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# Varieties of Democratic Diffusion: Colonial and Neighbor Networks\*

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## **Abstract**

Numerous studies have reported that countries tend to become more similar to their immediate geographic neighbors with respect to democracy. We show that a similar process of mutual adjustment can be found within very different international networks: geographically dispersed colonial empires, especially those that were founded early and lasted a century or more. The causal mechanisms for the diffusion of democracy are notoriously vague, but the existence of diffusion within colonial networks helps narrow the possibilities. Where these relationships are significant, the net tendency is overwhelmingly convergence: colonies have tended to democratize more quickly than similar countries that were never colonies, and some colonizers have tended to democratize more slowly than similar countries that never had colonies. We distinguish between effects that took place during colonial rule and later relations between former colonies and their colonizers. These estimates also confirm, and control for, convergence among immediate neighbors, using an electoral democracy index from the Varieties of Democracy project, which includes historical democracy ratings for colonies.

## Introduction

“No man is an island; some countries are, but even so, no country can be regarded as completely self-determined and unaffected by the world beyond its borders” (Coppedge 2012, 301). This is a widely accepted proposition backed by many empirical studies. Yet, stating that countries are in some way affected by external forces only hints at the innumerable possible pathways of influence, which have only begun to be explored. This paper builds on Brinks and Coppedge (2006), which reported that geographic neighbors tend to converge toward a shared level of democracy. Here we expand the focus to colonial networks. We find that colonial ties matter only within certain empires, particularly where colonialism lasted the longest, especially in the former Spanish and Portuguese empires. Where there has been diffusion, the predominant pattern is for colonizers and their colonies to become more similar in their levels of democracy.

Networks are patterns of connections: well-worn paths, channels, or bridges (choose your preferred metaphor) linking countries. Many networks are potentially relevant for understanding the diffusion of democracy, including geographic proximity, trade, migration, alliances, language, religion, and information. This paper tests two kinds of networks: geographic neighbors and current and former colonial networks. The reason that neighbor networks (the plural is necessary because each country has its own unique network of immediate neighbors) matter is unclear because neighbors often share many characteristics – language, religion, and an approximate level of development – and because many things flow between neighbors – people, goods and services, news and entertainment. Democracy has always exhibited strong geographic clustering (O’Loughlin et al. 1998), but it is difficult to know whether neighbors have similar levels of democracy because their other shared characteristics predispose them to similar democracy levels or because neighboring countries really do influence one another (Simmons and Elkins 2004). Brinks and Coppedge (2006) sought to distinguish the internal causes of this clustering from international diffusion by controlling for likely domestic determinants while testing for a specific pattern of democratization that was unlikely to be observed unless countries really did influence one another. Their hypothesis was that gaps in democracy levels between countries drive changes within countries. Their results were consistent with convergence among neighbors: countries surrounded by more democratic countries tended to become more democratic, while those surrounded by less democratic countries tended to become less democratic.

Although Brinks and Coppedge ruled out domestic determinants shared by neighbors as the reason for this tendency, they could only speculate about the causal mechanisms driving democratic diffusion. A few studies have yielded clues about causal mechanisms in international diffusion by closely examining flows of people and information. Much of this research has focused on the diffusion of policies rather than democracy (Brooks 2012, Collier and Messick 1975, Meseguer 2005, Simmons and Elkins 2004). Keck and Sikkink (1998) explored the activities of transnational issue networks driving reforms in developing countries; Madrid (2003) revealed that pension privatization owed much to training by technocrats in the World Bank; González (2014) documented NGO efforts to train lawyers and judges in international human rights law; and Elkins et al. (2012) showed that some constitutional provisions have been adopted word for word by other countries. Unfortunately, it is impractical to test for such mechanisms systematically on a large scale.<sup>1</sup> A complementary alternative strategy is to infer the mechanisms from the type of network that channels diffusion. For example, several analyses have found some evidence that countries that are linked by trade, investment, or flows of information or population tend to have or move toward similar levels of democracy (Rudra 2005). Levitsky and Way (2006) argue that competitive authoritarian regimes are more likely to democratize if they have strong trade, finance, transportation, and information linkages to the West (and if the West chooses to exercise its influence). Others have noted that democracies tend to form political and military alliances with other democracies and that those alliances may reinforce and stabilize members' political regimes (Layne 1994). Woodberry (2012) argues that protestant missions promoted democracy by expanding access to education. Generalizing the logic of this strategy, if democracy follows migration patterns, then people probably bring democratic (or non-democratic) ideas, norms, institutions, and practices with them when they cross borders. If democracy follows trade, then commercial interests probably influence democratization. If democracy follows language, then the mechanism probably has to do with the flow of ideas, norms, and symbols through books, magazines, television, movies, and now the Internet.

In this paper we examine the diffusion of democracy through colonial networks, i.e., the networks linking colonizers to their current and former colonies.<sup>2</sup> As Figure 1 illustrates, studying colonial rule focuses attention on very different networks than neighbor networks, as

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<sup>1</sup> An exception is Pevehouse (2002), which focused more narrowly on membership in regional organizations, and found that the higher the proportion of democratic members of the organization, the more likely other members were to become and remain democracies.

<sup>2</sup> We do not count military occupations as colonies. Some of the literature suggests that the distinction between the two lies in their intended duration. Although they may end up lasting a long time, occupations are intended to be short. Neither the occupier nor the occupied territory has an interest in sustaining the occupation for long, which is not necessarily true of colonies (Edelstein 2008).

colonizers have usually been located far from their colonies. Several different causal mechanisms could be relevant in such networks. If there is convergence between colonizers and (former) settlement colonies, then the settlers themselves and their ties to the mother country presumably play the main role of transmitting ideas, institutions, and norms, as well as a common language and sometimes religion to the colony. Even beyond the colonies of settlement, however, colonizers and colonies are often linked by language and religion and with them, easy access to literature, news, and entertainment. These cultural ties could also encourage trade and investment. Colonial elites have often been educated in the colonizing country. In some empires, institutions such as courts, elections, and legislatures were transplanted to the colonies before independence. The most dramatic forms of influence have been economic sanctions and military intervention in former colonies. Such actions reached their peak before independence, with the British in India, the Portuguese in Africa, and the French in North Africa; but France continues to intervene militarily in its former West African colonies, most recently in Mali.

There are, however, other possible mechanisms that would lead colonizers and colonies to diverge in their levels of democracy. Much of the literature on colonialism emphasizes the exploitative nature of these relationships (Wallerstein 1974, Cardoso and Faletto 1979, Acemoglu et al. 2001, Lange et al. 2006, Mahoney 2010). The motivation for colonization was not to spread democracy, but to bring economic benefits to the colonial powers. They, or private firms chartered by them, extracted immense mineral wealth from some colonies and purchased agricultural products from others at artificially low prices. In order to maintain control over colonial territories and populations, colonizers appointed governors who ruled in authoritarian and sometimes violently brutal ways. In the colonies of occupation, colonizers ruled indirectly through local elites, who thereby became less accountable to their own communities. Although France and Portugal considered their colonies overseas territories in a unified empire and even granted them representation in the national parliament (when there was an elected parliament), both states created a second-class “indigenous” citizenship for colonial peoples who were not descended from settlers (Owolabi 2010 and 2012). In the most extreme instances, colonizers imported enslaved Africans to provide a workforce for the most difficult and dangerous labor. In sum, at a time when Europe was moving slowly and with fits and starts from absolute monarchy toward proto-democratic systems, its colonial populations were being subjected to profound economic, social, and political inequalities. There are good reasons to expect that the net impact of colonial rule may have caused political development in Europe and its colonies to diverge.

One can think of convergence as the product of “pull” effects and divergence as the result of “push” effects. Actions by the center (the colonizer) in the short term to improve democracy in the periphery (the colony) constitute a “pull up” effect. For example, the former colonizer could use diplomacy, economic sanctions, or invasion to restore a deposed elected government. A less inspiring possibility is that “pull down” convergence could happen when a colonizer is dragged down by its own colonies, resulting in suppression of protests against the cost of maintaining an empire, tensions surrounding immigration from the colonies, or rationalizations of brutal repression carried out abroad. This scenario calls to mind DeGaulle’s interruption of the French Fourth Republic, precipitated by the costly war in Algeria. But a colonizer may push the level of democracy (often already very non-democratic) lower by carrying out acts of repression—arresting independence activists, censoring the press, sowing divisions among ethnic groups, etc. It is also possible for divergence to result from “push up” forces. Colonies may provide a positive example for their colonizers. Some examples could include ties between Britain and its former settler colonies (such as the United States, Australia, Canada, and New Zealand); or between some democratic Latin American countries and the Franco dictatorship in Spain; or between Brazil and the Salazar dictatorship in Portugal from 1946 to 1963. The flow of ideas, information, and norms may also promote divergence. Citizens of the colonizers, repelled by what they have heard about conditions in the colonies, may become determined not to allow those practices to happen at home and not to take their rights and liberties for granted. They may take more pride in being “civilized” (including being democratic) than they would have without colonies.

Reality, however, is complex. Although there are reasonable arguments for either convergence or divergence, there are probably forces pushing and pulling in both directions. Whether divergence or convergence dominates depends on whether the pull forces are stronger than the push forces in a given case. Where possible, we estimate pressures in both directions separately. Furthermore, it is important to realize that divergence does not require the colonizer to become more democratic and the colony to become less democratic. Divergence is equally consistent with all the countries in a network becoming more democratic or all becoming less democratic. The same holds true for convergence: it is a question of the rate of change. For convergence to happen, the colonies must democratize faster (on average) than the colonizer. This is difficult because the colonizers are moving targets. The colonial powers were not perfect democracies throughout our study period (1900-2012). Germany and Italy had fascist interludes; Spain and Portugal were usually authoritarian before the 1970s; the Netherlands, Belgium, and France were temporarily occupied by Nazi Germany; and the United Kingdom

and the United States gradually improved their scores on the V-Dem Electoral Democracy Index during the 20th century. In every case, the differences between their lowest and highest scores over 113 years are dramatic. If both colonizer and colonies evolved in the direction of greater electoral democracy but the colonizer did so more rapidly, we would observe divergence. More precisely, as explained below, all of these differences are estimated relative to the tendency in a group of control countries that were never colonies or colonizers.

The dynamics of democracy within networks could follow many patterns, but there are good reasons to suppose that the flow of influence is proportional to the gap in democracy scores. In a colonial network, for example, if a former colony and colonizer have very similar levels of democracy—as in the United Kingdom and Australia, France and Belgium, Spain and Chile today—then we expect that neither country exerts much “pressure” to become more democratic or less so. But the greater the gap, the more we expect the disparity to matter. The gaps are something that people in both societies notice, care about, and comment upon; and sometimes, we think, it may move them to action, and those actions may have consequences. The core intuition, therefore, is that differences between countries help explain changes within countries. It is a process of mutual adjustment that drives either convergence or divergence.

Our approach is unlike any other in several respects beyond the gap-driven mutual adjustment model. First, we use new data on electoral democracy from the Varieties of Democracy project (version 5). V-Dem data does not just provide extensive geographic and historical coverage; it is the only dataset that measures electoral democracy (and other types of democracy) for colonies before independence, which is crucial for this analysis. Second, the Electoral Democracy Index we use is constructed from variables measured on a true interval scale, unlike most democracy measures, which are ordinal. Interval-level measurement is especially important for calculating democracy gaps between countries, as it is meaningful to subtract equal-interval values but not ordinal ranks—an advantage that ordinal Freedom House data did not afford to Brinks and Coppedge (2006). Third, we operationalize diffusion paths in increasingly fine-grained ways. We start by looking for convergence or divergence in center-periphery and periphery-center relations within each colonial network, past and present, and also distinguish between types of colonies. This creates fifty-four possible diffusion hypotheses concerning colonies that we test simultaneously.

