefore, I decided to use a better proxy that varies by year and by municipality: the *IFDM index*. It is based on employment rate, income, education, and health levels of each municipality. It ranges from 0 to 1, with 1 being the best situation a municipality can have.

⁸In Brazil, I used information from Bolsa Família. In Mexico, I used information about Solidariedad. In Venezuela, I used information from Misiones. And in Argentina, I used information from Programa Ciudadanía Porteña.

ity for legislators who are members of the presidents' legislative coalition. Municipalities that deputies are accountable to are called the *Electoral Constituency*. Using legislative and electoral data from each country,⁹ I created a dichotomous variable to indicate whether or not a municipality is a main electoral constituency of a legislator who is part of the president's legislative coalition. Municipalities that were identified in such way were coded as 1; the others received 0 value. For Mexico and Venezuela, I operationalized this variable based on the electoral outcomes in single-member districts. Every municipality that elected a deputy supporting the PAN in Mexico or the PSUV in Venezuela was identified as an electoral constituency of the government.

For Brazil and Argentina, I used two strategies. Argentina has a closed-list proportional representation system - votes are cast for the party lists - whereas Brazil's is open list - votes are cast for individual candidates. In Argentina, a municipality is classified as the electoral constituency of legislators from the president's legislative coalition when the plurality of that municipality voted for the FPV in the national legislative elections.¹⁰ For Brazil, the open-list system was also a challenge. For each deputy in Lula's legislative coalition, I identified the municipality from which a deputy received his greatest number of preference votes and coded it as 1.¹¹ Second, for each deputy in Lula's coalition, I identified the municipality in which a deputy had the largest victory margin. In other words, among all municipalities in which a deputy received votes, I identified the ones in which he got the largest percentage of votes, as a share of the number of votes in each municipality.¹²

⁹TSE in Brazil, the 'Ministerio del Interior' in Argentina, the CNE in Venezuela, and CIDAC's electoral database in Mexico.

¹⁰The overlap between municipalities and electoral districts is not perfect, but I used GIS information from Argentina to map the districts and the municipalities.

¹¹For example, if deputy A was elected with 100 votes, being 30 from municipality A, 60 from municipality B, and 10 from C, I coded municipality B = 1 and assigned 0 to A and C.

¹²For example, if deputy A was elected with 100 votes, being 30 from municipality A (population = 31), 60 from municipality B (population = 500), and 10 from C (population = 30), I coded municipality A = 1 and assigned 0 to B and C.

Previous studies have found that incumbent parties are better positioned to establish clientelistic linkages with their core voters and to extract the highest returns from allocations (Stokes, 2005; Magaloni, Diaz-Cayeros and Estevez, 2007; Zucco, 2008; Greene, 2008; Nichter, 2008). This scholarship suggests that there should be a positive vote share effect on the allocation of resources. That is, municipalities that were key for the president’s election should receive more discretionary transfers (Case, 2001; Golden, 2003; Larcinese, Rizzo and Testa, 2006; Ansolabehere and Snyder, 2006). To account for this hypothesis, I constructed a variable with the percentage of votes each municipality provided for each of the presidents, given the total number of votes each received. I am calling this the *president’s constituency*, as it takes into account how much electoral weight each municipality has in generating presidents’ electoral victories.

	Brazil	Mexico	Argentina	Venezuela
Poverty Rate (%)	26.8	42.7	23.4	36.3
GDP per capita (\$)	5,788	8,490	5,490	6,748
Population benefitted by CCT (%)	26.4	24.6	8.3	73.1
Electoral Constituencies (%)	10.4	29.1	21.3	42.5
President’s Constituency (Average)	0.08	0.11	0.12	0.25

Table 3: *Averages and Proportions of Control Variables, 2000 to 2011. Mexico has the highest levels of poverty, but the best values for GDP per capita. Conditional Cash Transfer programs are very popular across countries, and has covered most voters in Venezuela. Almost 30 percent of municipalities are represented by Legislators from the president’s party in Mexico, but only 10 percent in Brazil. Municipalities are on average much more important to the President of Venezuela than they are for the President of Brazil.*

I added *year fixed effects* to account for variation not captured by the substantive variables, but doing so only marginally improved the fit of the regressions. I also have controls for the *mayor’s vote share* in every municipal election that took place

between 2000 and 2011. This measure serves as a proxy for the municipal influence of mayors on their municipalities. To control for the heterogeneous influence of governors, I also included *governor's political party* in the models. Most of the literature on intergovernmental transfers used data from states or provinces. Setting state controls helps isolate the various important factors related to the influence governors have on presidential discretionary allocations (Desposato, 2004). Finally, the models control for the *mandatory* amounts of resources that each municipality received by year. Doing so, I expect to avoid any confoundedness due to the existence of constitutional investments for each municipality.

Estimation Challenges: How to Analyze Expenditure Data

Spending data takes nonnegative values with a substantial proportion of zeroes. A standard way to deal with these kinds of data — often called censored — is to use a Tobit model (Tobin, 1958). The Tobit model assumes that negative values are theoretically possible, but not actually observed. In its simplest version, the Tobit model has a latent variable that is observed whenever it is positive, but that is censored at zero when it is negative. More important, the dependent variable in this model follows a distribution that is a mixture of discrete and continuous random variables that correspond to one unique decision process. The process that I am modeling here, by contrast, has a different nature that a Tobit model cannot capture. I want to model a two-part process of presidential spending that is composed of two correlated moments: (1) the decision of whether or not to disburse some portion of resources to a municipality, followed by (2) a decision of how much to allocate in case the first decision was positive.

This type of process is not censored in a typical fashion, but it is characterized as semicontinuous. That is, there may exist a gap between the zero values (reflecting a decision not to spend) and the positive values of spending (reflecting the level of dis-

cretionary spending). In contrast with what the Tobit model assumes, in my data a zero value is the result of a presidential choice not to allocate any resources to a certain municipality. My data are positive, by contrast, because after deciding on whether or not to allocate, the president decides *how much* to allocate. One solution for when the data contain zeroes and positive values coming from different decision processes is to use a two-part model. The first stage models whether the response is positive or zero. Conditional on the first stage being positive, the second stage models its level. As noted by Duan et al. (1983), two-part models are easier to interpret than the Tobit because the second part of a two-part regression describes the conditional mean of the response given that it is non-zero, a quantity that is highly meaningful.

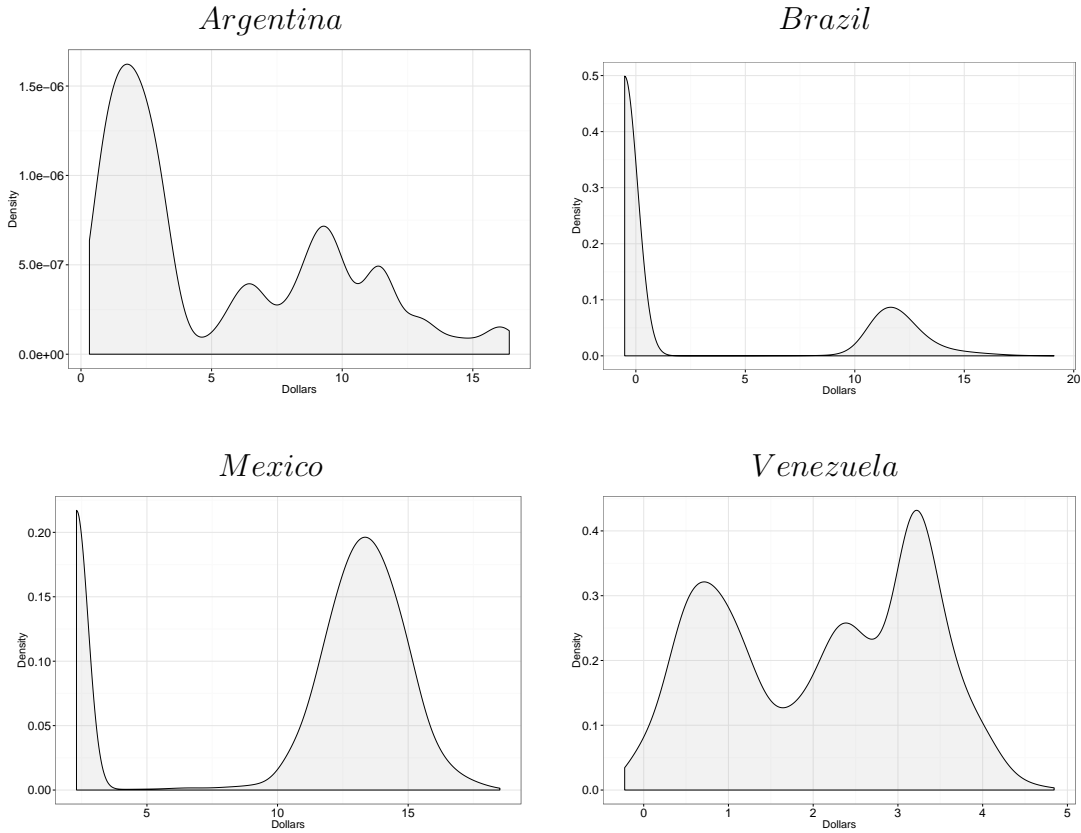


Figure 3: Presidential Discretionary Spending per capita in Dollars by country (2004).

The data analyzed here present clear features of semicontinuity, which suggests the adoption of a two-part model (see Figure 3). In Brazil, for example, more than 70 percent of municipalities received no annual discretionary federal investment whatsoever, whereas a small fraction had large expenditures, especially in 2008. In Mexico, roughly 35 percent of municipalities did not receive any discretionary investments from presidents between 2000 and 2011, but the majority of localities have been receiving more investments per capita over time. In both Argentina and Venezuela, by contrast, the percentage of municipalities not receiving investments is low, and the average amount invested by the federal government in municipalities has been roughly constant over time.

Besides having these two parts, the data also contain multiple observations for each municipality, which introduces within-municipality correlation. The correlations between spending in adjacent years varies from 0.01 to 0.99 from year to year and across countries, but they are always present to some extent. Ignoring that observations are correlated over time may lead to: exaggerated goodness of fit measures, estimated standard errors that tend to be smaller than the ‘true’ standard errors, and possible parameter inconsistency. The literature suggests many approaches for dealing with this; the most common is to assume that each unit has its own intercept, the ‘fixed effects’ (FE) model (Angrist and Pischke, 2009). This model simply adds a dummy variable for each unit. However, the fixed effects remove any of the average unit-to-unit variation from the analysis, and simply ask whether intra-unit changes in y are associated with intra-unit changes in x (Beck and Katz, 2011). Moreover, using fixed effects also makes it difficult to discern the impact of variables that change only slowly (Greene, 2003). Accordingly, I use a mixed model with municipal random intercepts and year random slopes that not only deals with the problems mentioned above, but that also allows

each municipality to have its own over time expenditure trajectory.¹³

The two-part mixture model fitted here has correlated random intercepts for municipalities and random slopes for time and can be represented as follows:

$$f(y_{it}|\mathbf{b}_i) = (1 - \phi_{it})^{1-d_{it}}[\phi_{it} \times LN(y_{it}; \mu_{it}, \tau^2)]^{d_{it}} \quad (1)$$

$$probit(\phi_{it}) = \mathbf{x}'_{1it}\boldsymbol{\alpha} + \mathbf{z}'_{1it}\mathbf{b}_{1i}$$

$$\mu_{it} = \mathbf{x}'_{2it}\boldsymbol{\beta} + \mathbf{z}'_{2it}\mathbf{b}_{2i}$$

where

- y_{it} is the t^{th} spending allocation for municipality i ($t = \{1, \dots, n_i\}$)
- d_{it} is an indicator that $y_{it} > 0$, and $\phi_{it} = Pr(Y_{it} > 0)$
- \mathbf{x}'_{jit} and \mathbf{z}'_{jit} are $p_j \times 1$ and 2×1 vectors of fixed and random effect covariates for component $j = [1, 2]$
- $LN(\cdot)$ is lognormal density evaluated at y_{it} , with mean μ_{it} and precision τ^2
- $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ are fixed effect coefficients.
- $\mathbf{b}_i = [(\mathbf{b}'_{1i}, \mathbf{b}'_{2i})'] \sim N_4(0, \Sigma)$, is a stacked vector of random effects for subject i , with covariance Σ . I assume that \mathbf{b}_{1i} and \mathbf{b}_{2i} are correlated to capture possible dependence between the two parts of the decision process that I am modeling.