These hypotheses are necessary implications of assumptions that four distinctions matter for diffusion in colonial networks. First, as argued above, the direction of the relationship matters: center → periphery vs. periphery → center. This enables us to distinguish pulling from pushing forces. Second, we distinguish between current and former colonial

networks. (In this paper “current” means that the unit was a colony in the year of a given observation in the dataset. It does not mean that the unit is a colony today. This is analogous to “current dollars” in economics: it refers to dollar values in the past rather than what the present-day values are.) Third, we expect that relationships may be different across the nine colonial networks—Belgian, British, Dutch, French, German, Italian, Portuguese, Spanish, and U.S.<sup>3</sup> Each colonizer governed in a different way, and each colonizer underwent a distinct process of democratization at home during its colonial rule period, so we prefer not to assume that the relationship between colonial rule and democratization was the same in all colonial empires. Fourth, there seems to be relative consensus in the literature that colonies vary in their degree of control (Fieldhouse 1981, Mahoney 2010, Abernethy, 2000). Although we consider colonial protectorates, mandates, and trusteeships all to be colonies, for the four largest networks (British, French, Spanish, and Portuguese), we make a distinction between types of colonies: settlement (voluntary migration from the colonizing state), forced settlement (forced migration of slaves) and occupation (control of indigenous populations) (Owolabi 2010 and 2012). The smaller empires are treated as all having had colonies of occupation.

With 2 directions times 2 periods times 9 empires times 3 types of colony, there are potentially 108 colonial hypotheses, but historical patterns and missing data reduce the number we can test to 54. For example, there are no current Spanish colonies after 1900, except for Equatorial Guinea, which is omitted from the V-Dem dataset. Our final model reports what we regard as the best estimates: tendencies in both directions, for current vs. former colonies, within each colonizer’s network, and for different types of colony where applicable. We also correct for selection bias to ensure that countries that became colonizers or colonies are comparable to countries that did not. The more carefully we model these diffusion relationships, the more stable they become. The final analysis supports the conclusion that convergence prevails in the longest-lasting colonial networks. Where colonial rule has had a significant impact on democratization, the gaps between colonizers and colonies have tended to increase the democratizing trend in the colonies or slow it down in the colonizers, compared with the trends in otherwise similar countries that have not belonged to colonial networks.

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<sup>3</sup> Japanese “colonies” are all treated as temporary military occupations rather than colonies in the sense that we use here. We do not count treat polities dominated or absorbed by Russia or the Soviet Union as colonies.

# 1. Varieties of Democracy

We use version 5 of the V-Dem dataset from January 2016.<sup>4</sup> The sample is observational but it is very large, encompassing 171 countries from 1900 to 2012, or whenever they existed during this period, for a maximum of 15,227 country-year observations.<sup>5</sup> Most of the data come from online surveys of 2,156 country experts, the majority of whom were nationals of or residents in the countries they coded. The online questions were typically coded by five experts whose ratings were aggregated to country-date ratings by a Bayesian latent-variable measurement model.<sup>6</sup>

The dependent variable, the Electoral Democracy Index, is an index constructed from 36 fine-grained variables that measure freedom of association, suffrage, clean elections, elected executive, and freedom of expression.<sup>7</sup> The V-Dem dataset contains indices of other varieties of democracy—liberal, participatory, deliberative, and egalitarian—but we chose electoral democracy as a first step in order to maximize comparability with other research on diffusion, most of which uses Polity and Freedom House indices, which conform most closely to a concept of electoral democracy. Our index correlates at 0.898 with Polity and .908 with the Freedom House indices, which assures us that we are not measuring an entirely different concept.<sup>8</sup> Nevertheless, we believe that V-Dem data are more valid in the sense that they take many more attributes of electoral democracy into account. We also believe that the data are more reliable because they are based on multiple ratings by thousands of raters who know their

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<sup>4</sup> Varieties of Democracy (V-Dem) is an international research collaboration with institutional homes at the Varieties of Democracy Institute at the University of Gothenburg and the Kellogg Institute for International Studies at the University of Notre Dame. The Principal Investigators are Michael Coppedge, John Gerring, Staffan I. Lindberg, and Svend-Erik Skaaning. A complete list of the dozens of Project Managers, Research Fellows, Project Coordinators, Regional Managers, and Country Coordinators who have made essential contributions to the project is available on the main project website, <https://v-dem.net>.

<sup>5</sup> Most of the omitted countries are microstates in the Pacific, Persian Gulf, and the Caribbean.

<sup>6</sup> The measurement model was designed by Daniel Pemstein and others and executed using high-performance computing at Sweden's SNIC and the Center for Research Computing at the University of Notre Dame (Pemstein et al. 2015). Some variables—the relatively objective ones—were coded by research assistants and thoroughly validated, and the dataset also contains some variables that were recoded from outside sources such as the Comparative Constitutions Project (Elkins et al. 2012).

<sup>7</sup> V-Dem data also make it possible to disaggregate electoral democracy into several components and many specific variables, which may help identify more precisely which aspects of electoral democracy diffuse. The components of this index were first transformed to 0-1 interval with a cumulative density function. Thus, high values are high with respect to all country-years from 1900 to 2012. Given the size of the sample, this is an excellent estimate of the full range of possible variation. However, the CDF tends to compress values near the top and bottom of the scale, compared to the point estimates from the measurement model.

<sup>8</sup> The Electoral Democracy Index used in this paper is:  $.1 * \text{Suffrage Index} + .1 * \text{Clean Elections Index} + .1 * \text{Elected Executive Index} + .1 * \text{Freedom of Association Index} + .1 * \text{Freedom of Expression Index} + .5 * \text{Suffrage Index} * \text{Clean Elections Index} * \text{Elected Executive Index} * \text{Freedom of Association Index} * \text{Freedom of Expression Index}$ . For a detailed description see Coppedge et al. (2015a) and Coppedge et al. (2015b).

countries well, and because coder disagreements have been reconciled by a state-of-the-art custom-designed IRT model.<sup>9</sup>

## 2. Operationalizing Diffusion Hypotheses

Many studies have operationalized diffusion by including regional dummy variables or the mean democracy level in a region among their explanatory variables (Bollen 1983, Hadenius 1992, Lipset et al. 1993; Mainwaring and Pérez Liñán 2013, Przeworski and Limongi 1997). Studies of the impact of colonial rule on democratization typically use dummy variables as well. Colonialism is usually operationalized simply as a series of dummy variables for having been colony of the United Kingdom, Spain, France, or other powers, and this is used to predict how democratic a country is, whether it is democratic, or how likely it is to become democratic or to break down (Barro 1999, Bollen and Jackman 1985, Burkhart 1997, Gassebner et al. 2009, Lipset et al. 1993, Muller 1995). Sometimes the length of colonial rule or the years elapsed since independence are factored in. One of the best studies, Bernhard et al. (2004) found that, among former colonies, democracy is more likely to survive in former Spanish and British colonies, especially those that spent more time under British rule. This and several other studies have reported worse prospects for democracy in former Belgian, Dutch, Portuguese, and sometimes French, colonies. However, dummy variables are too blunt to distinguish external influences from shared domestic ones such as language, religion, or level of economic development.

We conceive of democratic diffusion as a pattern of mutual adjustment in the levels of democracy within any network of countries. Each country has a level of democracy – in this analysis, electoral democracy. Each country is both a source of influence on other countries and a target of their influence. There is a gap between each target country's level of democracy and the level of democracy in the source countries in its network (Most and Starr 1990). These gaps drive the diffusion process in either a negative or a positive direction. If there is positive diffusion, there is convergence because either the more-democratic countries pull the less-democratic countries up toward greater democracy or the less-democratic countries pull the more-democratic countries down to their level, or both. Logically, this process would continue until all the countries in the network converged at the same level, where the democracy gaps would all be zero. Negative diffusion is also possible: more-democratic countries could push less-democratic countries down toward even less democracy, or less-democratic countries could

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<sup>9</sup> The measurement model also provides confidence intervals for most V-Dem variables. Eventually it will be possible to incorporate those measures of uncertainty into the kinds of regression estimates reported here, but we have not attempted this yet.

push more-democratic countries up toward greater democracy. Negative diffusion would therefore lead to divergence within the network.

Unlike most of the literature on colonial rule and democracy, much of which relies on cross-sectional analysis to test hypotheses about the relationship between present-day democracy and a distant colonial past, our attention is confined to the short-term effects of these gaps. Specifically, we test for relationships between the democracy gap two years prior and the change in democracy during the two subsequent years. Because the dependent variable is differenced, our models ignore all earlier characteristics of the target country as explanations for the present. The gap in 1950 still matters for explaining the situation in 1952, but the gap in 1950 is hypothesized to have no direct effect on change in 1953, much less 2012.

We test diffusion hypotheses by creating a series of variables that measure how much we would expect electoral democracy to change in each country, in each year, if each diffusion hypothesis is true. The variables operationalizing each diffusion hypothesis become predictors in a series of regressions. Their coefficients reveal how much each diffusion network contributes to democratization. Since we are interested in making inferences about convergence and divergence of electoral democracy, we first calculate what we call electoral democracy gaps. The gaps are between “source” countries and “target” countries. A source country is one that is theorized to have an effect on other countries in the same network. A target country is one that is theorized to be affected by the source country or countries. The electoral democracy gap is simply the source country’s electoral democracy score,  $D_{jt}$ , minus the target country’s electoral democracy score,  $D_{it}$ , calculated for every country-year. In the formula for the gap equation,  $G_{ijt}$  is the difference in electoral democracy scores between each target and source country at time  $t$ :

$$G_{ijt} = D_{jt} - D_{it}$$

The final steps in the construction of the network variables are to multiply the corresponding electoral democracy gap between each pair of countries by a network weight, yielding a pairwise network gap, and to add them up over all source countries  $j$  as follows:

$$\text{network weighted gap}_{it} = \sum_j (G_{ijt} \times W_{ijt})$$

$G_{ijt}$  is the democracy gap between two countries in a given year,  $n$  is the number of source countries in the network, and  $W_{ijt}$  is the corresponding network weight.

The first diffusion variable we test captures neighbor networks. Neighbor weights aim at capturing spatial effects affecting diffusion. For the neighbor network, “weights” may be a misleading term because they are binary: either a country is a neighbor (weight=1) or it is not (weight=0). To define neighbors we use the criteria of proximity used in Brinks and Coppedge (2006). Countries on continents are neighbors if they share a border; Australia is counted as an island, rather than a continent. If an island is close to a continent, its neighbors are the closest neighbor on that continent and any island nations in between. If an island is about equally close to any continent, or to multiple countries on the same continent, it has as neighbors all nearly equally close mainland countries and any islands in between. If an island is not close to any continent it has as neighbors islands within 150 percent of the nearest neighbor. Neighbor dyads are undirected. That is, if country A is a neighbor of country B, then country B is also a neighbor of country A, with the exception of island nations. The formula for calculating democracy gaps weighted by neighbor networks is

$$neighbor\ network_{it} = \frac{1}{n_{it}} \sum_j (N_{ijt} \times G_{ijt})$$

$N_{ijt}$  is a dummy variable that identifies whether countries  $i$  and  $j$  are neighbors at time  $t$ ,  $G_{ijt}$  is the electoral democracy gap at time  $t$ , and  $n_{it}$  is the total number of country  $i$ 's neighbors at time  $t$ .

### *Colonial network weights*

To test our hypotheses about diffusion in colonial networks, we construct colonial network weights. Unlike most studies of the impact of colonial rule, ours focuses narrowly on short-term relationships. We do not make claims about any legacies of colonial rule that have become permanent features of the former colonies or that took decades to unfold. An analysis of long-term effects would call attention to structural economic and social transformations such as impoverishment, social inequalities, past genocide, or a changed culture. Such transformations are undoubtedly relevant for understanding the full effects of colonial rule, but they are not the subject of our analysis. Instead, we test only hypotheses about (1) the existence of colonial networks linking countries and (2) the relevance of democracy gaps within each network during two-year moving windows.

We expect these networks to be most relevant while colonial rule is still going on, but we also expect some persistence after independence. The United Kingdom no longer rules

India, but even after 1947 they continue to share a language, which eases communication and the exchange of news and entertainment; some cuisine; population flows; trade; and many other ties. Our hypothesis is therefore that there is more mutual influence between this former colony and its colonizer than there is between, for example, India and Spain, or the United Kingdom and Mozambique. We have the same expectations for countries in the Spanish, French, Portuguese, Dutch, Belgian, Italian, German, and U.S. colonial networks.

The reason for this narrow focus on short-term change within colonial networks is that it improves causal inference. If we tested only for differences in the mean level of democracy across various colonial networks, as is done by all studies that simply include a dummy variable for former colonies, then it is hard to attribute any difference to colonial rule, as opposed to the dozens of other differences these groups of countries have had during the intervening decades, with respect to economic development, cultural heritage, geography, and war, among others. But by explaining short-term change within each country, we rule out as confounders the many characteristics of that country that did not change in the same interval. We also rule out cross-national differences that could be incautiously interpreted as equivalent to change within countries. Any relationships over multiple countries and many years between short-term changes in democracy, on the one hand, and gaps in democracy within networks, on the other, are very unlikely to have competing interpretations. There is, admittedly, a price to pay for such precise inferences: they end up ignoring some possible relationships that many scholars associate with colonial rule.

We used information in the V-Dem Country Coding Units document to define colonies (Coppedge et al. 2014). We coded these networks for the period from 1900 to 2012. A network weight of 1 represents the existence of a relationship for the two corresponding countries in a given year, and 0 represents the absence of such relationship.<sup>10</sup> For center→periphery networks, the colony is the target country, its colonizer is coded as its source country, and all the other colonies in the same empire in the same year have the same colonizing source country. For periphery→center networks, the colonizer is the target country and all of its colonies in a given year are its source countries.<sup>11</sup> Because colonizers have tended to be more democratic than their colonies, the democracy gaps tend to be positive for center-periphery networks and negative for periphery-center networks. However, there are exceptions to this, as between Franco Spain and some Latin American countries or between the Salazar dictatorship and Brazil in some years.

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<sup>10</sup> We refer to these variables as “weights” because in trade, migration, religious, and other networks, they take on fractional values. Colonial and neighbor networks are special cases in which a country either is or is not a member of the network.

<sup>11</sup> In previous analyses (not presented here) we tested the relationship between occupations as well as colonies and diffusion of electoral democracy and we found no significant effect.

We calculate expected changes in three or four steps: 1) calculating network weights; 2) calculating electoral democracy gaps; and 3) multiplying the two to get the magnitudes of the electoral democracy gaps in each network. For one-to-one relationships, such as the impact of a colonizer on each of its colonies, this is the end of the calculation. The formula for the center-periphery weights is

$$M_{et}(D_{Cet} - D_{Pit})$$

because these are one-to-one relationships for every dyad-year.  $M_{et}$  is a dummy for membership in the colonial network of empire  $e$  at time  $t$ ,  $D_{Cet}$  is the Electoral Democracy score for the colonizer in empire  $e$  at time  $t$ , and  $D_{Pit}$  is the Electoral Democracy score for colony  $i$  at time  $t$ . For the many-to-one relationships such as the impact of colonies on a single colonizer, there is a fourth step: calculating the mean electoral democracy gap between the colonizer and all of the colonies in that network. The formula for the periphery-center weights is therefore

$$\frac{1}{N_{et}} \sum_1^{n_{et}} M_{et}(D_{Pit} - D_{Cet}).$$

because the gaps between a colonizer and all of its colonies must be averaged.  $N_{et}$  is the number of colonies in empire  $e$  at time  $t$ .

### *Controls*

We include several control variables in the analysis. Presidential election (`v2xel_elecpres`) is a dummy for a presidential election taking place in a given year. We include this because we consistently find that democracy scores tend to change more at the time of these high-profile events. We also control for year dummies in order to minimize the risk of confounding by period effects. Without them, the risk is that diffusion variables that are relevant only for certain historical periods might capture a trend associated with those periods rather than real diffusion effects. For example, the electoral democracy scores of both some colonies and several colonizers rose during the second wave of democratization following World War II, and this trend was soon followed by decolonization. Controlling for mean electoral democracy levels in these years helps keep these processes separate. Finally, for one of the baseline models, we use the natural log of per capita gross domestic product, which is an interpolation and imputation

of data from Maddison (2001) using GDP per capita PPP in constant 2005 international dollars from the World Bank (2013).

Because the GDP per capita measure reduces our sample by over 7000 country-years and does not include colonial territories prior to 1960, we use the adult literacy rate as a proxy for economic development.<sup>12</sup> Many have argued that literacy has a relationship with economic development, as increased levels of literacy and schooling produce higher levels of human capital inside a country (Blaug 1966, Barro 1991, Benhabib and Spiegel 1994). The country can then convert human capital into tangible economic growth. Our measure of literacy is the adult literacy rate, which measures the percentage of the population age 15 or older who are literate. We use the percent literate variable from Vanhanen (2003) and merge it with the World Bank's (2016) adult literacy variable for country-years not covered by Vanhanen. Both variables measure the adult literacy rate in the same percentage format. Many colonizers kept records of the literacy rate and education in their colonies, which gives greater data coverage for the literacy variable. Since both data sources have gaps in their coverage of the literacy rate, however, we interpolated the data after they were combined into one measure. After interpolation, the literacy variable has 7000 more observations than the GDP per capita measure and covers almost all of the colonial cases we are interested in. Our interpolated adult literacy variable is highly correlated with the natural log of GDP per capita with a correlation of .73, suggesting that it is an adequate proxy for economic development.<sup>13</sup>

### 3. Estimation and Findings

#### *The models*

Our models make a strenuous effort to approximate causal inference by ensuring that coefficient estimates are based on comparisons of cases that are as similar as possible. First, these are fixed-effects estimates with random intercepts, meaning that all variables are transformed into deviations from country means, with an independent intercept for each

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<sup>12</sup> While using the GDP per capita measure reduces our sample size, we ran the baseline model using the adult literacy rate, the natural log of GDP per capita, and both at the same time to illustrate the usefulness of the adult literacy proxy. In the online appendix, we also ran the main mixed effects model substituting GDP per capita for adult literacy rate and our results largely remain the same.

<sup>13</sup> To ensure that using the adult literacy variable as a proxy for economic development did not drive our results, we also ran our model with an alternative proxy, urbanization. Urbanization is another factor argued by Lipset (1959) and others that promotes democratization through modernization and economic development. The urbanization measure is the ratio between urban population and total population (Coppedge et al. 2015). The urban population and total population measure used to construct the urbanization variable are interpolated and use multiple imputation to cover the full dataset. We re-ran the main mixed effects model with the urbanization measure instead of literacy as a control and included the results in the online appendix. The results largely remain the same (Figures A9-A12).

country. Each country is therefore compared only to itself; given the thousands of attributes that make each country unique, no other country could be equally similar. Although fixed-effects estimation has been a familiar tool in econometrics for decades, it accomplishes much of what is promised by the differences-in-differences tests that are now common in the causal identification literature (Katz 2014). Second, we difference the dependent variable by two years. Because of the aggressive modeling of time (the two-year differenced dependent variable and the year dummies), values of the dependent variable hover close to zero for most country-years, but they are punctuated by spikes in the years of large changes in electoral democracy. When the same controls are partialled out of the diffusion variables, they also become flat series punctuated by spikes. Our model therefore, in effect, tests for temporal associations between these spikes: if there is a spike in the electoral democracy gap between two countries in one year, do changes in the electoral democracy score in the target country also tend to spike in the following two years? We use a two-year difference and a two-year lag because we do not expect a democratization process in one country to be immediately responsive to a democracy gap with another country. It should take time for influential actors in the target country to take stock of a changed situation, to formulate a response, and to organize people and resources to bring about a change. Because there is uncertainty about exactly how long the lag should be, we also tested one-year and three-year reaction times; those, which are very similar, are reported in the online appendix (Figures A3-A6).

The coefficients for the diffusion variables should be interpreted as the difference between, on the one hand, belonging to a given network and having a gap of a given magnitude, and on the other hand, not belonging to any of the networks specified in the model. In the case of colonial networks, the reference group for these coefficients is the set of countries that have never been colonizers and are not either a current or former colony.<sup>14</sup> The typical rich reference countries are in Scandinavia; the typical poor reference countries are the Central Asian “-stans.” Causal inference requires comparing the countries “treated” by various kinds of colonization to a control group that is as similar as possible to the treatment group in every way except for the treatment. This makes it possible to estimate the average treatment effect.

Because the reference group here is a little more democratic, richer, more populous, and smaller in land area than the countries in colonial networks, we take the further precaution of

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<sup>14</sup> The reference countries are Afghanistan, Albania, Armenia, Austria, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, China, Croatia, Czech Republic, Denmark, Estonia, Ethiopia, Finland, Georgia, German Democratic Republic, Greece, Hungary, Iceland, Iran, Ireland, Kazakhstan, North Korea, South Korea, Kosovo, Kyrgyzstan, Latvia, Liberia, Lithuania, Macedonia, Moldova, Mongolia, Montenegro, Nepal, Norway, Poland, Romania, Russia, Saudi Arabia, Serbia, Slovakia, Slovenia, Sweden, Switzerland, Taiwan, Tajikistan, Thailand, Turkey, Turkmenistan, Ukraine, Uzbekistan, and Yemen.

correcting for the probability of being “selected” as a colonizer or “selected” as a colony.<sup>15</sup> The process of colonization was not randomly assigned to territories, and thus the distribution of colonizers and colonies throughout the world could have been determined by various characteristics that either allowed for colonization or inhibited colonization. Controlling for this form of selection bias helps create more conservative estimates of the diffusion effects, as it takes into account this non-random assignment of colonization. To correct for this bias, we follow the two-step Heckman selection procedure (Heckman 1979). First, we produce two first-stage probit models that predict the probability of being either a colonizer or a colony (see Table A1 and Figures A1 and A2 in the online appendix). For the colonizer selection probit, we estimate the probability of a country being a colonizer based on distance from the equator, whether the country is an island, the average elevation of the country (Gallup et al 1999), the year the country enters the dataset, and whether the country had been a great power at any time since 1815 (Levy 1981).<sup>16</sup> For the colony selection probit, we similarly estimate the probability of a country having been a colony or a part of a colonial territory based on distance from the equator, percentage of the country in the tropics (Gallup et al 1999), the average elevation of the country, whether the country is an island, whether the country neighbors a colony, and whether the country was a great power at any time since 1815. Both models fit our data well and for the most part accurately predict whether a country is more or less likely to be a colony and whether a country is more or less likely to be a colonizer. After producing the probit model predictions, we calculate the inverse Mills ratios for both the colonizer and colony selection models and produce two selection variables to help control for selection bias in the model.<sup>17</sup> The estimates from both selection models are included in the appendix.

To calculate the diffusion effects of the networks using cross-sectional selection variables in a fixed-effects model, we utilized mixed-effects regression with the two selection variables serving as random slopes in the model. We re-estimate the models using the inverse

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<sup>15</sup> Unlike Brinks and Coppedge (2006), this first-stage probit model does not correct for selection bias that could be due to factors that inhibit countries from changing. We have estimated such a model (adapted to our continuous dependent variable), and it yields some interesting conclusions about the conditions under which countries change their level of electoral democracy more than an insignificant amount. However, this correction does not significantly or substantively alter estimates in the main model, probably because we use a continuous rather than ordinal variable and because the differenced dependent variable controls for stasis very well.

<sup>16</sup> Since the traditional measures of state material power does not cover the countries and years of our dataset, we use a dummy variable for great power status since 1815 to capture the dynamic of state power since 1815 in predicting colonization by a country, assuming a certain level of material power is necessary to colonize foreign lands. The first year in the dataset variable helps determine whether the country was in existence during the colonial period. It helps control for the entrance of new countries into the dataset following the dissolution of Yugoslavia, the Soviet Union, and other secessionist events, which are distinct from the decolonization process.