When $d_{it} = 0$, the only contribution to the likelihood is the first term in equation 1 — the probit probability that no allocation was made to municipality i at time t . When

¹³A major complaint lodged against random effect models relates to the restrictive assumption that independent variables be orthogonal with the random effects term. Since a variable varies both within and between municipalities, many argue that this is an unrealistic assumption, because unobserved heterogeneity will almost always be correlated with the independent variables. I acknowledge this limitation in the approach used here, but later in the paper I provide evidence for why this is not going to be critical here.

$d_{it} = 1$, the second term is activated and the contribution to the likelihood includes both the probit probability that spending occurs and also the value of the log-normal density at the level of observed spending. The model that I present here is the standard two-part model for semicontinuous data (Tooze, Grunwald and Jones, 2002) with random intercept for municipalities and random slopes for time, in which the variance-covariance matrix of the random effects includes cross-covariances between the random effects of the two components. As inspection of the likelihood reveals, without these correlations, the probit and the log-normal parts of the two-part model could be estimated separately. However, because the same unobserved factors are likely to affect each of the two parts of the allocative choice, I can not assume these correlations are zero and must estimate the two-parts of the model jointly.

A two-part mixed model with correlated random effects, like the one presented here, is an attractive approach to characterize the complex structure of longitudinal semicontinuous data. But it is computationally challenging to fit these complicated models to longitudinal data using maximum likelihood. To avoid, for instance, problems with algorithm convergence, I estimate the model using Bayesian Markov Chain Monte Carlo (MCMC). By sampling rather than optimizing, MCMC makes estimation and inference simpler (Jackman, 2000). First, the Bayesian methods are well suited to the large number of parameters to be estimated in each part of the model and the hierarchical structure that the data presents (Browne and Draper, 2006).

The Bayesian approach employed here also gives me the opportunity to incorporate informative priors from in-depth interviews conducted with political elites in Argentina, Brazil, Mexico, and Venezuela into my quantitative analysis. As advocated by Gill and Walker (2005), the elicitation of priors has the potential to tie together ‘the seemingly antithetical research approaches of qualitative area studies with data-oriented work based on statistical methods, perhaps then mending a recent rift in political science.’

To combine fieldwork information collected through interviews (qualitative) with fiscal records (quantitative), as well as to ensure a well-identified model with proper posteriors, I pursued a systematic procedure to recover elicited priors for the quantities in which I am most interested.

Eliciting Priors: Representing Political Elites Knowledge

Elicitation is the process of estimating a person's knowledge and beliefs about one or more uncertain quantities. The result of elicitation is a (joint) probability distribution over those quantities that characterize the person's beliefs. In the context of Bayesian statistical analysis, elicitation arises most often as a method for specifying the prior distribution for one or more unknown parameters of a statistical model. In this context, the prior distribution will be combined with a statistical model and data through Bayes' theorem to derive a posterior distribution. The literature on elicited priors is large and the justifications for using it abound (Garthwaite, Kadane and O'hagan, 2005; Gill and Walker, 2005; Kuhnert, Martin and Griffiths, 2010). One of the most frequently cited reasons to pursue it has to do with the fact that elicitation brings the analysis closer to the application by demanding attention to what is being modeled, and what is reasonable to believe about it. Further, elicited priors help researchers to read better conclusions when the quantitative data themselves are not necessarily trustworthy, but also when the data contain missing values that are not missing at random (Western and Jackman, 1994; Jackman, 2009).

Bayesian inference is relatively new in political science and there have been only a handful of instances of the use of informative priors (Gill and Walker, 2005; Jackman, 2004; Western and Jackman, 1994). These papers highlight the substantive value of using elicited priors because the 'expert' views are tempered by actual data through the mechanics of Bayesian inference and produce more substantively comprehensive

estimates of our quantities of interest. Otherwise, the best that we can do is describe such opinions anecdotally or with imprecise summary impressions because the number of available experts typically insufficient for standard statistical analysis. As noted by Gill and Walker (2005), ‘elicited priors can be a means of systematically integrating qualitative and quantitative empirical work in political science, thus reaching across a traditional divide in the discipline.’ In comparative politics, this could be a solution for systematically integrating the qualitative information we discover during fieldwork with the quantitative information we collect from various sources. Analyzing data to reveal political allocation strategies offers an opportunity to employ a Bayesian estimation incorporating politicians’ own beliefs about how they do things. In other words, the joint use of quantitative data and qualitative information gleaned from fieldwork can provide a way to evaluate whether what politicians say is compatible with what they indeed do.

I follow a standard procedure to produce elicited information from politicians: (1) I selected the expert(s) and identified the quantities of interest, (2) I elicited specific summaries of the experts’ distributions over those quantities, (3) fitted a (joint) probability distribution to those summaries, and (4) assess the adequacy of the elicitation (see Appendix C for more details). I interviewed academics, politicians, and public officials from the national and subnational levels of government in Argentina, Brazil, Mexico, and Venezuela, including President Cristina Fernández de Kirchner (Argentina), former presidents Luis Inácio Lula da Silva and Fernando Henrique Cardoso (Brazil), and the former vice president of Venezuela Elías Jaua. For the coefficients that I did not have expert priors, I use estimates from other papers that had estimated the effects of, for example, poverty, GDP, and the other control variables on presidential discretionary allocation in these four countries (Brollo and Nannicini, 2012; Penfold-Becerra, 2004; Armesto, 2009; O’Neill, 2006).

It is often asserted that fiscal, inflation, and social data in centralized Latin American countries have been manipulated by its governments (Business Insider, 2012; The Economist, 2012). As fiscal information is often believed to be inaccurate, I was interested in acquiring some qualitative information about the process of presidents' allocations in Argentina, Brazil, Mexico, and Venezuela. I wanted to contrast the experts beliefs about discretionary allocation for political advantages with the actual data on political decisions about investments (Jackman, 2009). I directly asked my interviewees for a 'guess' about the chances and the levels of spending presidents allocated to the four types of municipalities describe before (core districts, core districts with rivals, opposition district with ally, opposition district). This information served as a reference for the mean values to my quantities of interest: α and β .

As I conducted several interviews, I pooled the guesses using a logarithmic opinion pooling method (Garthwaite, Kadane and O'hagan, 2005). The results are reported in Table C.1 and the list of interviewers is detailed in the Appendix C. I also asked the experts for a measure of the uncertainty of their estimates, an upper and lower bound, which I used as a reference in a range method to find the level of precision for the prior estimates. Again, the levels reported in Table C.1 refer to the overall mean elicited from the experts interviewed. I recognize, however, that I am using a non-conservative measure for the uncertainty because experts tend to overestimate uncertainty values for very large intervals (Weiss, 2012).

Brazilian experts believe that municipalities with the plurality of voters supporting the president and the mayor from her party are the ones that receive the largest investments. Note, however, that this distribution mostly overlaps with the prior distribution for municipalities governed by the president's party — the PT — but without the plurality of voters supporting the president. The expert priors for the probit part of the model follow the same order as the priors for the lognormal effects. The most remark-

able feature of these latter distributions, however, is that the prior for municipalities governed by the PT without electoral support for Lula has very low precision; it is the only non-informative prior in the case of Brazil (see Figure C.1).

For Mexico, the experts' priors for the volume of resources invested in the municipalities follow this order: (1) municipalities with the plurality of voters supporting the president's party — the PAN — in the presidential election and with a PAN mayor; (2) municipalities governed by PAN but without majoritarian support for the president; (3) municipalities in which voters mostly voted for PAN in the presidential election, although the mayor is from an opposition party; and (4) municipalities not governed by PAN or supporting the PAN president (Figure C.2). Different from Brazil, the experts' information in Mexico leads to more precise and non-overlapping distributions. The exception is the prior distribution for PAN/Opposition municipalities. The priors on the likelihood that a municipality would receive federal investments have the same order as presented before, but with highly overlapping tails.

For Argentina and Venezuela, the pooled experts' knowledge about the average level of resources invested by the federal government in municipalities composed two groups: the municipalities with and without presidential votes. Although the amount of overlap is substantial, it is possible to distinguish the two groups. The elicited priors for the probability of receiving any investments are less informative. Especially in Venezuela, it seems the experts believe that all types of municipalities have the same chance of receiving investments (Figure C.3). In Argentina, voting for the Kirchners seems to increase the municipalities' chances of receiving resources, but the densities drawn from the elicited priors overlap enough to decrease our prior knowledge about the government disbursements (Figure C.4).

Who Is the Target of Presidential Allocation?

In this section, I assess the main implication of my theory of discretionary allocation, combining the qualitative and the quantitative information collected during my field-work through a Bayesian estimation approach. Again, if strong local politicians (i.e., in more decentralized countries) are able to affect whether or not the president can fulfill her agenda, the president should use her discretionary power to allocate proportionally more resources to municipalities governed by co-partisan mayors, who tend to be her most loyal agents. By contrast, if weak local politicians cannot steal political credit or siphon resources from the president and have less power to help or hurt her electorally, as in centralized systems, then we should observe the president allocating resources where her own core voters are settled, regardless of the local mayor's party affiliation.

Table 4 presents the coefficients from the Bayesian two-part model. The first set of coefficients corresponds to the estimates from the probit model. The second part of the table contains the results from the log-normal model. Each column presents outcomes for one of the countries analyzed here. I start analyzing the results from the first part of the model that estimate the probability that a municipality would receive any spending at all. Across all specifications, municipalities with presidents' co-partisans in decentralized systems are associated with a higher propensity to receive federal allocations, whereas municipalities with more of the presidents' core voters in centralized systems tend to have a higher propensity to receive national investments. These results are statistically significant and substantively meaningful when different municipal profiles are considered. When these political factors are taken into account, conventionally important variables such as municipality poverty rate, municipality GDP per capita, and number of municipal beneficiaries of conditional cash transfer programs present effects indistinguishable from zero.