<sup>17</sup> The formula for calculating the inverse Mills ratios is as follows:  $\lambda_i(-\mathbf{Z}_i\boldsymbol{\gamma}) = \frac{\varphi(\mathbf{Z}_i\boldsymbol{\gamma})}{\Phi(\mathbf{Z}_i\boldsymbol{\gamma})}$  where  $\varphi$  = the standard normal probability density function and  $\Phi$  = the standard normal cumulative distribution function.

Mill's ratios we calculated with the two selection probits as random slopes in this model. By applying this selection method we achieve more conservative estimates about diffusion effects, as it helps control for the non-random nature of becoming a member of a colonial network. Instead of estimating only the effect of diffusion within a colonial network, the probability of being selected into that network is also taken into account. This helps eliminate potential confounding factors that simultaneously push countries to become part of a colonial network and operate among colonial network members. Using this modeling technique increases our confidence that there is a distinct diffusion effect, as opposed to a byproduct of the selection process that led to the creation of the colonial network.

Because the composition of the reference group is crucial for causal inference, it is important to specify the diffusion variables in a comprehensive and balanced way. That is, all of the country-years affected by colonization, either as colonizers or as colonies, current or former, must be represented by a diffusion variable in the model. If they are not, the omitted country-years fall back into the reference group and therefore modify the nature of the average treatment effect. For example, if one were to test for just the effect of being, or having been, a British colony, then the average treatment effect would be the difference between British colonies, on the one hand, and the core reference group and colonies in other empires and Britain itself and other colonizers. The correct specification is to include variables that cover all the empires and the colonizers as well. Similarly, estimating relationships only for former colonies and colonizers relegates current colonies and colonizers to the reference group, changing the effect to the difference between former colonies and colonizers, on the one hand, and the non-colonial reference group and current colonies and colonizers—a very different relationship. No previous study has ever specified colonial models this fully, because only the new V-Dem dataset measures electoral democracy for colonies before independence. Fully specifying the colonial diffusion model is essential for drawing conclusions about the effect of colonial networks versus the non-colonial reference group and the differential effect of each type of colonial network versus all the others, as they are all compared to the same non-colonial reference group.

Table 1 presents seven baseline models without any diffusion or selection variables. Model 1 takes advantage of the largest possible sample. Model 2 controls for the best-known correlate of democracy, per capita GDP (logged), but in the process sacrifices nineteen countries and more than five thousand country-year observations due to listwise deletion.<sup>18</sup> Model 3 includes the neighbor network control variables. Models 4 through 7 repeat the same

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<sup>18</sup> We plan to eventually incorporate multiply imputed estimates to avoid the reduction in the sample and any sample bias that it may bring, but these baseline models suggest that there is no cause for concern.

pattern but include the adult literacy control variable. Even with the smaller samples, the estimates are virtually identical for all the model specifications. Presidential election year and adult literacy are significant and positive in every model specification, indicating that higher levels of adult literacy and presidential election years predict positive changes in democracy levels. GDP per capita is surprisingly never significant in any model specification. From this point forward we control for literacy rather than per capita GDP in order to take advantage of the maximum sample size, which also allows us to include colonial experiences that occurred before the starting point of our GDP data series. However, all of the other baseline variables are included in the model even though they are omitted from the coefficient plots below.

## *Results*

Neighbor networks are positive and significant, confirming previous work reporting that neighbors converge to the same level of democracy. This is true even though Brinks and Coppedge used Freedom House data from 1972 to 1996 and we use V-Dem's Electoral Democracy Index from 1900 to 2012. Although the coefficient of 0.088 looks small, it is large enough to produce strong convergence when compounded over several years, especially if the initial democracy gap is large.

Each of the models presented in the previous section estimates diffusion effects in the center-periphery direction and the periphery-center direction for each of nine empires. The four largest empires—British, French, Spanish, and Portuguese—are further divided into colonies of settlement, colonies of forced settlement, and colonies of occupation. This produces 54 coefficients to report. Given space constraints, we highlight the most general tendencies and a few interesting exceptions. Because all the colonial networks are included in these models, and because we control for selection into the set of colonizers and the set of colonies, all the effects we report should be interpreted as differences in the rate of democratization between (a) the target countries in each network and (b) similar countries that had never had a colony or been a colony. Using observational data, this specification comes as close as possible to the average treatment effect of having colonies in a given empire or being a colony in that empire.

Figures 2 and 3 display the coefficients and confidence intervals for periphery-center and center-periphery, respectively. Figure 3b contains the periphery-center coefficients excluding the coefficient for the current Portuguese colonies, as the size of that coefficient makes it difficult to judge the magnitude of all the other coefficients. Despite a large sample size of over 13,000 observations in which one would expect almost every variable to be significant, half of the center-periphery and two-thirds of the periphery-center coefficients are not

statistically significant. This lack of significance is a reassuring sign that our estimates are conservative.<sup>19</sup>

What determines which coefficients are significant? We see two patterns. First, more of the significant influence flows from the colonizers to the colonies than in the reverse direction. This is what one would expect, given that (a) colonizers had more economic and military power than their colonies, and (b) the large British, Spanish, French, and Portuguese empires contained a diverse array of colonies that were less likely to change democracy levels at the same time. Their average democracy gap with their colonizers were therefore less likely to send a clear diffusion signal to the center. It was less likely that the center would respond to many conflicting signals from its periphery than that colonies in the periphery would respond to a clear signal from the center.

A second pattern is that the older, more established colonial networks are more likely to have a significant impact than the more recent and short-lived networks. The Spanish empire lasted more than three centuries, and all six of its coefficients are significant. The Portuguese governed Brazil for more than 300 years and parts of Africa for more than 400 years, and four of the nine coefficients for its empire are significant. The Dutch ruled their territories in the East Indies for nearly 150 years, and half of these coefficients are significant. Sixty-two percent of the French empire coefficients are significant, corresponding to rule of more than sixty years in Indochina and West Africa, seventy-five in Tunisia, and 132 in Algeria (although only 28 in the Congo). In contrast, only one out of three coefficients are significant for the Italian, German, and Belgian empires. Although Belgium ruled the Congo for 75 years, the United States governed the Philippines for 46 years; Italy was in Libya, Ethiopia, and Somaliland only 32-47 years; and Germany ruled present-day Rwanda and Burundi and Southwest Africa only 28-35 years. The outlier here is the British empire, which ruled India for 335 years, the Bahamas for 255, Nigeria for 160, Malaya for 133, the Gold Coast for 131, and Burma for 124 (although Kenya for only 25 years and Egypt for just eight). If long colonization increases the chances of a significant effect, we should observe more significant relationships in the British empire, yet only two of eight networks are significant. However, all of Britain's colonies of settlement (the United States, Canada, Australia, and New Zealand) achieved or exceeded British levels of democracy before entering our sample in 1900. Their democracy gaps are therefore too small to matter. Britain itself had a slow, gradual pattern of democratization in the 20<sup>th</sup> Century, aside from the suffrage expansion after World War I. Its evolution was not sufficiently dynamic to generate decisive tests for the colonies of forced settlement, in the British West Indies, which

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<sup>19</sup> Preliminary models yielded estimates that were very sensitive to specification. The multilevel corrections for selection bias we now use yield more robust estimates, but at the cost of rendering more of them non-significant.

followed a similar pattern, albeit at a less democratic level. The impact of diffusion from the UK is more discernable for the more volatile current and former colonies of occupation, which are all significant in the center-periphery direction.

In both figures, the coefficients that attain significance are overwhelmingly positive, which means that the predominant tendency within colonial networks is toward convergence in levels of electoral democracy. In Figure 2, positive coefficients signify convergence in levels of democracy because colonizers are usually more democratic than their colonies. A positive gap times a positive coefficient yields a positive expected effect: in Figure 2, a “pull up” effect of the center on the periphery. The greater the democracy gap between colonizer and colony, the faster the colony moved toward democracy compared to similar countries that never had colonies. In Figures 3a and 3b, positive coefficients indicate convergence for the opposite reason: a negative gap between colonizer and colony times a positive coefficient predicts a decline in the colonizers’ level of electoral democracy, or a “pull down” effect of the center on the periphery.<sup>20</sup>

Nevertheless, the overall pattern of convergence or divergence does not require that every coefficient be statistically significant, because the pattern depends on the coefficients for both directions in a given network, such as the impact of Britain on its former settler colonies and the impact of those colonies on Britain. We can identify the net tendencies by adding the pair of coefficients for each network and testing for the significance of the sum. If the sum is negative and significant, it diverges; if the sum is positive and significant, it converges. To clarify the net tendencies, Table 3 reports all the colonial diffusion coefficients by network and their sums. Significant coefficients are in bold. There are seven networks for which the sum is not significant despite one or both coefficients in the pair being significant because a positive coefficient in effect cancels out a negative one.

In nine of the eleven significant networks, the net tendency is to converge. This is the tendency in all of the former long-lived colonies of settlement or forced settlement belonging to Spain and Portugal, as well as the current Portuguese colonies of forced settlement (Cape Verde and São Tomé and Príncipe). There is no significant relationship for the former colonies of the

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<sup>20</sup> There was some concern that our estimates could continue to diverge and produce estimates of electoral democracy that extend beyond the 0-1 range of democracy. To test this, we generated the predicted values of change in electoral democracy after running the full selection model and added that to the previous value of electoral democracy. This created an expected value of democracy in time  $t$ . No observations went beyond the upper bound of 1, but 0.6 percent of the observations extended below the lower bound of 0, none lower than -0.025. We ran a model correcting for this possibility of infinite divergence and included it in the online appendix below as Table A2 and Figure A7 and Figure A8. The results here are largely the same and indicate that infinite divergence is not a major issue with our findings.

short-lived empires of Germany, Belgium, or Italy, but our model shows significant convergence in those networks before independence, when colonial rule was in effect.

For example, our model finds a virtuous circle in former Spanish colonies of occupation (Bolivia, Chile, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, and Peru) and the former Portuguese colony of settlement, Brazil. These countries democratized at a faster rate, on average, than comparable countries that were never colonies. According to our model, these former colonies were pushing Spain and Portugal toward greater electoral democracy while their colonizers were pulling them toward greater democracy. If a former colony backslid, its relationship with its former colonizer would help it recover.

Five of the 54 networks are estimated to have negative diffusion, signifying divergence, but only one of these is credible. In three of the five (former Spanish colonies of settlement and occupation and former Spanish colonies of forced settlement), a negative relationship in one direction is canceled out by a positive coefficient in the other direction. In fact, the positive coefficient for the impact of former Spanish colonies of forced settlement on Spain is so much larger than the impact of Spain on these colonies that the net tendency is significantly positive: net convergence. The fourth case of apparent divergence, the periphery-center effect of former French colonies of occupation on France, is not credible. The appearance of an effect comes from the liberation of France during the Second World War, leading to much improved electoral democracy in 1944-1948 compared to 1940 to 1943, during German occupation. This improvement clearly had nothing to do with French colonies acting on France. However, the fifth case is credible: the impact of current Portuguese colonies of occupation on Portugal. Decolonization and democratization were intimately linked in Portugal. The authoritarian Estado Novo was prolonged in part by its mission to hold onto Portuguese colonies in Africa. But within two years of Guinea-Bissau gaining independence in 1973 and Angola and Mozambique becoming independent in 1975, Portugal experienced a transition to democracy. The Portuguese regime was overthrown in 1974 by military officers opposed to the war to maintain control over Portugal's colonies. This coup launched the Carnation Revolution, which culminated in a transition to democracy by 1976. It is plausible that the gap between Portugal and these colonies in 1971-75 "pushed up" Portugal's electoral democracy in 1973-1976: a rare case of divergence.