		Brazil	Mexico	Argentina	Venezuela
Probit	Core District	0.55 (0.08)	0.49 (0.08)	0.72 (0.06)	0.67 (0.04)
	Core Dist. with Rival	0.35 (0.03)	0.31 (0.08)	0.55 (0.09)	0.63 (0.09)
	Oppos. Dist. with Ally	0.56 (0.03)	0.48 (0.10)	0.41 (0.03)	0.22 (0.10)
	Opposition District	0.23 (0.03)	0.33 (0.04)	0.22 (0.09)	0.29 (0.07)
	GDP cap	-0.35 (1.00)	-0.52 (0.44)	-0.21 (2.48)	-0.10 (3.08)
	Poverty Rate	-0.71 (8.55)	0.26 (1.96)	0.12 (3.18)	0.78 (0.64)
	Electoral Constituency	-0.25 (0.87)	0.19 (1.89)	0.03 (0.79)	-0.17 (1.12)
	Benefitted by CCT	-0.31 (2.38)	-0.25 (1.33)	-0.58 (2.57)	-0.82 (0.60)
	President's Constituency	0.05 (0.91)	0.05 (3.16)	0.14 (0.31)	0.32 (2.21)
	Mandatory Resources	-0.35 (0.37)	-0.17 (0.10)	-0.29 (0.16)	-0.09 (0.07)
Lognormal	Core District	27.6 (3.29)	29.6 (2.29)	26.3 (1.65)	28.3 (4.89)
	Core Dist. with Rival	13.5 (1.93)	16.5 (0.92)	20.1 (0.81)	23.4 (1.69)
	Oppos. Dist. with Ally	24.5 (1.83)	22.9 (1.50)	17.2 (1.36)	12.9 (0.89)
	Opposition District	2.6 (1.59)	3.8 (1.73)	9.7 (3.54)	6.5 (3.08)
	GDP cap	-7.89 (1.22)	-1.98 (5.08)	-3.54 (6.12)	-9.14 (4.68)
	Poverty Rate	1.23 (0.10)	6.63 (0.87)	1.76 (1.11)	2.57 (0.42)
	Electoral Constituency	-3.78 (3.19)	-7.74 (2.67)	-0.29 (3.21)	-0.98 (4.33)
	Benefitted by CCT	0.09 (0.01)	-2.01 (2.87)	-6.92 (3.21)	-1.50 (0.34)
	President's Constituency	3.90 (1.75)	-0.01 (0.99)	7.65 (2.12)	7.32 (3.91)
	Mandatory Resources	-6.75 (4.83)	-4.19 (2.45)	-9.73 (4.13)	-6.21 (2.76)
Mayor's Vote Share	Yes	Yes	Yes	Yes	
Governor's Political Party	Yes	Yes	Yes	Yes	
Year Fixed Effects	Yes	Yes	Yes	Yes	
Number of Cases	43,978	31,374	23,357	3,759	
MCMC Iterations	80,000	84,000	82,000	90,000	

Table 4: *Posterior estimates and standard error of presidential discretionary spending from probit and lognormal regressions, Argentina, Brazil, Mexico, and Venezuela (2000-2011). I exponentiated the lognormal coefficients.*

Figure 4 reports the propensity effects from the estimated posterior distributions. For the propensity to receive any expenditures, the estimates show striking effects across the municipal categories. The estimates indicate that Brazilian and Mexican municipalities governed by presidents' co-partisans had as much as a 55 percent chance of receiving federal investments. The same types of municipalities in Argentina and Venezuela had higher chances when voters are also presidents' supporters (roughly 70 percent), but lower chances when voters supported the opposition candidates in the presidential elections (range from 20 to 40 percent).

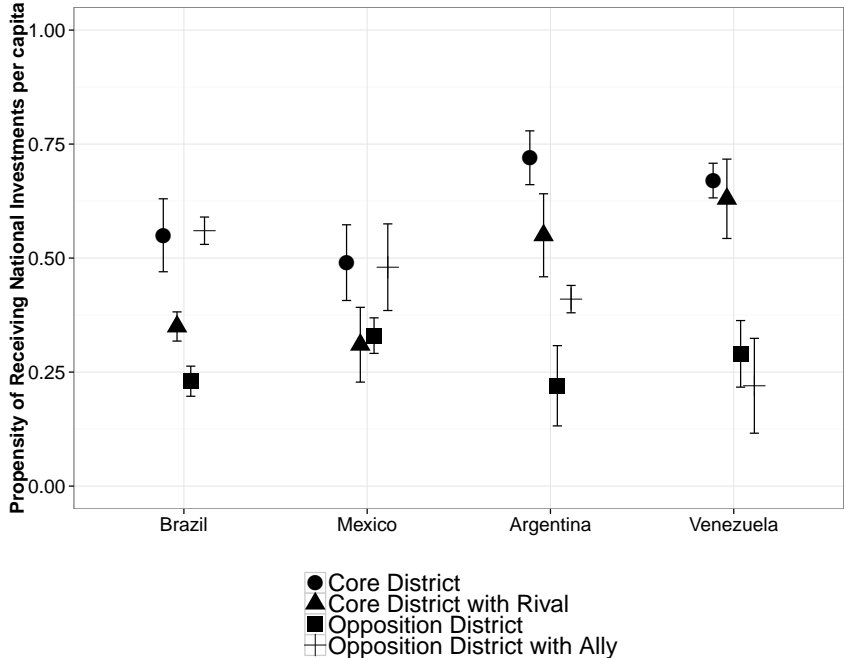


Figure 4: *Estimated Propensity of Presidential Discretionary Investments per capita for Municipalities of Different Political Support, Argentina, Brazil, Mexico, and Venezuela.*

These results are consistent with the elicited priors discussed before and corroborate the importance of decentralization in the politics of the region. Both the Kirchners' and Chávez's governments have been described by experts and the media as very central-

ized, with holders of local offices switching to the president's party to receive national help. In Mexico, the necessity to change the local dominance of the *Partido Revolucionario Institucional* (PRI), given its traditional power, seems also to be consistent with the higher propensity for PAN presidents to target only their allies. In Brazil, besides the relevance of decentralization, the fact that the PT was the most ideological political party in the country, and not in power for three decades, also helps explain the president's need to divert resources from the support bases of traditional ruling parties.

Controlling for poverty levels, legislators' electoral constituencies, and for many other important covariates, there are, then, important differences across municipal configurations for the probability of receiving investments. The effect of a co-partisan mayor in a decentralized setting is positive and substantially large. The effect of having the plurality of voters in a municipality in centralized countries is positive and large. Moreover, there is no significant difference between municipalities without or with presidential voters in decentralized systems, indicating mayoral partisanship trumps local presidential vote share for resource allocation decisions. In order to target core voters, the results suggest, presidents in Brazil and Mexico prefer to do so mostly where they have a co-partisan in the city hall.¹⁴ In Argentina and Venezuela, the conclusion is the opposite. Voters seem to be the first concern of presidents when deciding on the allocation of discretionary results, and the partisanship of mayors appears to be less relevant.

Next, I assess the average volume of investments each municipality receives, conditional on it having received something. The results are also consistent with what we have observed for the probit models (see Figure 5). The effects for each municipal profile are straightforward to interpret. I exponentiated the estimated coefficients to

¹⁴One interesting exception, however, is São Paulo. Even though it has been controlled by Lula opponents for 10 years, Lula has disbursed a lot of resources there in order to guarantee benefits to such voters. PT has been doing everything to persuade voters to elect a PT mayor again.

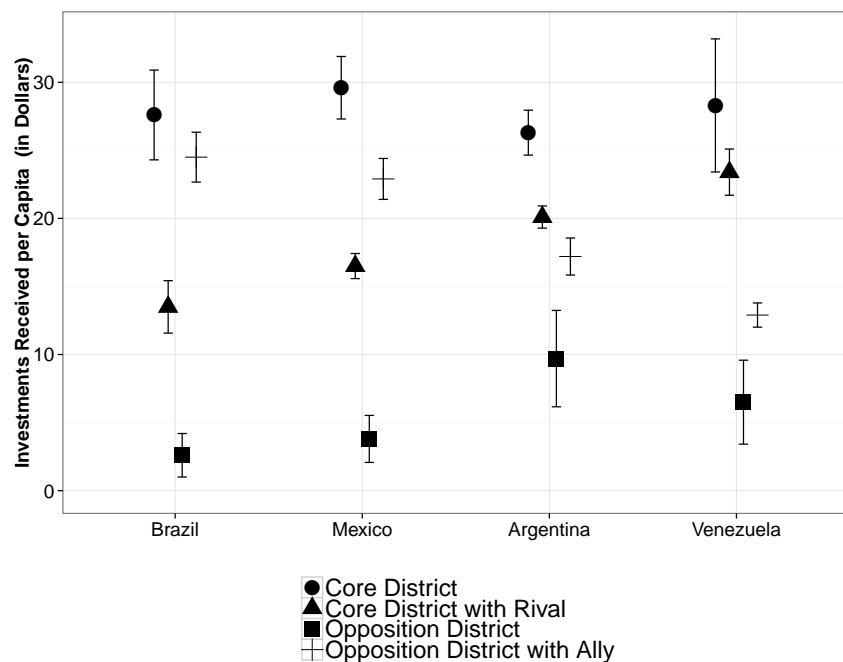


Figure 5: *Estimated Amount of Presidential Discretionary Investments per capita for Municipalities of Different Political Support, Argentina, Brazil, Mexico, and Venezuela. I exponentiated the estimated values to report meaningful values here.*

report meaningful values here. In a hypothetical district within a decentralized system where voters support the president, being governed by a president’s co-partisan increases by \$15 per capita the amount a president invests in a municipality. In a centralized setting, when president’s core voters are a plurality but the mayor is from a party different than the president’s the difference of presidential spending estimated is only \$5. When we compare two hypothetical districts governed by co-partisans of the president, one whose voters supported the president and the other whose voters did not, we observe no difference in the amount of presidential expenditures when they are in decentralized systems, but a difference of \$12 per capita in centralized systems. Municipalities with allies receive, on average, a much higher volume of transfers than municipalities with opposition mayors in decentralized systems, regardless of the vote pattern observed there; whereas municipalities with the plurality of presidential voters

are the main target in centralized systems, regardless of mayor's party alignment.

Different than with the probit model results, it is possible to distinguish the pattern of allocation between municipalities in the four countries using the lognormal posterior distributions. There is a clear centralization-based ordering of municipality types in terms of the level of investments each receives. In decentralized countries, the order is as follows: core districts, opposition districts with ally, core districts with rival, and opposition district. Core districts tend to receive \$30 per capita and opposition districts with an ally, on average, \$22. This difference is not large, suggesting the importance of allies in determining the volume of federal investments a municipality receives. Core districts governed by president's rival party receive, on average, \$15 per capita, but opposition districts only \$4. For centralized countries, the middle two municipality types are switched: core districts, core districts with a rival, opposition districts with an ally, and opposition district.

In comparison to the decentralized countries, the only categories which magnitudes of spending change considerably are core districts with a rival and opposition districts with an ally. In Mexico, for example, opposition districts with an ally receive more spending than core districts governed by a rival party. Whereas the former receives \$24 per capita, the latter only receives \$17. In Argentina, opposition districts governed by a presidential ally receive, on average, \$18 per capita, and core districts governed by a rival party \$20. The magnitude difference is not as large as in Mexico, but it is statistically distinguishable from each other.

The results presented here are not only statistically significant, but are substantively important as well. For instance, a change to a PT mayor is estimated to have the same effect on presidential spending in a municipality as a 9 percentage-point increase in the municipal poverty rate. To have a reference of the magnitude of this difference, it is equal to the poverty rate difference between Bento Gonçalves (Rio Grande do

Sul) — a very rich city in the South of Brazil — and Macurure (Bahia) — one of the poorest cities in the Northeast of Brazil. These voters are being deprived just because they are not governed by the president’s loyal ally. By contrast, a change to a FPV mayor in Argentina is estimated to have the same effect on presidential spending as a 2.5 percentage-point increase in municipal poverty rate. This difference is so small that it does not even corresponds to the difference in poverty levels of the rich and the upper-level middle class in Buenos Aires-Argentina.

This picture is remarkably different in centralized countries by the variation of the municipal presidential support. A change to support Chávez in the presidential election is estimated to have the same impact on presidential spending as a 6 percentage-point worsening in the municipal poverty rate of a municipality. The amount of resources spent in municipalities in which the plurality of voters support Chávez is equivalent to transfer half of Caracas population to poverty just at once. In Mexico, increasing the electoral support a president has in a municipality, by contrast, corresponds to an increase in spending that is equal to a 1 percentage-point increase in the level of poverty of a municipality — not a substantive difference.

Elicited Priors vs. Data in the Bayesian Framework

These results highlight not only the relevance of decentralization to explain political allocations in Latin America, but also a substantive value of using elicited priors in political science. The prior beliefs that I elicited throughout interviews suggest that loyalty in the municipalities is a good indicator of discretionary distribution. The difference is that in centralized countries, a president can disburse resources to voters directly, whereas in decentralized settings, she depends on loyal mayors to reach voters. This is possible to detect because the political elites’ expressed views are tempered by actual data on discretionary allocation through the mechanics of Bayesian inference.

On the one hand, without the actual spending data, we could only anecdotally report the politicians' and staff members' opinions because the number of available experts is insufficient for standard statistical analysis. On the other hand, without the elicited priors, we might rely too much on a particular draw of data and estimation technique. As always, qualitative and quantitative approaches complement each other, but the modeling technique used here brings the qualitative data to bear in a systematic and transparent way, instead of merely relegating it to the role of impressionistic reality check, as is so common in the field.

A posterior distribution summarizes our knowledge about the quantities of interest in Bayesian analysis. Analytically, the posterior density is the product of the prior density and the likelihood estimated from the quantitative data. Using elicited information requires careful decisions though (Gigerenzer, 1996). As highlighted in Burgman (2005), the perception of experts is inevitably subject to bias and depending on the nature of that bias, their opinions may influence the model estimates. It is therefore important to be aware of the impact that priors can have on models as this may influence our conclusions. There are several scenarios that can arise when combining the likelihood with priors generated from expert opinion. The amount of data, the mean value, the precision and the way in which the prior mean and precision are captured and incorporated into a model can influence the posterior estimate. In situations where data are limited, the expert's expressed opinion has the potential to drive model predictions. When data is abundant, by contrast, the priors tend to play a less critical role.

In most of the above analysis, the informative priors are just improving the precision of the estimates. Including them does not change the direction or the substantive interpretation at all. But there are also the instances in which the conclusions do change from null to positive or from positive to null when non-informative priors are used.

Figure 6 presents the case in which results become more conservative, and therefore stronger, when the elicited priors are employed. The figure presents the estimated average amount of spending the presidents in Argentina disburse for municipalities governed by opponents but with the plurality of presidential voters (bottom), and for municipalities with the majority of opposition voters but governed by a president's ally (top). The conclusion one takes from the results with noninformative priors does not change when compared to the outcomes using the priors gleaned from the interviews. However, the elicited priors make the conclusions more moderate. Whereas the results using noninformative priors estimate averages of presidential discretionary spending of magnitude \$24 and \$21 per capita, respectively; the results contemplating the expert beliefs estimate averages of spending of magnitude \$20 and \$17, respectively.

But there is another case in which the elicitation has helped in distinguishing between the middle categories. Figure 7 presents prior, likelihood, and posterior distributions for the average amounts of presidential allocation in Venezuela among municipalities with pro-government voters but opposition mayors (bottom) and municipalities with opposition voters but co-partisan mayors (top). Note how the prior distribution pulls the posterior to the right in the municipalities with opposition voters and co-partisans of President Chávez, whereas the prior distribution pulls the posterior to the left in the municipalities with Chávez's voters but opposition mayors. For the opposition districts governed by a *chavista* mayor, the Bayesian approach with elicited priors produces an estimate that is higher than the data alone would have produced, but lower than what I would have estimated from the interviews alone. The opposite is the case for the *chavista* electorate — core district — governed by a non-chavista mayor. Moreover, the Bayesian estimates are more precise than either data source alone could have produced in both cases. This is one instance in which elicitation allows the researcher to learn more from the data. In most of the posterior estimates in this paper, however,

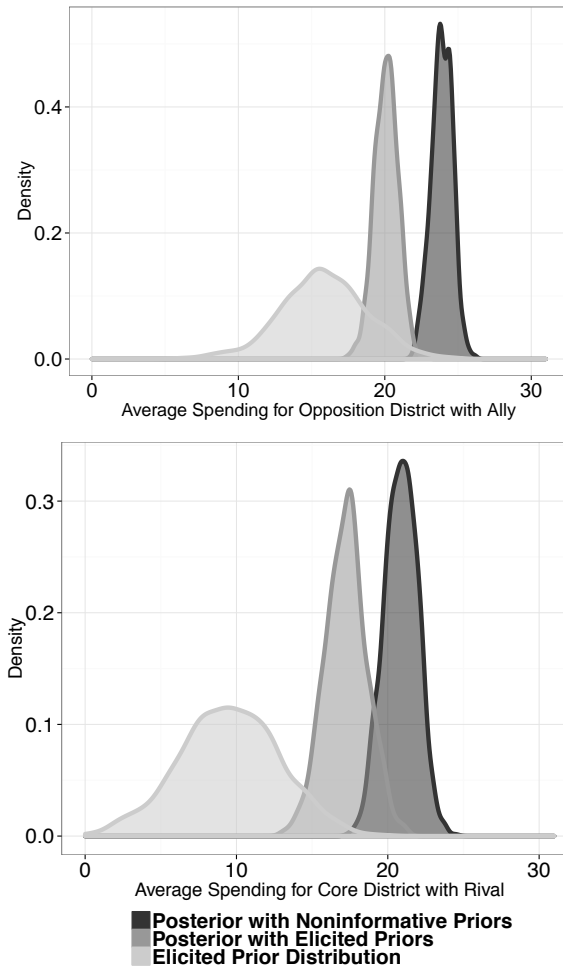


Figure 6: *Prior, Likelihood, and Posterior Distributions for the Average Amounts of Presidential Discretionary Allocations to Municipalities with municipalities with opposition voters but co-partisan mayors (top), and pro-government voters but rival mayors (bottom). Argentina (2003 - 2010).*

the priors are just helping the estimation be more efficient, not changing the direction or the substantive effects at all.

Although for the most part the incorporation of the elicited priors does not contradict the information in the data, there are some instances in which the expert knowledge influences the outcome distinguishing the levels of spending by municipal type. The choice to present the posterior results with elicited priors and not the noninformative

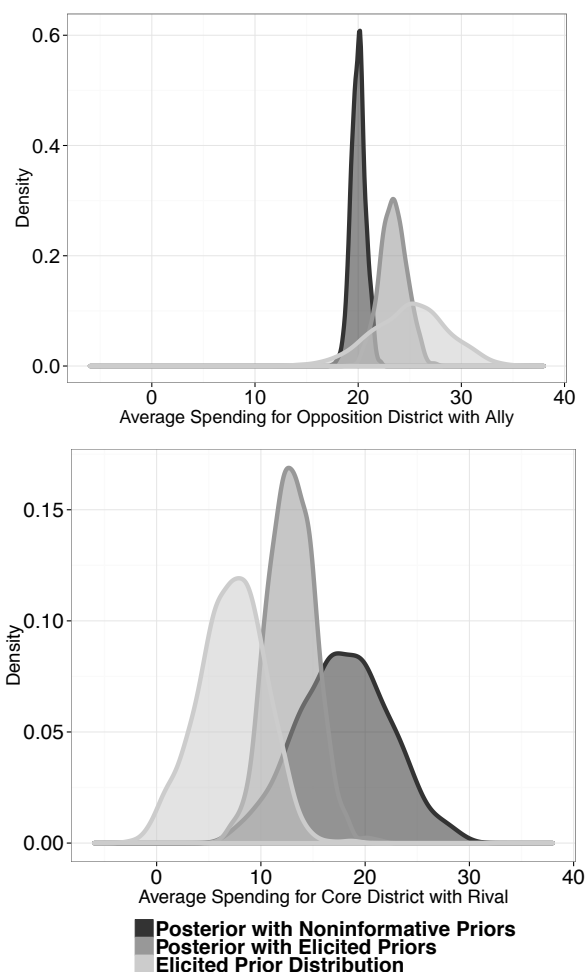


Figure 7: *Prior, Likelihood, and Posterior Distributions for the Average Amounts of Presidential Discretionary Allocations to Municipalities with municipalities with opposition voters but co-partisan mayors (top), and pro-government voters but rival mayors (bottom). Venezuela (2000 - 2011).*

ones relies on two arguments. First, the critique of the use of elicited priors in the Bayesian paradigm is reasonable when small samples are being analyzed. In the analysis reported here, the majority of the weight is automatically assigned to the data, given its sample size. Overall, I am analyzing more than 100,000 data points. Second, given the frequently expressed doubts about the reliability or completeness of official government data in some Latin American countries, either due to politically motivated

massaging or to important, unofficial flows of resources; talking to people in a position to know and treating their answers as evidence can help us to evaluate the observational data with the proper circumspection.

Finally, a word of caution. Regardless of the appeal of these results, we cannot conclude that these patterns reflect a true causal effect of presidential support in the municipalities — they could be biased by some omitted variable that is associated with both president’s party’s electoral success in the municipalities and higher transfer rates. Although the inclusion of municipal fixed effects could absorb time-invariant factors that operate within regions, and the year dummies should account for broad temporal trends affecting the whole country, these statistical adjustments provide only a partially satisfying response to such concerns. Recognizing the causal limitations of my work is necessary to properly value the contribution of the model discussed here.

As robustness checks, I tried matching, fixed effects, and difference-in-difference models in the Brazilian data. With these non-parametric modeling approaches, I found similar results to those presented here. To mitigate the possibility of selection bias and reduce model dependence, I use matching to achieve balance between treatment (co-partisan mayors) and control groups across all observed covariates. Matching seeks to create a sample of treatment group observations that look as similar as possible to the control group. Balance between treatment and control groups allows analysis that is less sensitive to choices of functional form and model selection while also reducing bias and variance (Ho et al., 2007). Having identified a matched sample, I then ran analyses to estimate the treatment effect of PT power on municipal transfers. The coefficient on the PT treatment indicator was positive and statistically significant in every specification. The fact that PT mayors are effective at getting transfers for municipalities may reveal both their ability to persuade the president, and the presidential interests in maintaining and expanding PT influence in Brazilian municipalities. The evidence explored here

is coherent, no matter what methodological strategy is pursued. But more important, these findings set forth a novel research agenda that will build on the empirical patterns observed here.

Conclusion

In this article, I document the existence of tactical motivations in the allocation of federal transfers by the central government in four federal countries, aimed at targeting president's core voters. I demonstrate how presidential strategies about discretionary spending are conditioned by the level of governmental decentralization. Presidents under decentralized countries tend to target municipalities governed by co-partisan mayors, even when such municipalities are abundant in opposition voters. Presidents in centralized systems tend to distribute resources to municipalities with the plurality of core voters, even when such municipalities are governed by president's political rivals. In a decentralized system, the political benefits of federal spending accrue not just to the president, but also to local politicians. If powerful local politicians from parties different from the president's have access to resources, it is likely they will make voters believe their parties are responsible for the investments observed. This is a real threat to the president, as she is wasting resources and producing rivals for herself.

I believe that my results could extend to the politics of intergovernmental transfers in every presidential system where the president is strong, but has lost some budgetary authority. Particularly, my argument should apply where (a) the central government has some discretionary power in sharing central revenues among lower-level layers of government; (b) political credit spillovers exist between central and local governments in claiming credit for the transfers; and (c) political parties are not extremely weak and partisan affiliation shapes electoral competition at the local and national level.

Perhaps, these results could also extend for other federal or unitary systems which levels of political, administrative and fiscal decentralization are high. The decentralized Bolivia, Colombia, and Peru should display discretionary spending being delivered to the presidents' local allies, whereas it should be possible to observe presidential voters targeted in the centralized Chile.