These estimates may be surprising to those familiar with literature claiming that British colonial rule left a positive legacy for democracy or that other empires, such as the Portuguese empire in Africa, had negative consequences (Bollen and Jackman 1985 or Bernhard et al. 2004,

for example). Our results are different because we use a much larger sample and we operationalize democratic diffusion in very different and dynamic way. We can replicate the finding of a positive impact of British colonial rule (and a negative one for Portuguese rule) by matching their 1965 cross-section and specifying a dummy variable for each empire. But running the same model for a 2010 cross-section (still with empire dummies) yields results more like the ones we report here. (Figures A13 through A15 in the online appendix are coefficient plots of these estimates.) We ran the same model on polyarchy data in five-year intervals from 1960 to 2010 to replicate the various versions of these models. In these cross-sections, British colonization is significant from 1965-1975 and in 1985, but insignificant elsewhere; Spanish colonization is significant from 1985 onward. We have more confidence in our large-sample, dynamic model that uses a much more precisely calibrated operationalization of democratic diffusion.

### *Comparison with other democracy indices*

As a check on how much our results depend on the choice of V-Dem Electoral Democracy Index, Table 4 replicates the colonial networks mixed effects model correcting for selection bias but substituting several alternative democracy indicators as the dependent variable and as the basis for democracy gaps in the colonial diffusion variables. The alternatives are Polity (Marshall et al. 2014), Freedom House (Freedom House 2015), the Unified Democracy Scores (UDS) (Pemstein et al. 2010), and Contestation and Inclusiveness (Coppedge et al. 2008).

The periphery-center part of the analysis shows some real differences. Between 84 to 95 percent of the coefficients were not significant, compared to 67 percent when using the V-Dem data. This discrepancy is probably due in part to differences in sample size. Nevertheless, 73 percent of the alternative estimates have the same sign and significance as V-Dem coefficients. Estimates using Polity and UDS tend to agree with V-Dem the most. Freedom House and inclusiveness tended to disagree with the V-Dem estimates the most. Freedom House's estimates presented the greatest difference, perhaps because the sample size was the smallest. Inclusiveness measures a different dimension of democracy, hence the high number of discrepancies. When considering the center-periphery direction, 35 to 52 percent of the coefficients using the alternative dependent variables were not significant, whereas 50 percent were insignificant for V-Dem. However, only 64 percent were in agreement with the sign and significance of V-Dem's coefficients.

Despite the lack of strong agreement across indices, perfect agreement is not expected. By design, V-Dem data measure democracy differently. A far more complex analysis would be

required to reach a conclusion about which democracy measure gives the most valid and reliable results. However, in a looser sense, the alternative indices support the basic conclusions about the colonial diffusion relationships: between half and two thirds of them are not statistically significant, and almost all (84 percent) of the coefficients that are significant are positive, including over 95 percent of center-periphery coefficients. Given that, it is safe to say that our finding of democratic divergence in colonial networks is not tied to the choice of V-Dem Electoral Democracy Index as our main dependent variable of interest.

## Conclusion

Building on Brinks and Coppedge (2006), this paper provides a rigorous analysis of the relationship between neighbor networks, colonial networks, and democratization. The research design employed here approximates the standards for rigorous causal inference. Fixed-effects estimation focuses attention on over-time differences within each country; the two-year differenced dependent variable controls for omitted variables that inhibit year-to-year change; we distinguish among empires, between current and former colonies, and between opposing directions of influence; by specifying 54 diffusion variables in the same model, we are in a position of estimating average treatment effects between a great variety of colonial relationships, on the one hand, and a fairly comparable reference group of country-years that were untouched by the experience of being either a colonizer or a colony; and because the reference group is not perfectly comparable, we add corrections for two types of possible selection bias.

Our analysis confirms and extends the Brinks and Coppedge (2006) conclusion that “diffusion is no illusion.” Our findings suggest that colonies in certain empires have tended to increase their electoral democracy scores at a faster rate than similar countries that were outside any colonial network (such as Saudi Arabia and Thailand), and that France, Spain, and Portugal have tended to democratize less quickly than similar countries that were outside any colonial network (such as the Scandinavian countries and Switzerland). We also find that these forces are proportional to the sizes of the electoral democracy gaps between countries in each network, and they are more likely to be significant in the oldest and longest-lasting empires. Colonialism therefore tends to promote net convergence where it lasts a long time.

Taken together, these findings suggest that some international forces other than immediate neighbors can contribute to the dynamics of democratization. Certainly there are powerful domestic forces at play that may be immune to the world outside a country’s borders.

But when the outside world matters for democratization, it usually promotes convergence in the levels of electoral democracy achieved by colonies and their colonizers. At the same time, neighboring countries condition how much former colonies change. Because countries tend to become more similar to their neighbors, neighbor networks can accelerate any pressure from a colonial network in the same direction or dampen colonial pressure in the opposite direction. Other networks of democratic diffusion have yet to be tested: networks of migration, information, language, and religion. They promise to provide even more specific clues about the causal mechanisms of democratic diffusion than those suggested by colonial networks.

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## Appendix A

<b>Table 1: Baseline Models of Electoral Democracy</b>							
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>	<b>Model 6</b>	<b>Model 7</b>
Intercept	0.019*	0.073*	0.002	0.019*	0.058	0.009	-0.019
	0.003	0.031	0.034	0.003	0.043	0.006	0.037
Presidential Election Year	0.016***	0.016***	0.018***	0.016***	0.016***	0.018***	0.019**
	0.003	0.003	0.003	0.003	0.003	0.002	0.003
Year dummies	Not shown						
GDP per capita (log) <sub>t-2</sub>	--	-0.002	0.005	--	-0.00007	--	-0.007
		0.003	0.005		0.004		0.005
Neighbor Network <sub>t-2</sub>	--	--	0.131***	--	--	0.126***	0.144***
			0.013			0.013	0.014
Literacy <sub>t-2</sub>	--	--	--	0.0001*	0.0003**	0.0002*	0.0003**
				0.00006	0.00008	0.0001	0.0001
N	15432	10100	10000	13352	9426	13095	9334
N-countries	171	153	153	164	149	162	149
R2-within	0.0412	0.0598	0.1134	0.0462	0.0601	0.0974	0.1191
R2-between	0.0369	0.0487	0.0031	0.000	0.0036	0.0029	0.0551
R2-overall	0.0410	0.0592	0.0721	0.4031	0.0505	0.0623	0.0645
* p<0.05, ** p<0.01, *** p<0.001							

**Table 2: Colonial Network Model of Electoral Democracy, Controlling for Selection, Presidential Election Year, Neighbors, Adult Literacy and Year Dummies.**

	<b>Model 4</b>
Intercept	0.007
	0.008
Presidential Election Year	0.018 ***
	0.002
Adult Literacy	0.0003***
	0.00004
Neighbors	0.088***
	0.005
Year dummies	output suppressed
	--
<b>Center-Periphery, former</b>	
British Settlement $t-2$	0.052
	0.032
French Settlement $t-2$	0.021
	0.040
Portuguese Settlement $t-2$	0.145 ***
	0.031
Spanish Settlement $t-2$	0.074***
	0.011
British Forced Settlement $t-2$	0.001
	0.025
French Forced Settlement $t-2$	0.008
	0.023
Portuguese Forced Settlement $t-2$	0.250***
	0.068
Spanish Forced Settlement $t-2$	-0.028*
	0.014
British Occupation $t-2$	0.017**
	0.006
French Occupation $t-2$	0.026***
	0.006
Portuguese Occupation $t-2$	0.012
	0.015
Spanish Occupation $t-2$	0.064***
	0.007
Belgian $t-2$	0.034
	0.019
German $t-2$	0.008
	0.018
Italian $t-2$	-0.002
	0.013
Dutch $t-2$	0.086***
	0.019
US $t-2$	-0.006
	0.019
<b>Center-Periphery, current</b>	
British Forced Settlement $t-2$	0.016
	0.016
British Occupation $t-2$	0.026***
	0.006
French Occupation $t-2$	0.043***
	0.008

Portuguese Occupation	0.018
	0.044
Belgian <sub>t-2</sub>	0.059**
	0.021
German <sub>t-2</sub>	-0.031
	0.130
Italian <sub>t-2</sub>	0.067*
	0.030
Dutch <sub>t-2</sub>	0.061***
	0.016
US <sub>t-2</sub>	0.027
	0.031
<b>Periphery-Center, former</b>	
British Settlement <sub>t-2</sub>	0.063
	0.090
French Settlement <sub>t-2</sub>	0.264**
	0.083
Portuguese Settlement <sub>t-2</sub>	-0.057
	0.050
Spanish Settlement <sub>t-2</sub>	-0.070*
	0.035
British Forced Settlement <sub>t-2</sub>	-0.029
	0.085
French Forced Settlement <sub>t-2</sub>	-0.206**
	0.067
Portuguese Forced Settlement <sub>t-2</sub>	0.014
	0.084
Spanish Forced Settlement <sub>t-2</sub>	0.135***
	0.039
British Occupation <sub>t-2</sub>	0.051
	0.057
French Occupation <sub>t-2</sub>	0.206**
	0.067
Portuguese Occupation <sub>t-2</sub>	0.031
	0.049
Spanish Occupation <sub>t-2</sub>	-0.109*
	0.050
Belgian <sub>t-2</sub>	-0.004
	0.021
German <sub>t-2</sub>	0.019
	0.025
Italian <sub>t-2</sub>	-0.021
	0.017
Dutch <sub>t-2</sub>	0.027
	0.021
US <sub>t-2</sub>	-0.044
	0.026
<b>Periphery-Center, current</b>	
British Forced Settlement <sub>t-2</sub>	-0.051
	0.068
Portuguese Forced Settlement <sub>t-2</sub>	4.531***
	0.713
British Occupation <sub>t-2</sub>	-0.006
	0.048
French Occupation <sub>t-2</sub>	-0.021

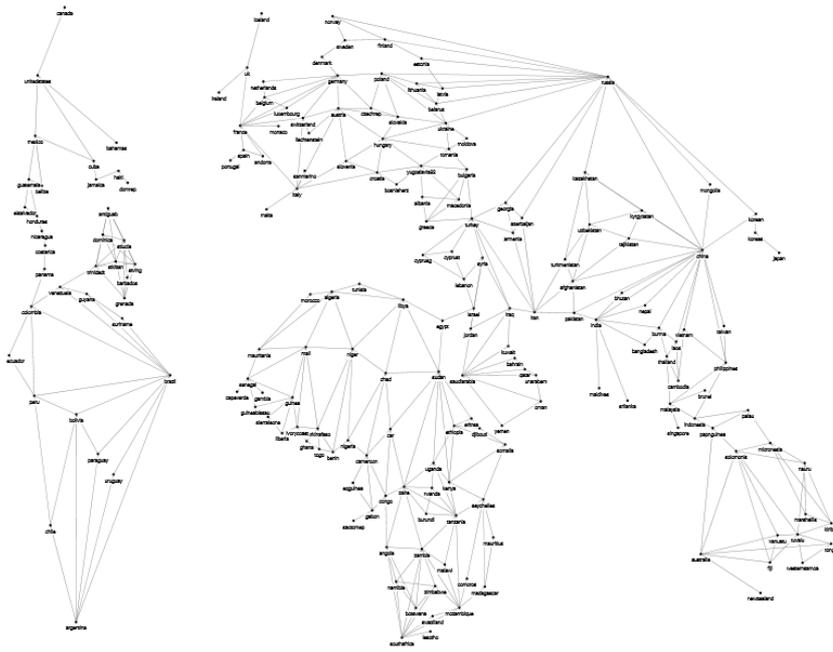
Portuguese Occupation $t-2$	0.028 -4.352***
Belgian $t-2$	0.678 0.039
German $t-2$	0.023 0.252
Italian $t-2$	0.125 0.056
Dutch $t-2$	0.032 0.036
US $t-2$	0.023 0.012
	0.030
<b>Random Effects Variance Components</b>	
Colony Selection Variance	$2.11 \times 10^{-17}$
Colonizer Selection Variance	$8.44 \times 10^{-17}$
Constant Variance	$1.43 \times 10^{-6}$
Residual Variance	$1.06 \times 10^{-6}$
	0.0001
	0.00004
	0.0043
	0.00005
N	13105
N-countries	162
Wald $\chi^2$	1578.09
Prob > $\chi^2$	0.000
Log-Likelihood	17018.772
Standard errors below estimates.	
* $p < 0.05$ , ** $p < 0.01$ , *** $p < 0.001$	