The evidence presented here shows that discretionary transfers in federal systems are allocated on political grounds even controlling for alternative explanatory variables for efficiency and equity. It is not that political factors explain all presidential choices. But the fact that lots of municipalities in Brazil and Mexico, as well as in Venezuela and in Argentina, do not receive these discretionary funds even having considerable levels of poverty, seems to suggest a special role that the political motivations play in determining presidential discretionary transfers. If one believes that redistribution should be a goal for newly inaugurated left presidents, then, the normative implications of my empirical findings call for a spending system that emphasizes constitutional rules based on necessity, rather than let the fiscal responsibility be with central governments, as they appear to be strongly influenced by political considerations. The results also suggests that presidents do not use public goods allocation to build legislative majorities in Congress, as voters and mayors political alignments to the president seem to matter more in explaining presidential allocative decisions.

From a more general perspective, my study emphasizes that (a) whoever allocates benefits may care about electoral outcomes at all levels, (b) capturing the top prize of the presidency in a decentralized context, although necessary, is not sufficient for a party interested in implementing a distributive agenda and enjoying the electoral benefits of it, and (c) conflictive political interests in multi-level systems may produce inefficient or slower changes. These emphases allow me to disclose a systematic intergovernmental pattern, namely, that presidents neglect core voters governed by opposition mayors in

decentralized systems. But it also present a novel interpretation of federal politics, that is to say, the recognition that policy changes can be harder when politically motivated actors face decisions that not necessarily give them political credit. Hence my approach suggests that various theoretical models of distributive politics may benefit from taking a multilevel view.

The next steps of this research agenda involve mainly the investigation of the mechanisms to justify the actor's decisions laid out here. First, it is necessary to evaluate the claim that decentralization increases the political influence of local politicians in national politics. If local officers become more autonomous in deciding how resources are allocated in their districts, we should also expect them to have a bigger impact in the political life of such localities. Second, we need to investigate if voters respond to targeted spending rewarding the politician they believe is responsible for the provision of the benefits they care most about. In other words, how voters assign political credit for politicians when more than one officer has the legitimate authority to claim credit for outcomes observed locally. Both questions are part of a broader research agenda that I develop in other research papers.

Also, this paper projects the possibility of investigating whether or not these strategies pay off. The challenges for presidential spending presented by decentralization and vertically divided government characterizes president's party nationalization as a means to unified policy control. I expect that newly inaugurated presidents use central government authority to create a net of competent candidates to win subnational offices in Brazil and in Mexico, but induce opposition mayors to switch parties in Argentina and in Venezuela to jump at the presidential bandwagon. This tactical movement should explain in the long run why allocations vary by level of decentralization. Municipalities that swung to be governed by the president's party in future elections may have done so to receive more resources from the president.

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A Presidential Discretionary Spending

In Figure A.1, I present temporal trajectories of municipal investments from the central government by states in Brazil. Note how the y-axis changes by state, indicating substantive differences in the levels of investments per capita in each state. The trajectory of spending is not linear, nor does it follow a clear pattern that could be described by any of the well known error-covariance models. This is a good indication that we need to use temporal fixed effects in order to capture the temporal trends properly (Weiss, 2005). The clearest pattern observed in this data set is the presence of investment peaks followed by absence of spending in varies municipalities. Note the triangular shape of the lines connecting the dots.

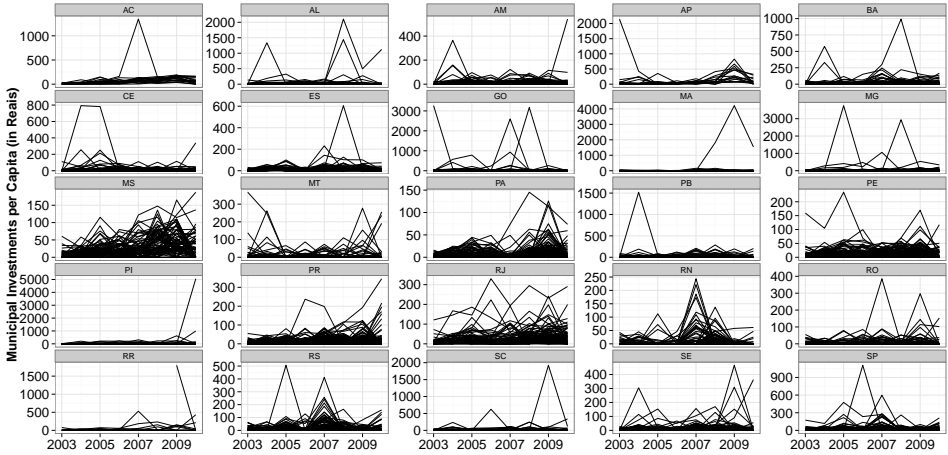


Figure A.1: *Municipalities that received federal investments by state, Brazil (2003-2010)*

The Mexican case in Figure A.2, presents a similar pattern of peaks and to the Brazil’s, but it does show a group of municipalities whose investments over time seem to follow a linear trajectory. Note the block of lines varying monotonically together in the middle of the plots for Chiapas, Durango, Sinaloa, and Yucatan. A linear time

trend could be sufficient to capture the temporal dependency of investments in Mexican municipalities, but given the presence of some unstructured tendencies of investments, I prefer to use year fixed effects to model such temporal dependency as well.

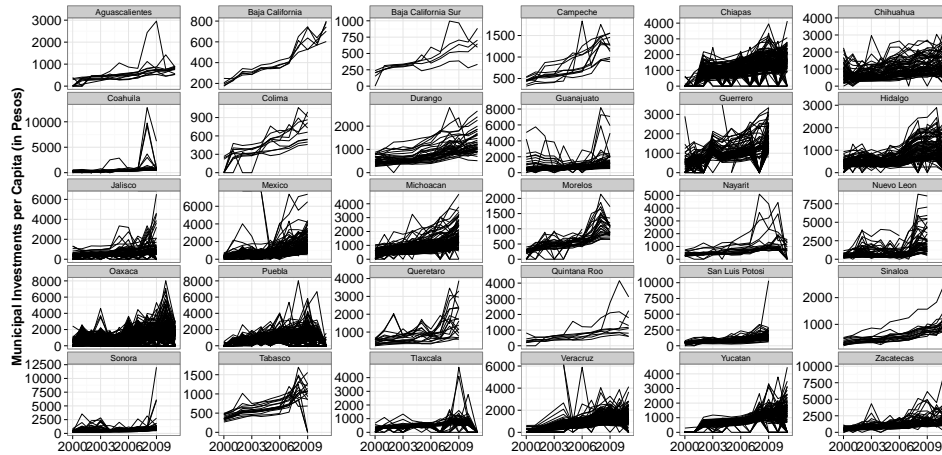


Figure A.2: Municipalities that received federal investments by state, Mexico (2000-2011)

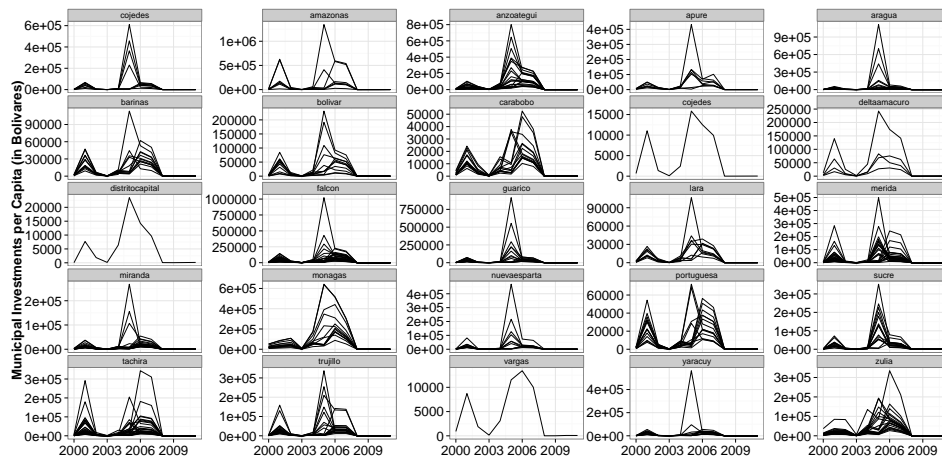


Figure A.3: Municipalities that received federal investments by state, Venezuela (2000-2011)

In Figure A.3, I present the trajectories of municipal expenditures in Venezuela. Note the presence of common variation over time, with investment peaks between 2005 and 2008. The trends are also non-linear, which also suggests we should use year fixed effects to model the temporal correlation of the data. The Argentinian case in Figure A.4, is the least erratic among all the cases analyzed here. The municipal investments vary a lot across municipalities, but not over time. Note the linear trend on most of the expenditures, which indicates that a shift-in-intercept model would be sufficient to deal with the temporal dependency in the data set. The patterns of investments in three economically important states in the country, Cordoba, Entre Rios, and Santa Fé are particularly noteworthy. These are the states whose municipalities received the most investments from the federal government, although they represent strongholds for the Kirchners’ opponents. The province of Buenos Aires, by contrast, received less investments than one would expect a priori, since it is the most populated area in the country.

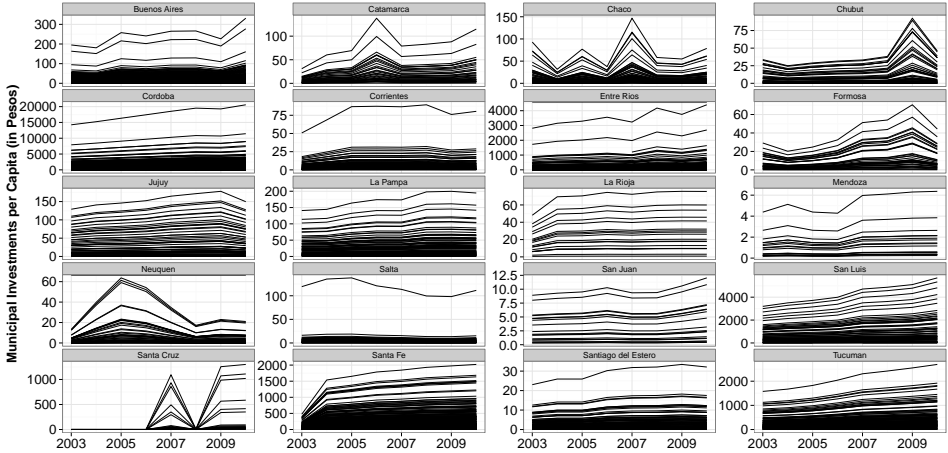


Figure A.4: *Municipalities that received federal investments by state, Argentina (2003-2011)*

One of the important features of the investment data, however, is the presence of a large volume of zeros both across time and across municipalities. Note how close the

lines are to zero in many years, especially in Brazil. Roughly 70 percent of municipalities in Brazil do not receive any investments over time. In Mexico, this number is much smaller although still significant: approximately 25 percent. In Argentina and in Venezuela, by contrast, the percentage of municipalities that do not receive any investments, is close to zero. Modeling the semicontinuity of the data explicitly will help us to understand how presidents decide on the distribution of investments for the municipalities over time. Given the large variation presented in the figures above, I expect to be able to identify precise estimates for the several trajectories that investments take in different municipalities and across the countries.

B Longitudinal Municipal Political Profiles

Municipal political profile is a categorical variable that combines information about voters' preferences as expressed in presidential and mayoral elections, respectively. The variable contains four mutually exclusive categories: municipalities in which the plurality of voters supported the current president in the presidential election and also elected a mayor from the president's party (core districts), municipalities in which the plurality of voters supported the president but did not elect a mayor from the president's party (core districts with rivals), municipalities in which the plurality of voters did not support the president but did elect a mayor from the president's party (opposition districts with allies), and municipalities in which the plurality of voters did not support either the president or her party's mayoral candidate in the most recent round of elections (opposition districts).

In Brazil, Lula obtained the plurality of votes in the majority of the municipalities in his first election, but his party was not able to accomplish even nearly the same thing. However, the number of municipalities governed by the PT did more than double between 2002 and 2010, increasing from 200 to roughly 500 (see Figure B.1).

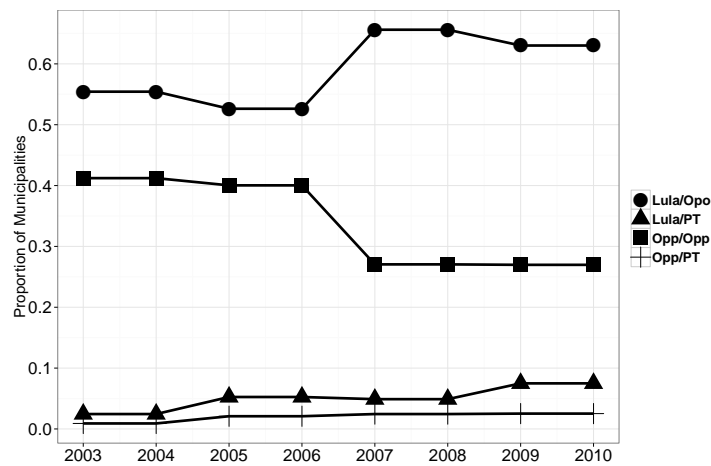


Figure B.1: *Municipal Political Profiles by Year, Brazil (2003-2010)*

In Mexico, president Fox was inaugurated with plurality of votes in 53 percent of the municipalities, but Calderón had 55 percent in 2006. By contrast, PAN controlled only 9 percent of mayorships in 2000, but 26 percent in 2007.

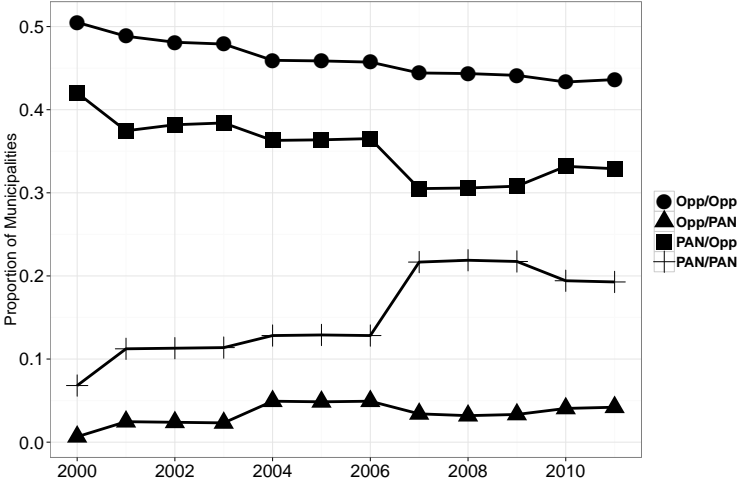


Figure B.2: *Municipal Political Profiles by Year, Mexico (2000-2011)*

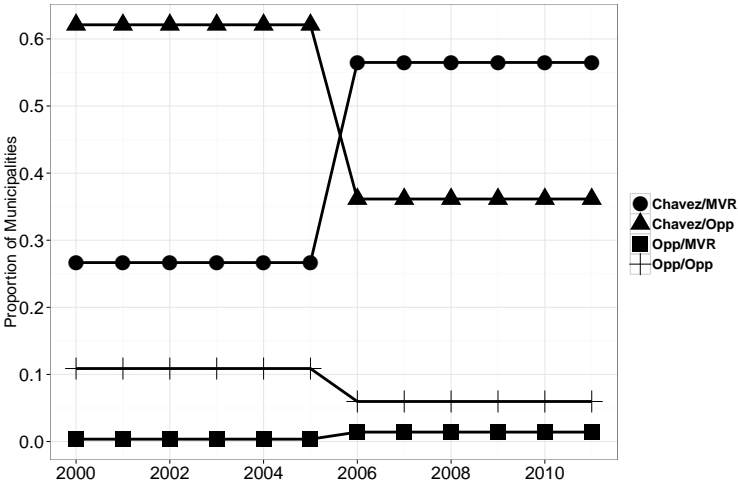


Figure B.3: *Municipal Political Profiles by Year, Venezuela (2000-2011)*

Both Chávez (Venezuela) and Kirchner (Argentina) were elected with the majority of the votes in a large majority of the municipalities, but their parties won more mayoral races only in the two presidents' second terms in office. Hugo Chávez, won the plurality of the votes in 80 percent of the municipalities in 2000 and 92 percent in 2006. His party governed 27 percent of the municipalities in 2000, but six years later controlled 57 percent of the local offices. In Argentina, It is only during the first term of president Cristina Kirchner, the inheritor of Nestor Kirchner's government, that the *Frente por la Victoria* (FPV) controlled the majority of the municipalities in the country. In 2003, the FPV had 14 percent of the local offices, in 2008, this number rose to 48 percent. In terms of votes, the number of municipalities in which the FPV had the plurality of the voters went from 58 percent in 2003 to 79 percent in 2009.

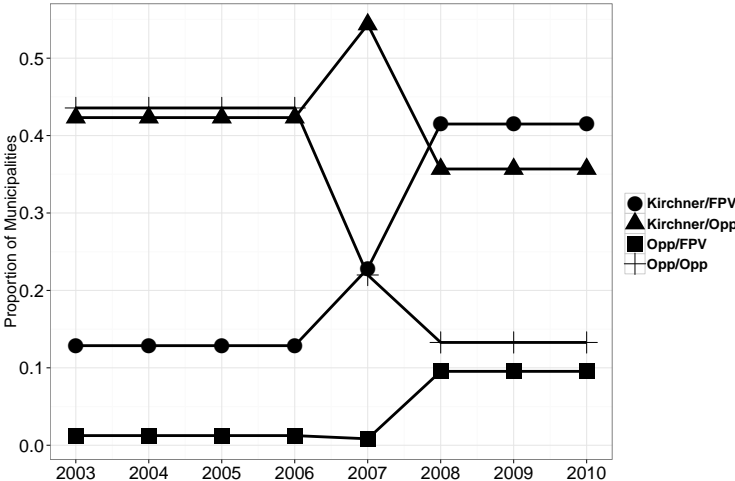


Figure B.4: *Municipal Political Profiles by Year, Argentina (2003-2010)*

C Eliciting Priors

There has been a recent surge in the use of expert knowledge in Bayesian models (Gill and Walker, 2005; Jackman, 2004; Western and Jackman, 1994). There are two reasons for this trend. First, the types of political science questions being proposed, particularly those pertinent to political decision-making, are characterized by uncertainty and paucity of empirical data. Even when data are available, they are invariably subject to error due to the size and complexity of political systems, resulting in parameter estimates with wide confidence intervals, leading to uninformative predictions. Second, decisions based on previous studies focussing on public policies and resource allocation are often required urgently. In situations such as these where hard data are lacking yet political decisions are required, the use of expert knowledge may provide a way forward. Yet for researchers wishing to use expert knowledge, questions remain regarding how to properly conduct an elicitation and use it in a model to address the political research questions.

Although frequentist techniques are evolving to accommodate expert knowledge (e.g. Lele and Allen (2006)), Bayesian methods are naturally suited to the incorporation of expert knowledge through priors; probability distributions representing what is known about the variable (Gelman et al. 2003). In brief, Bayesian modeling consists of four key elements: a prior probability distribution capturing prior knowledge about a parameter; data on the parameters captured through the likelihood; a model that describes the underlying process and incorporates both the likelihood and priors; and finally posterior estimates that result from combining the likelihood with the prior reflecting uncertainties captured by the model (McCarthy & Masters 2005; Cressie et al. 2009).

There has been considerable discussion about elicitation methods and how elicited information can be incorporated into a model as one or more priors to inform an anal-

ysis (Garthwaite & Dickey 1988; Steffey 1992; OHagan 1998). Here, I follow Kuhnert, Martin and Griffiths (2010) who provide a comprehensive guide to conducting an elicitation of priors through a modeling process that explicitly considers expert knowledge and its impact in a model. Between June and October of 2012 I conducted fieldwork research in Argentina, Brazil, Mexico, and Venezuela. During this period I collected fiscal, electoral, and socio-economic data for each of the municipalities of these four countries for the time period between 2000 and 2011. I also used this opportunity to carry out in-depth interviews with academics, politicians, and public officials from the national and subnational levels of government in the four countries (see list by country below). This information is used to produce elicited priors for the Bayesian model I am interested in fitting here.

Eliciting expert information needs careful structure, drawing on aspects of the social sciences (Gigerenzer 1996, 2002, 2007) to extract relevant information in an unbiased manner that is non-threatening to the expert. Furthermore, the process needs to align not only with the research question but with the model that will be used to incorporate the expert information. The main danger of elicitation is that experts are invariably subject to bias and depending on the nature of that bias, their opinion may influence conclusions. There are several scenarios that can arise when combining the likelihood with priors generated from expert opinion. Both the amount of data, mean, precision and the way in which the prior mean and precision is captured and incorporated into a model can influence the posterior estimate. In situations where data are limited, the expert's opinion has the potential to drive model predictions. The researcher therefore needs to be aware of the issues that can lead to bias and ensure that expert biases can be minimized.

As more data become available, the likelihood is moderated with the prior. However, in situations where the prior directly specifies the mean and precision, an informative

prior can lead to a very informative posterior distribution, irrespective of the empirical data and how much data are collected (Lele & Allen 2006). If priors are incorporated into the model as an adjustment to an overall mean and precision, depending on their specification, the posterior estimates can be conservative. Here, the term adjustment refers to a shift in the mean or a rescaling of the precision, where the mean and precision are also considered random variables with appropriate priors attached. On my research I find value of using multiple experts in an elicitation exercise as the aggregation of multiple responses leads to an estimate of the uncertainty around the elicited quantity. It also represents a natural mechanism for feedback through the discussion and revision of opinion amongst experts.

Each of the experts I interviewed (see list below), provided me with guesses on the propensity and the level of investments presidents allocate to municipalities of the following types: municipalities in which the plurality of voters supported the current president in the presidential election and also elected a mayor from the president’s party (core districts), municipalities in which the plurality of voters supported the president but did not elect a mayor from the president’s party (core districts with rivals), municipalities in which the plurality of voters did not support the president but did elect a mayor from the president’s party (opposition districts with allies), and municipalities in which the plurality of voters did not support either the president or her party’s mayoral candidate in the most recent round of elections (opposition districts). These guesses were summarized in the Table C.1.

Given the information (mean and range of distribution) gleaned from experts, I identified sensible and convenient parametric distributions for the experts’ information. For the fixed effects, I assumed normal priors: $\alpha \sim N(\mu_\alpha, \Sigma_\alpha)$ and $\beta \sim N(\mu_\beta, \Sigma_\beta)$. I assumed that the prior hyper-parameters are identical across classes. Each Σ is assumed to have a conjugate Inverse-Wishart $IW(\nu_0, D_0)$ distribution. Since the other param-

eters of the model do not have a scientific interest for this paper, I assigned weakly informative proper distributions to them. This will ensure a well-identified model with proper posteriors determined almost entirely by the data. For, the lognormal precisions, τ^2 , I assumed conjugate $Ga(\lambda, \delta)$ priors. Following Garrett and Zeger (2000) and Elliott et al. (2004) I assumed $\gamma \sim N_r[0, (9/4)I_r]$, which induces a prior for π_i centered at $1/K$ and bounded away from 0 and 1.¹⁵

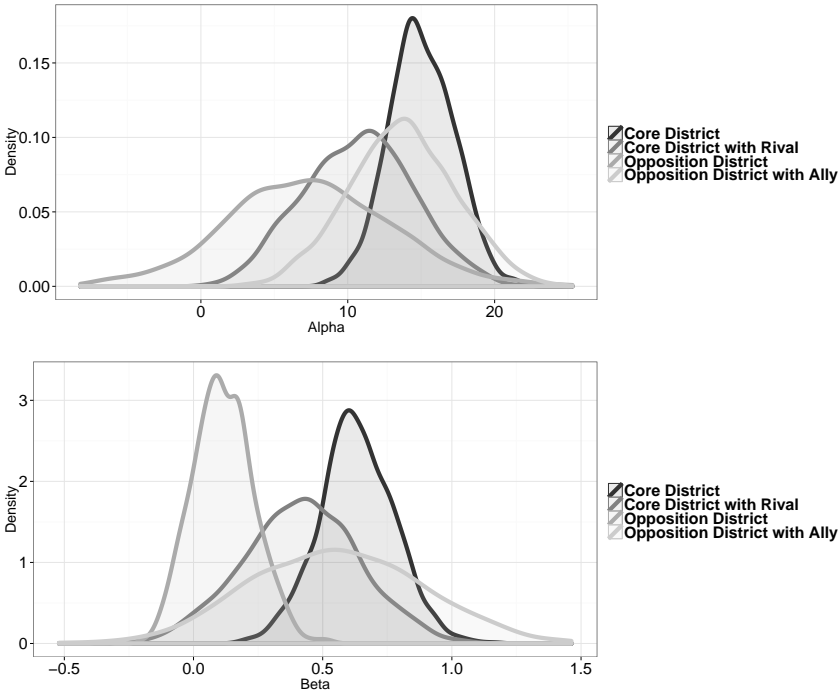


Figure C.1: *Prior Distributions for Fixed Effects in the Two-part Bayesian Model, Brazil*

C.1 Brazil Interviews

- Ex-president Luis Inacio Lula da Silva - Ex-president Fernando Henrique Cardoso - Carlos Ranulfo* - Manoel Santos* - Fatima Anastasia* - Monica Mata Machado de

¹⁵Prior precision specified through range method. Since α and β are assumed Normal, we can find Σ by $(\mu_{97.5} - \mu_{2.5})/4$ from $\mu \pm 2 \times \Sigma$.

Castro* - Marília Campos (prefeita Contagem)* - Dalmir Silva (Secretário Economia de Contagem) - Antonio Augusto Anastasia (Governor of Minas Gerais)* - Leonardo Avritzer* - Leo Guerra - Julio Pires (Secretário Fazenda Pimentel) - Marta Arretche* - Maria do Pilar Lacerda (ex-secretaria educação MEC)* - Marcelo Dulci - Thiago Nascimento (USP)* - Sergio Simoni Jr. (USP) - Andreia Freitas (USP)* - Lucio Renno (UnB)* - Roberto Rocha Coelho (IPEA) - Graziella Gaviota (UnB)* - Flavio Cirenno (MDS)* - Luis Otávio (Senado) - Andre Borges (UnB)* - Acir Almeida (IPEA)* - Felix Garcia Lopes (IPEA)* - Mathieu Turgeon (UNB)* - Carlão (PT) - Maria do Carmo Lara (PT) - Graziella Testa (UNB)* - Suely Araujo (Consultora Camara)

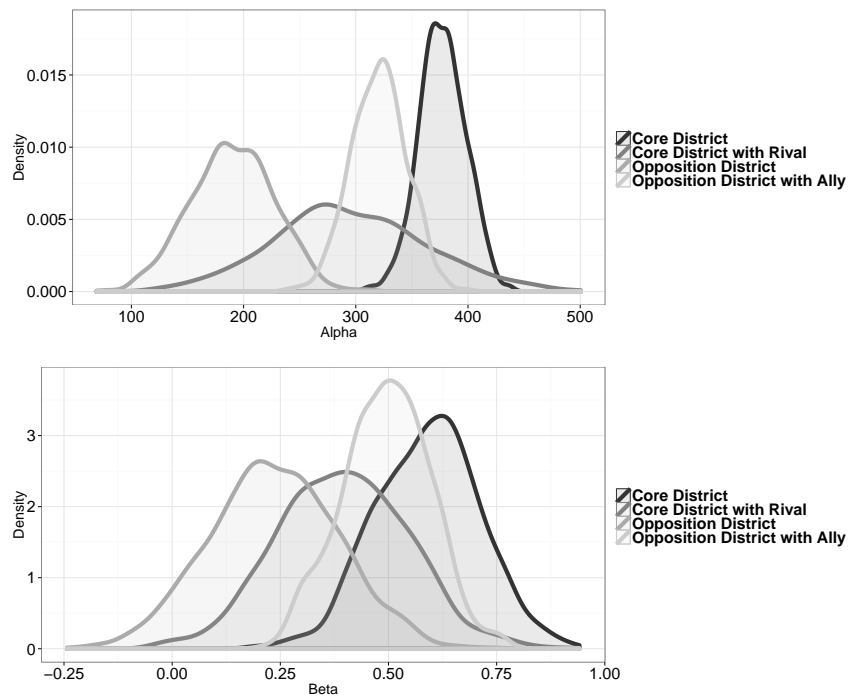


Figure C.2: *Prior Distributions for Fixed Effects in the Two-part Bayesian Model, Mexico*

C.2 Mexico Interviews

- Alysson Benton (CIDE)* - Yamil Nares (DEFOE encuestadora)* - Alberto Villar (Encuesta)* - Yolanda León (IEDF)* - Patricia Marin (IEDF)* - Alejandra Armesto (UAM)* - Marta Sahagún de Fox - Marcelo Ebrard (mayor of City of Mexico) - Vidal Romero (ITAM -ävromero@itam.mx)* - Maria Amparo Casar (CIDE) - Francisco Cantu (UCSD)* - Alberto Valencia Armas (INEGI)* - Alfredo Cristalinas Kaulitz (Instit. Federa. Elect)* - Pedro Echeverria (Secretaria de Hacienda) - Federico Estevez - Graciela Teruel (Universidad Iberoamericana) - John Scott (CIDE) - Jose Luis Leon* - Nahum Flores Mesa (Asesor del Consejo General del DF)* - Francisco Zorrilla (Director Asociaciones Politicas)* - Felix Cruz (Director de Financiamiento y Registro de Asociaciones Políticas)* - Roberto Perez Paredes (Subdirector de Estadística Electoral IFE)* - Alejandro Godínez (UAM)

C.3 Venezuela Interviews

- Elías Jaua (Vice-president of Venezuela) - Juan Carlos Centeno (Universidad Autónoma de Nuevo León/Mexico)* - Yorelis Acosta (Universidad Central de Venezuela)* - Johanna Monagreda (UFMG)* - Nubia Nuñez (Salamanca)* - Rodolfo Magallanes (Director Instituto Estudios Políticos - UCV)* - Nicmer Evans - Liliana Rivero (socióloga, defensoria pública) - Eladio Hernandez Muñoz (Dir. Escuela Estudios Políticos)* - ãMargarida Lopez Maya - Tomás Straka (Universidad Católica Andrés Bello (UCAB))* - Anjel Alvarez - Asdrúbal Baptista (Economista)* - Eduardo Quintero (Jefe Biblioteca BCV)* - John Magdaleno - Alejandro Narvaez (comité de Capriles)* - Omar España - Diego Branco - Juan Fernandez (alcalde de Los Salias en Estado de Miranda de 1995-2008)* - Maria Teresa (asesora de Maria Corina)* - Angel Alfonso (Coordinador de

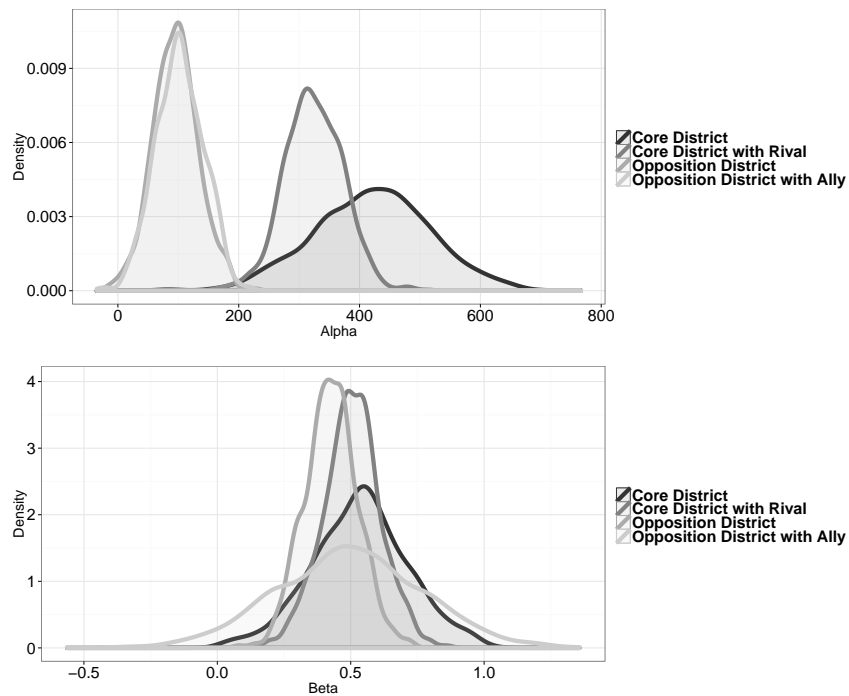


Figure C.3: *Prior Distributions for Fixed Effects in the Two-part Bayesian Model, Venezuela*

Finanzas Publicas de Transparencia Venezuela)* - Joselin Veitia (Jefe biblioteca ON-APRA)* - Ricardo Sucre (Encuestas y professor UCV)* - Bernadino Alarcon (Prof. Poli Publicas UCAB) - Ronald Balza (Economista, UCAB) - Carlos Mascareño (economista político) - Mauricio Flores (inversion social, min planificacion estrateg, coordinador de la directoria general de planificación social)* - Gabrielle Guerron (prof. UCV)* - Jesus Briceño (jefe ONAPRE)* - Victor Carrillo (estudiante IESA) - Juan Jacobo Escalona (Min. Finanzas, especialista) - Mariela Navas (Min. Planific. Estrat, Jefe)* - Miguel Brito (MERCAL)

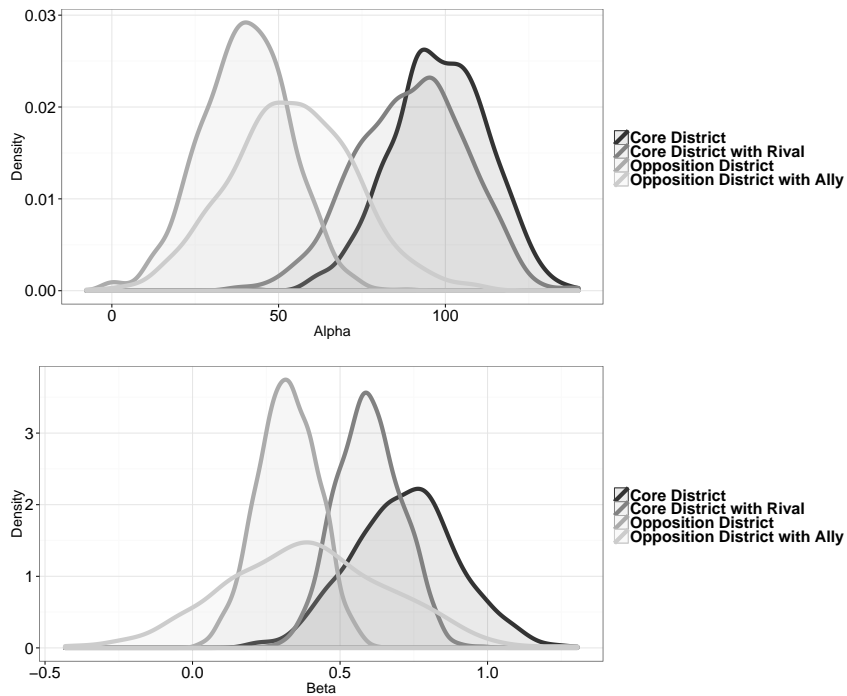


Figure C.4: *Prior Distributions for Fixed Effects in the Two-part Bayesian Model, Argentina*

C.4 Argentina Interviews

- Presidente Cristina de Fernandez Kirchner - Noelia Barral Grigera (Periodista CRO-NISTA.COM)* - Marcelo Leiras (Universidad de San Andrés)* - German Lodola (Di Tella)* - Lucas Gonzales (San Andres) - Carlos Gervasoni (Di Tella)* - Andy Tow (Congreso)* - Antonella Bandiera (Maestria Di Tella)* - Alejandro Bonvecchi (Di Tella)* - Miguel Braun (Fundación Pensar - Think Tank del PRO / Nomeado Diretor do Banco da Cidade)* - Hugo Callegari (director general de presupuesto del gobierno de la ciudad de BA)* - Pablo Olivares (Secretario de Planificación y Política Económica de la provincia de Santa Fe)* - Marcelo Escolar (Geografía Electoral - UBA) - Ernesto Calvo (Maryland)* - Nadia Arno (maestria en Di Tella)* - Lorena Moscovich (Univ. Buenos Aires) - Alejandro Catterberg (Encuestas Poliarquia) - Juan Pablo Micozzi (University New Mexico)* - Elsa Duffy (Centro de Documentación y Información en el Ministério

Economía)* - Sergio Suarez (Director de Analisis y Información Financeira de la Contaduría Publica - Min Economía)* - Adrián Centurión (Directório de Relación con las provincias) - Nicolas Cherny (Investigador Asistente del Consejo de Investigaciones Científicas y Técnicas (CONICET)) - Estefanía di Leo (maestria Di Tella)

		Argentina	Brazil	Mexico	Venezuela
$\alpha_{Core\ District}$	$\mu_{\alpha,Core\ District}$	97.6	15.1	377.3	420.5
	$\Sigma_{\alpha,CoreDistrict}$	14.2	2.15	21.1	98.9
$\alpha_{Core\ with\ Rival}$	$\mu_{\alpha,Core\ with\ Rival}$	89.3	10.8	291.7	323.8
	$\Sigma_{\alpha,Core\ with\ Rival}$	16.5	3.8	67.1	47.1
$\alpha_{Opposition\ with\ Ally}$	$\mu_{\alpha,Opposition\ with\ Ally}$	53.7	13.8	320.1	103.3
	$\Sigma_{\alpha,Opposition\ with\ Ally}$	18.4	3.6	25.1	41.1
$\alpha_{Opposition\ District}$	$\mu_{\alpha,Opposition\ District}$	40.2	7.3	189.5	95.1
	$\Sigma_{\alpha,Opposition\ District}$	13.6	5.5	37.5	36.4
$\beta_{Core\ District}$	$\mu_{\beta,Core\ District}$	0.73	0.63	0.59	0.53
	$\Sigma_{\beta,Core\ District}$	0.18	0.15	0.12	0.18
$\beta_{Core\ with\ Rival}$	$\mu_{\beta,Core\ with\ Rival}$	0.60	0.42	0.40	0.50
	$\Sigma_{\beta,Core\ with\ Rival}$	0.11	0.23	0.15	0.11
$\beta_{Opposition\ with\ Ally}$	$\mu_{\beta,Opposition\ with\ Ally}$	0.39	0.55	0.49	0.49
	$\Sigma_{\beta,Opposition\ with\ Ally}$	0.28	0.33	0.10	0.28
$\beta_{Opposition\ District}$	$\mu_{\beta,Opposition\ District}$	0.32	0.11	0.24	0.42
	$\Sigma_{\beta,Opposition\ District}$	0.10	0.12	0.15	0.10
b_i	$\mu_{(probit)}$	0	0	0	0
	$\mu_{(lnorm)}$	0	0	0	0
	σ_1^2	0.94	0.61	0.53	0.71
	σ_2^2	3.47	2.68	1.78	2.56
	ρ	0.4	0.8	0.6	0.3
τ^2	λ	3.63	2.26	3.12	3.45
	δ	2.89	4.51	5.13	6.18
γ	μ_{γ}	0	0	0	0
	Σ_{γ}	$2.25I_r$	$2.25I_r$	$2.25I_r$	$2.25I_r$

Table C.1: *Prior specification from fieldwork interviews and previous studies*

D Computation and Assessment of Model Fit

The posteriors are estimated using JAGS calling *rjags* 3-10 from *R* 2.15 (code available upon request). I ran 5 MCMC chains for 200,000 iterations each, discarding the first 50,000 as a burn-in to ensure that a steady-state distribution had been reached, and retained every 50th draw to reduce autocorrelation. Convergence is monitored by running multiple chains from dispersed initial values and then applying standard Bayesian diagnostics, such as trace plots; autocorrelation statistics; Geweke (1991) Z-diagnostic, which evaluates the mean and variance of parameters at various points in the chain; and the Brooks-Gelman-Rubin scale-reduction statistic \hat{R} , which compares the within-chain variation to the between-chain variation (Gelman et al., 2004). As a practical rule of thumb, a 0.975 quantile for $\hat{R} \leq 1.2$ is indicative of convergence. In the application below, convergence diagnostics were performed using the R package *boa* (Smith, 2007).

Figure D.2 presents post-burn-in trace plots for twelve representative parameters from the random intercept and slope models: α_{11} , α_{12} , α_{21} , α_{22} , α_{31} , α_{32} , β_{11} , β_{12} , β_{21} , β_{22} , β_{31} , and β_{32} . For clarity of presentation, I have graphed only one of the four MCMC chains. The trajectory of lines suggest convergence and efficient mixing of the chains. The Geweke Z-diagnostic p-values ranged from 0.11 (β_{22}) to 0.89 (α_{22}), indicating no significant difference in posterior means across regions of the chains; the 0.975 quantiles of the Brooks-Gelman-Rubin statistic were each less than 1.04, again indicating convergence of the chains. However, I did observe modest autocorrelation in the chains: the lag-10 autocorrelations ranged from 0.05 for α_{22} to 0.25 for ρ_2 .

A well-known computational issue for Bayesian mixture models is ‘label switching’, which is caused by symmetry in the likelihood of the model parameters during the course of the MCMC run (Celeux, 2012; Jakobsson and Rosenberg, 2007). In some cases, label switching can be avoided by placing constraints on the class probabilities

(Lenk and DeSarbo, 2000) or on the model parameters themselves (Congdon, 2005). As an alternative, Stephens (2000) proposed a relabeling algorithm that minimizes the posterior expected loss under a class of loss functions - which is the one used in the application below. Figure D.1 presents good computational evidence for no auto-correlation in the several iterations of the MCMC, but it does show a moderate to low label switching trend. Even when I used Stephens' algorithm the problem persisted.

To assess the adequacy of the selected model, I use posterior predictive checking (Gelman, Meng and Stern, 1996), whereby the observed data are compared to data replicated from the posterior predictive distribution. If the model fits well, the replicated data, \mathbf{y}^{rep} , should resemble the observed data, \mathbf{y} . To quantify the similarity, I can choose a discrepancy measure, $T = T(\mathbf{y}, \boldsymbol{\theta})$, that takes an extreme value if the model is in conflict with the observed data. Popular choices for T include sample moments and quantiles, and residual-based measures.

The Bayesian predictive p-value (P_B) denotes the probability that the discrepancy measure based on the predictive sample, $T^{rep} = T(\mathbf{y}^{rep}, \boldsymbol{\theta})$, is more extreme than the observed measure T. A Monte Carlo estimate of P_B can be computed by evaluating the proportion of draws in which $T^* > T$. A p-value close to 0.50 represents adequate model fit, while p-values near 0 or 1 indicate lack of fit. The cut-off for determining lack of fit is subjective, although by analogy to the classical p-value, a Bayesian p-value between 0.05 and 0.95 suggests adequate fit. In some cases, a stricter range, such as (0.20, 0.80), might be more appropriate. For the latent class two-part model, I follow the recommendations proposed by Neelon, O'Malley and Normand (2011). To assess the fit of the binomial component, I use T_1 (the proportion of observations greater than zero). For the nonzero observations, I use a modification of the omnibus chi-square measure proposed by Gelman et al. (2004).

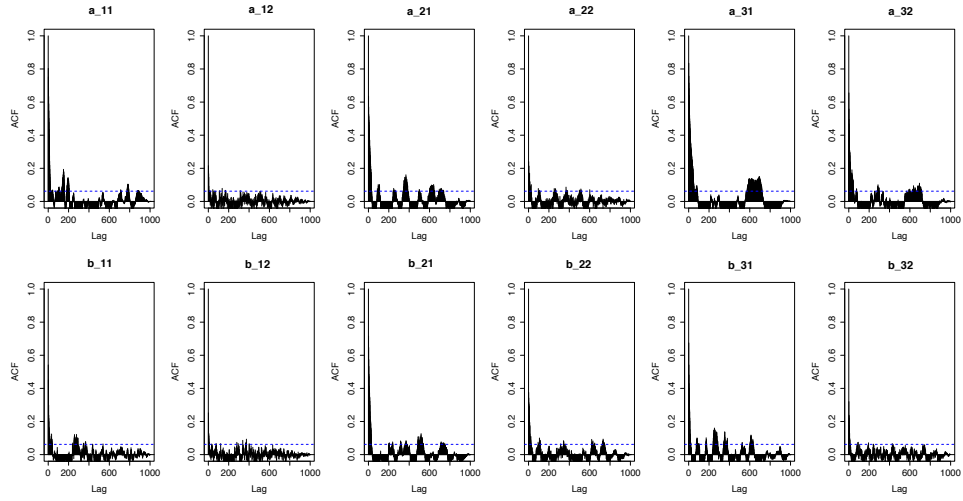


Figure D.1: *Auto-correlation plots for twelve representative parameters from the random intercept and slope correlated models, Argentina, Brazil, and Mexico.*

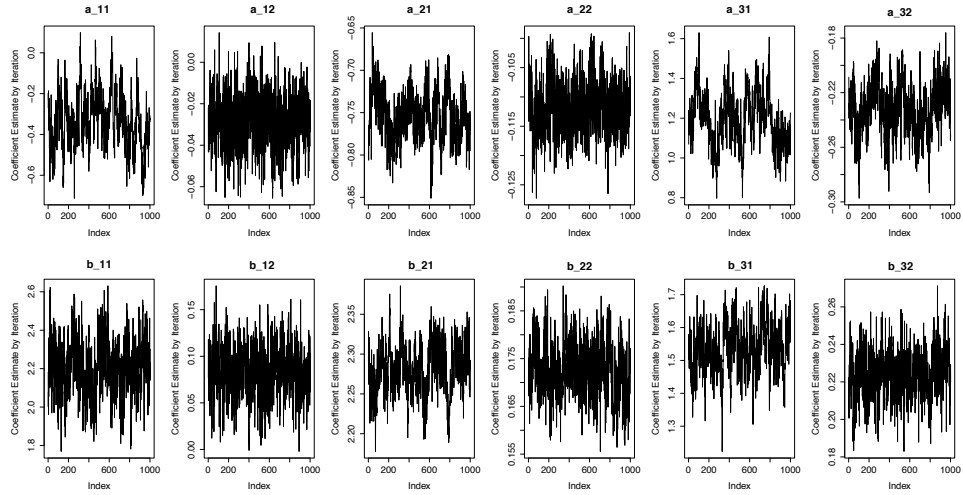


Figure D.2: *Trace plots based on one MCMC chain for twelve representative parameters from the random intercept and slope correlated models, Argentina, Brazil, and Mexico.*