**Table 3: Significant Tendencies by Colonial Network**

Network	Center-Periphery	Periphery-Center	Net tendency	Tendency
<i>Colonies of Settlement</i>				
former French	0.021	<b>0.264</b>	<b>0.285</b>	convergence
former British	0.052	0.063	0.115	
former Spanish	<b>0.074</b>	<b>-0.070</b>	0.004	
former Portuguese	<b>0.145</b>	-0.057	0.088	
<i>Colonies of Forced Settlement</i>				
former French	0.008	<b>-0.206</b>	<b>-0.198</b>	divergence
current British	0.016	-0.051	-0.035	
former British	0.001	-0.029	-0.028	
former Portuguese	<b>0.249</b>	0.014	<b>0.263</b>	convergence
former Spanish	<b>-0.028</b>	<b>0.135</b>	<b>0.107</b>	convergence
current Portuguese	--	<b>4.531</b>	<b>4.531</b>	convergence
<i>Colonies of Occupation</i>				
current Portuguese	0.018	<b>-4.351</b>	<b>-4.333</b>	divergence
former Italian	-0.002	-0.021	-0.023	
former US	-0.006	-0.044	-0.05	
current Dutch	<b>0.061</b>	0.036	<b>0.097</b>	convergence
current French	<b>0.043</b>	-0.021	0.022	
former Portuguese	0.012	0.031	0.043	
former British	<b>0.017</b>	0.051	0.068	
current British	<b>0.026</b>	-0.006	0.020	
former German	0.008	0.019	0.027	
current US	0.027	0.012	0.039	
former Belgian	0.034	-0.004	0.030	
former Spanish	<b>0.064</b>	<b>-0.109</b>	-0.045	
former Dutch	<b>0.086</b>	0.027	<b>0.113</b>	convergence
current Belgian	<b>0.058</b>	0.039	<b>0.097</b>	convergence
current German	-0.031	<b>0.252</b>	0.221	
current Italian	<b>0.067</b>	0.056	<b>0.123</b>	convergence
former French	<b>0.026</b>	<b>0.206</b>	<b>0.232</b>	convergence
<b>Bold</b> = Significant at .05 level				

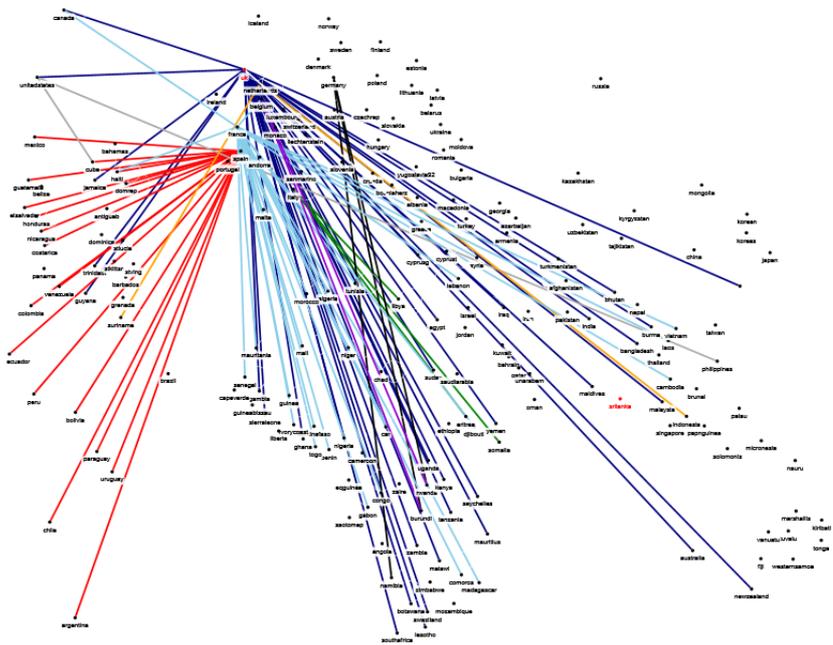
Figure 1: Comparison of Neighbor Networks and Colonial Networks

### Immediate Geographic Neighbors



Created with NodeXL (<http://nodexl.codeplex.com>)

### Former Colonial Networks



Created with NodeXL (<http://nodexl.codeplex.com>)

Figure 2:

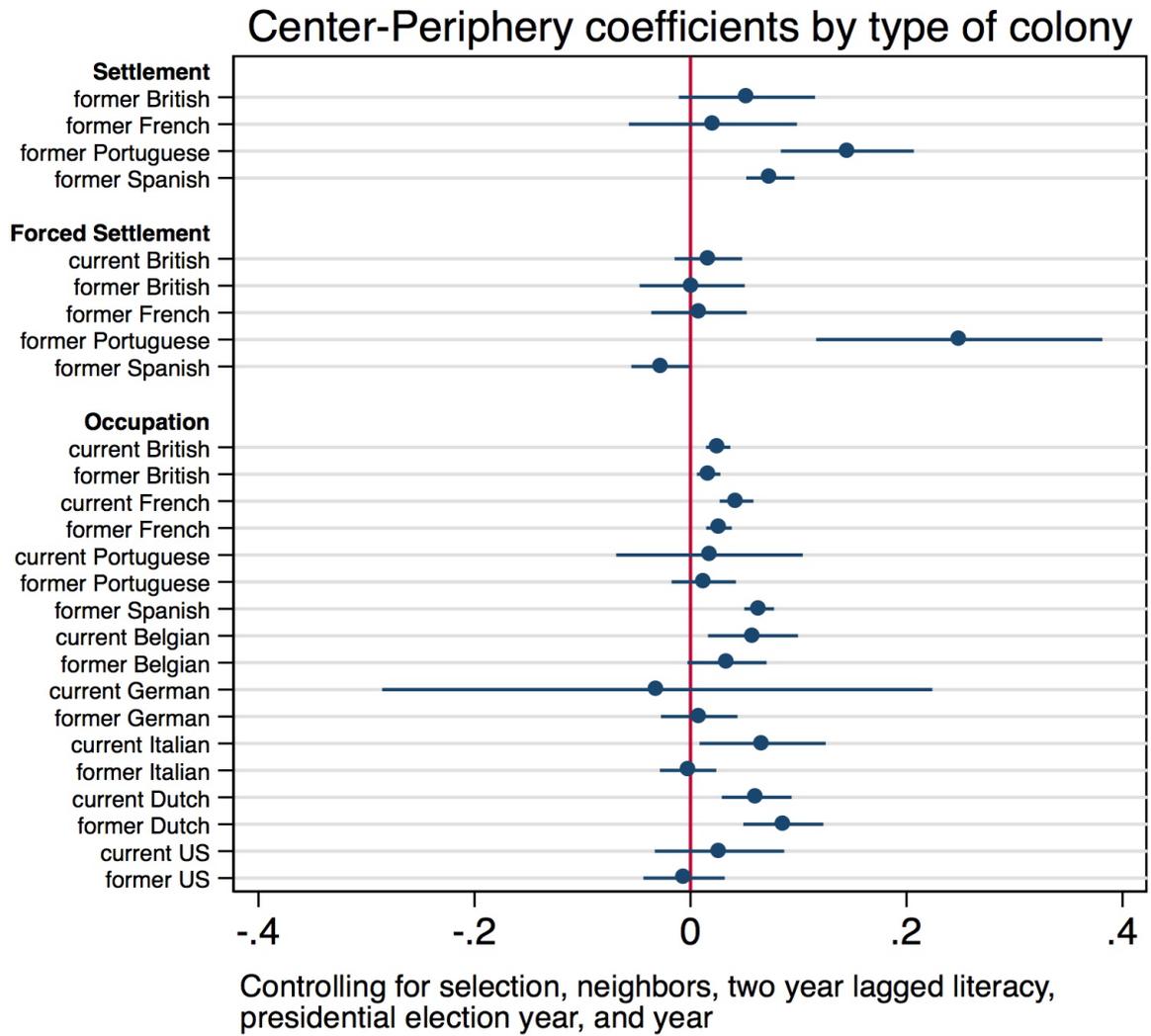


Figure 3a: with Current Portuguese networks

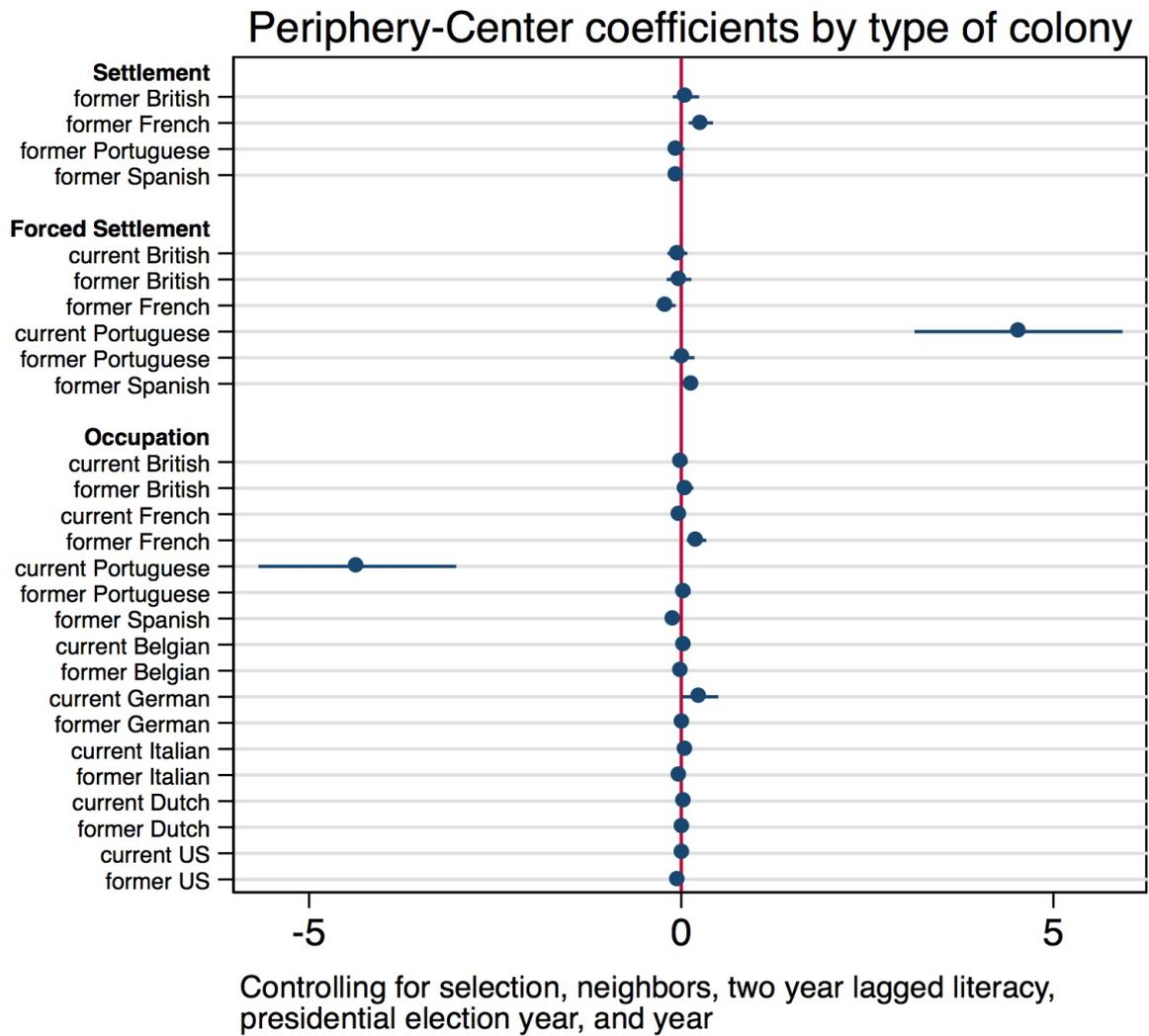
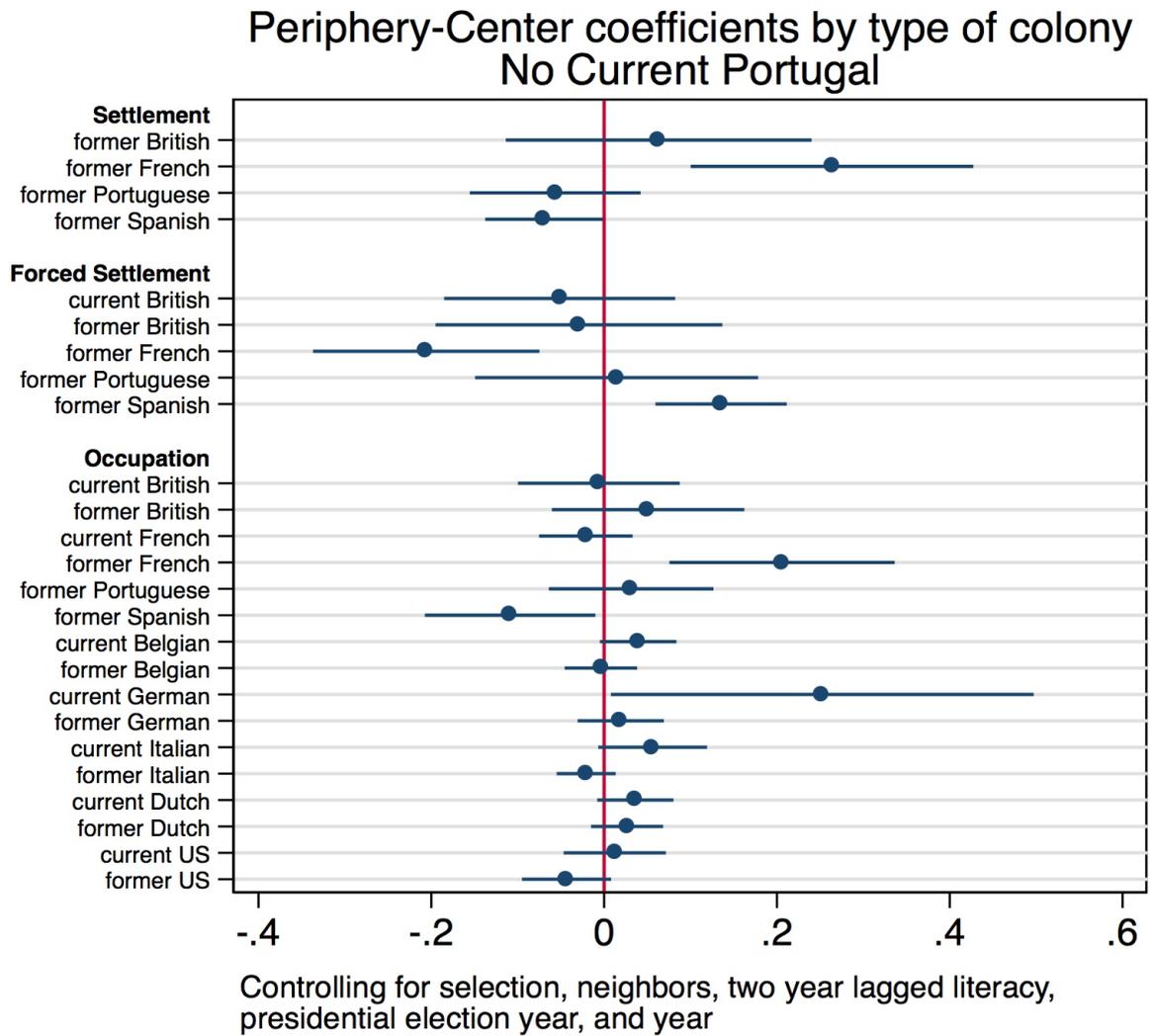


Figure 3b: omitting current Portuguese networks to zoom in on other networks



**Table 4: Replication with Alternative Democracy Indices**

Network	Center-Periphery						Periphery-Center					
	V-Dem	UD S	Contest	F H	Inclusiveness	Polity	V-Dem	UD S	Contest	FH	Inclusiveness	Polity
<b>Settlement</b>												
former British	0	+	0	0	0	0	0	0	0	0	0	0
former French	0	0	0	0	0	0	+	+	0	0	0	+
former Portuguese	+	+	+	0	0	+	0	0	0	0	+	0
former Spanish	+	+	+	+	+	+	-	0	-	0	0	0
<b>Forced Settlement</b>												
current British	0	0	0		0		0	0	0		0	
former British	0	0	0	+	0	0	0	0	0	0	0	0
former French	0	+	+	+	0	+	-	0	0	0	0	0
current Portuguese							+					
former Portuguese	+	+	+	+	0	+	0	0	0	0	0	0
former Spanish	-	0	0	-	+	0	+	0	0	+	0	+
<b>Occupation</b>												
current British	+	+	0		0	+	0	0	0		0	0
former British	+	+	+	+	+	+	0	0	0	0	0	0
current French	+	0	0		0		0	0	0	0	0	0
former French	+	+	+	+	+	+	+	0	0	0	0	0
current Portuguese	0						-	-	-	-	0	
former Portuguese	0	+	+	+	+	+	0	0	-	+	0	0
former Spanish	+	+	+	+	+	+	-	0	0	0	0	0
current Belgian	+	0	0		0		0	0	0		0	
former Belgian	0	+	+	+	+	+	0	0	0	0	0	0
current German	0						+					
former German	0	-	0	0	0	0	0	0	0	0	0	0
current Italian	+						0					
former Italian	0	0	+	0	+	+	0	0	0	0	0	0
current Dutch	+					+	0					0
former Dutch	+	+	+	+	+	+	0	0	0	0	0	0
current US	0					0	0					0
former US	0	0	0	0	+	0	0	0	0	0	0	0
% agreement with V-Dem		62	67	65	52	75		77	73	68	64	81

## Appendix B

<b>Table A1: First Stage Selection Probit Models</b>		
	Colonizer Selection	Colony Selection
Intercept	250.72***	1.91
	68.19	1.20
Latitude	2.98**	-7.10**
	0.89	2.32
Great Power Since 1815	1.80**	-1.49*
	0.68	0.65
Island Country	-1.05	2.28***
	0.62	0.46
Elevation	-0.0013	-0.0008**
	0.0007	0.0003
First Year	-0.13***	--
	0.04	
Percent in Tropics	--	-1.17
		0.67
Neighbors Colony	--	2.36***
		0.46
N	19772	19772
N-countries	172	172
Prob> $\chi^2$	0.000	0.000
Pseudo R2	.5360	.6571
* p<0.05, ** p<0.01, *** p<0.001		

Figure A1:

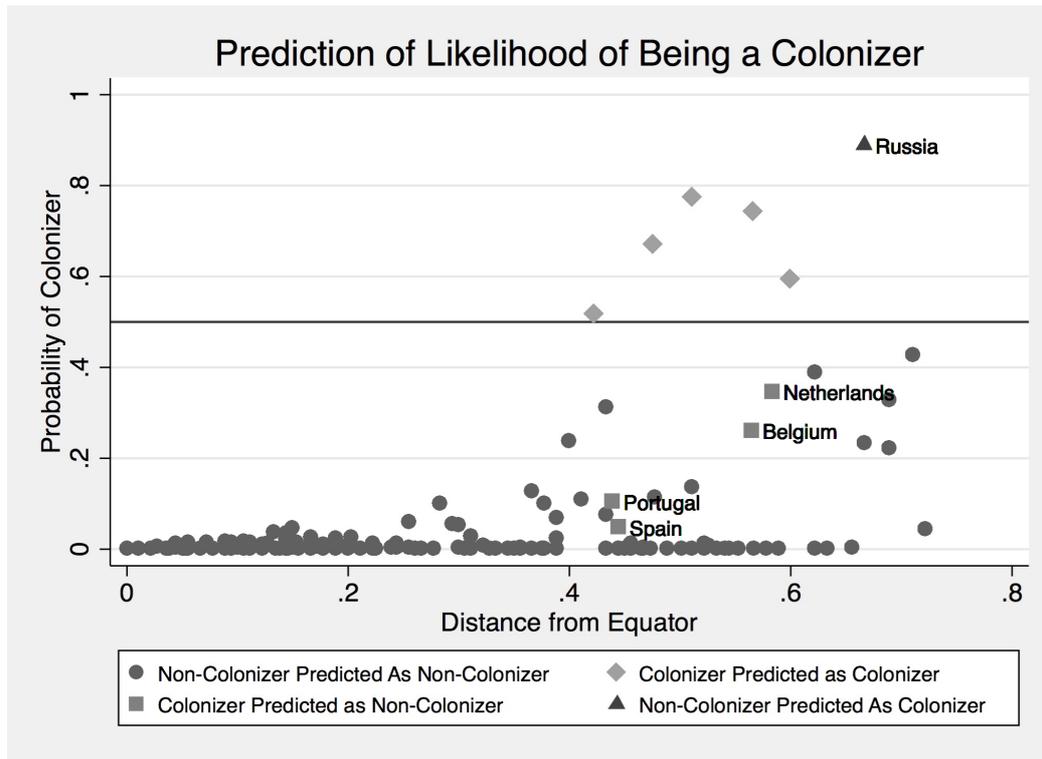


Figure A2:

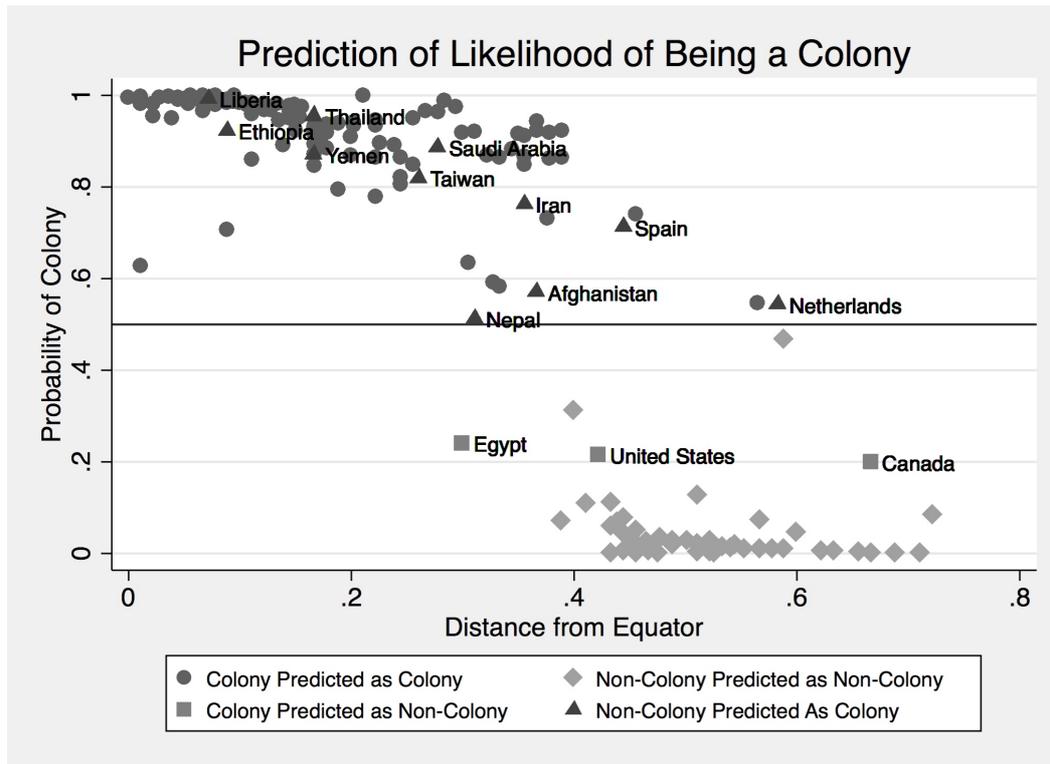


Figure A3:

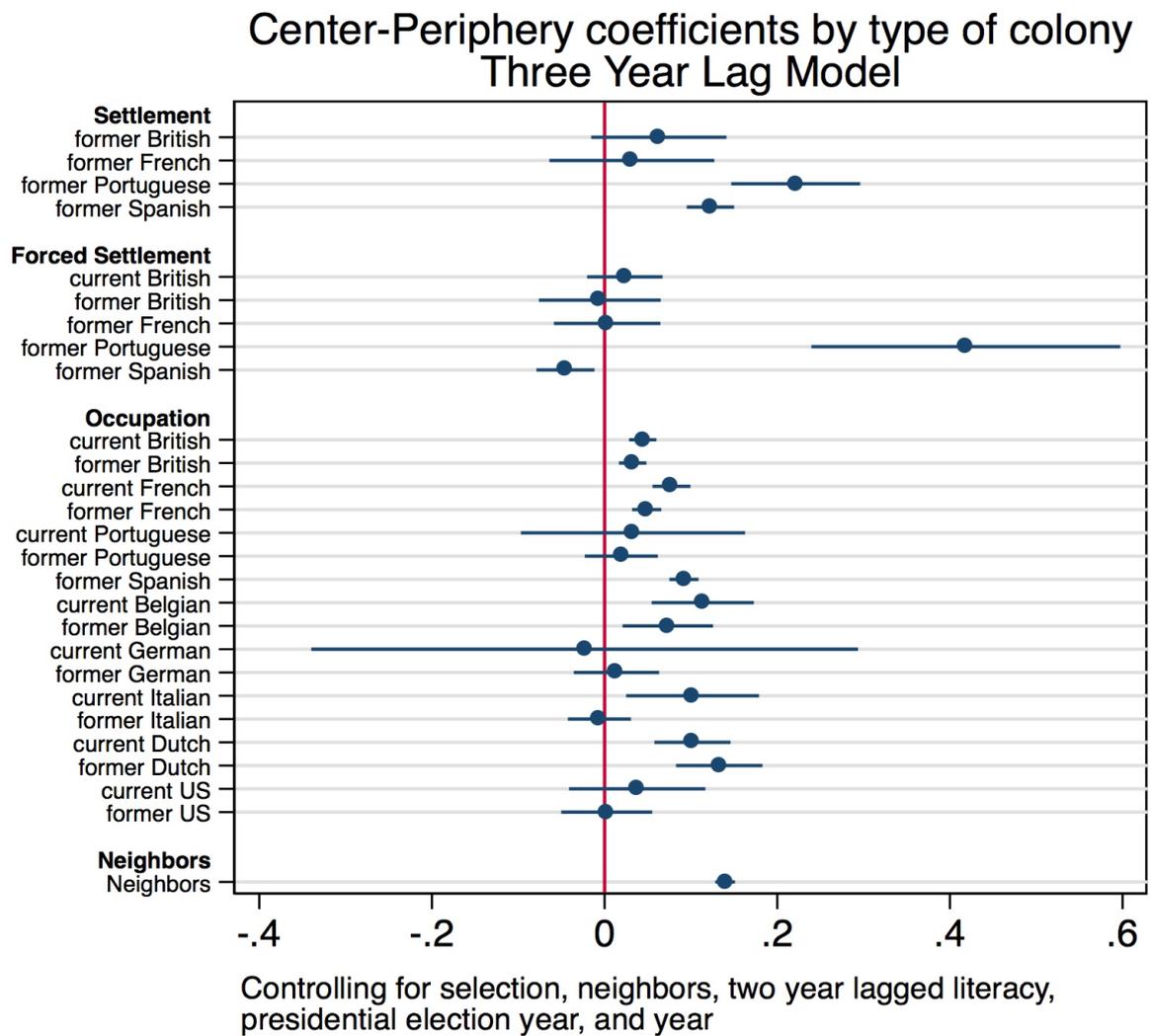


Figure A3 presents the center-periphery coefficients from the selection model with three year lagged diffusion variables and three year differenced dependent variable. This is one year greater than our main model and illustrates similar results.

Figure A4:

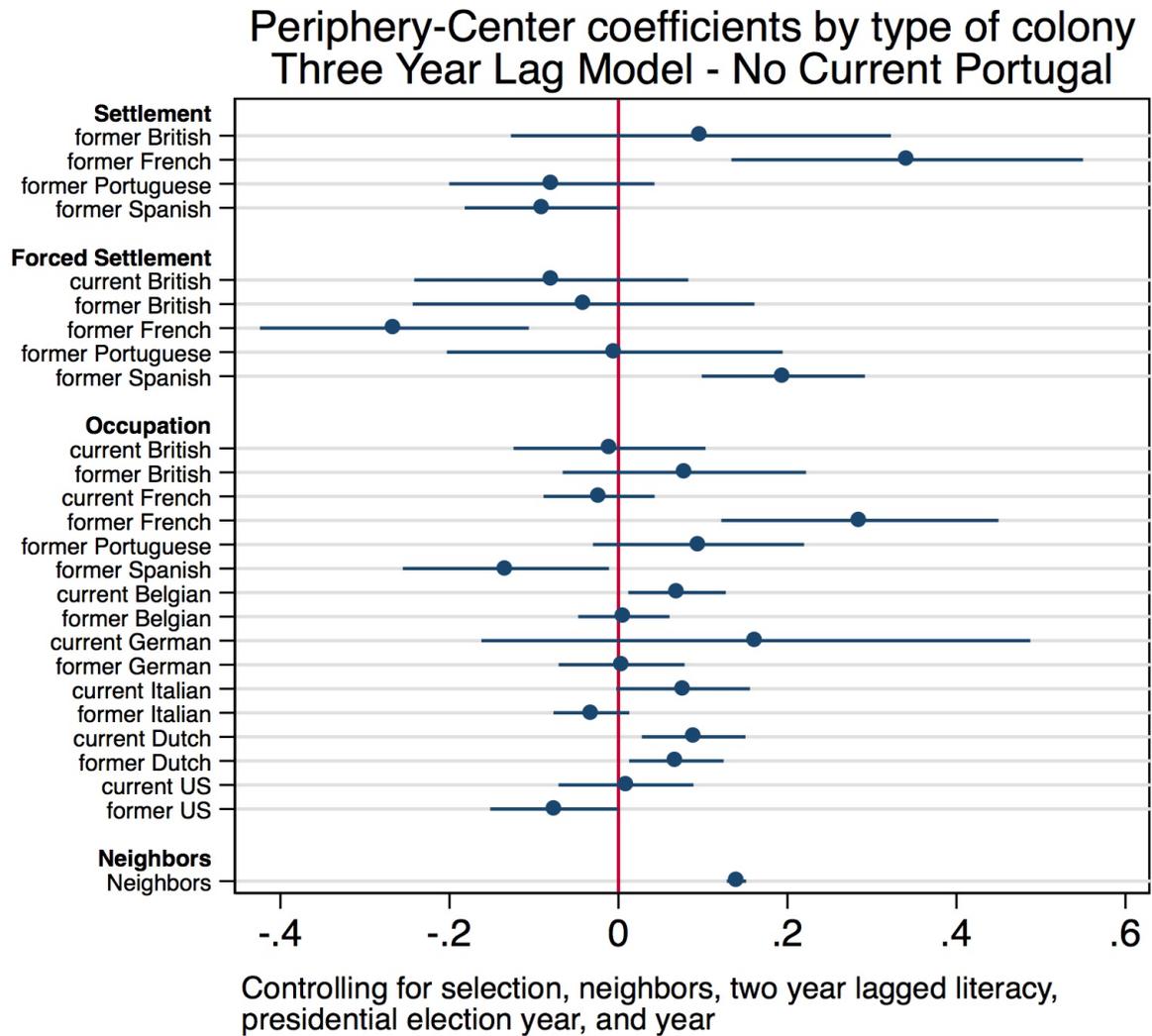


Figure A4 presents the periphery-center coefficients from the same model as Figure A3. The results are similar to the two-year lagged model. Omits current Portugal for legibility.

Figure A5:

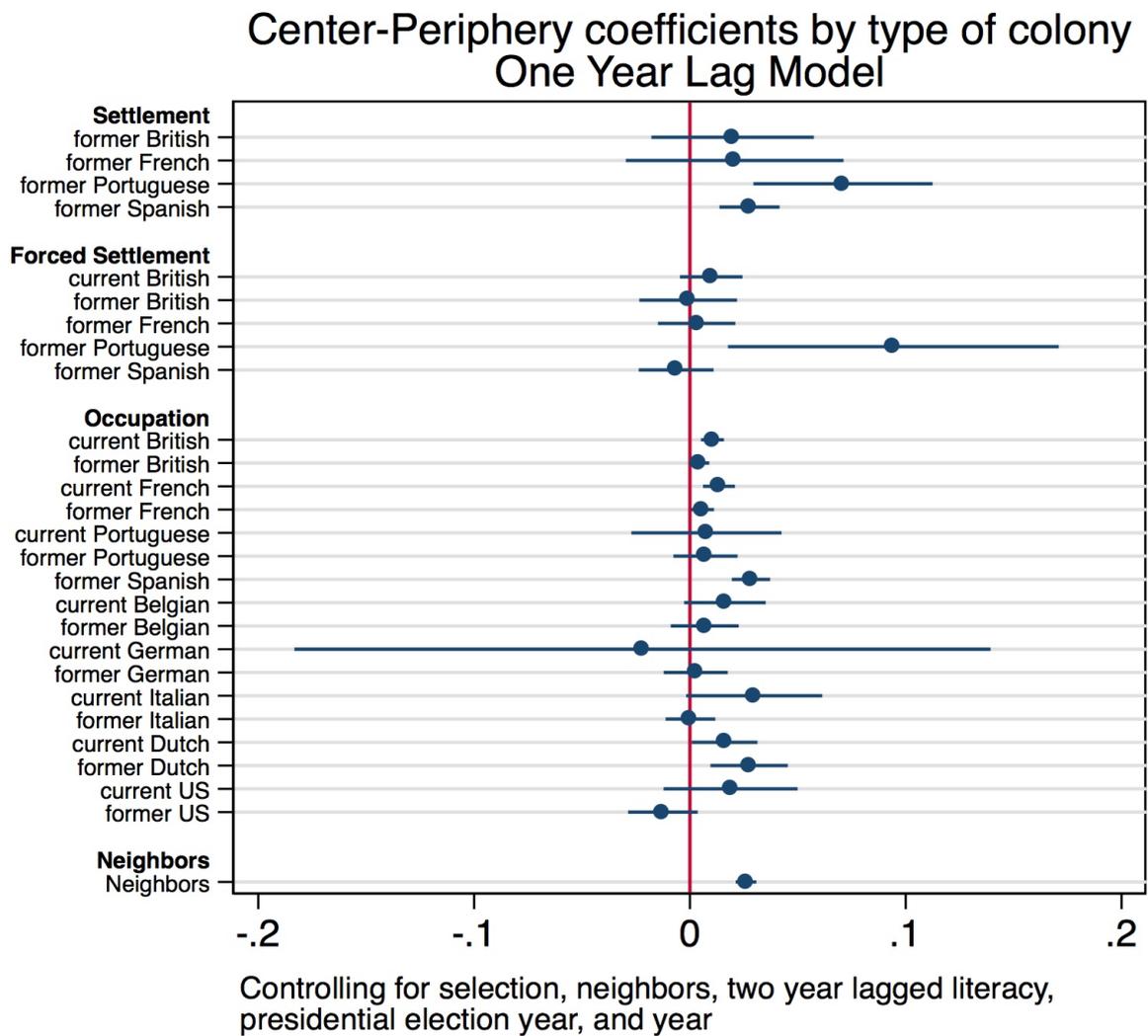


Figure A5 presents the full selection model with one year lagged diffusion variables and a one year differenced dependent variable. This is one year less than our main model and produces similar results.

Figure A6:

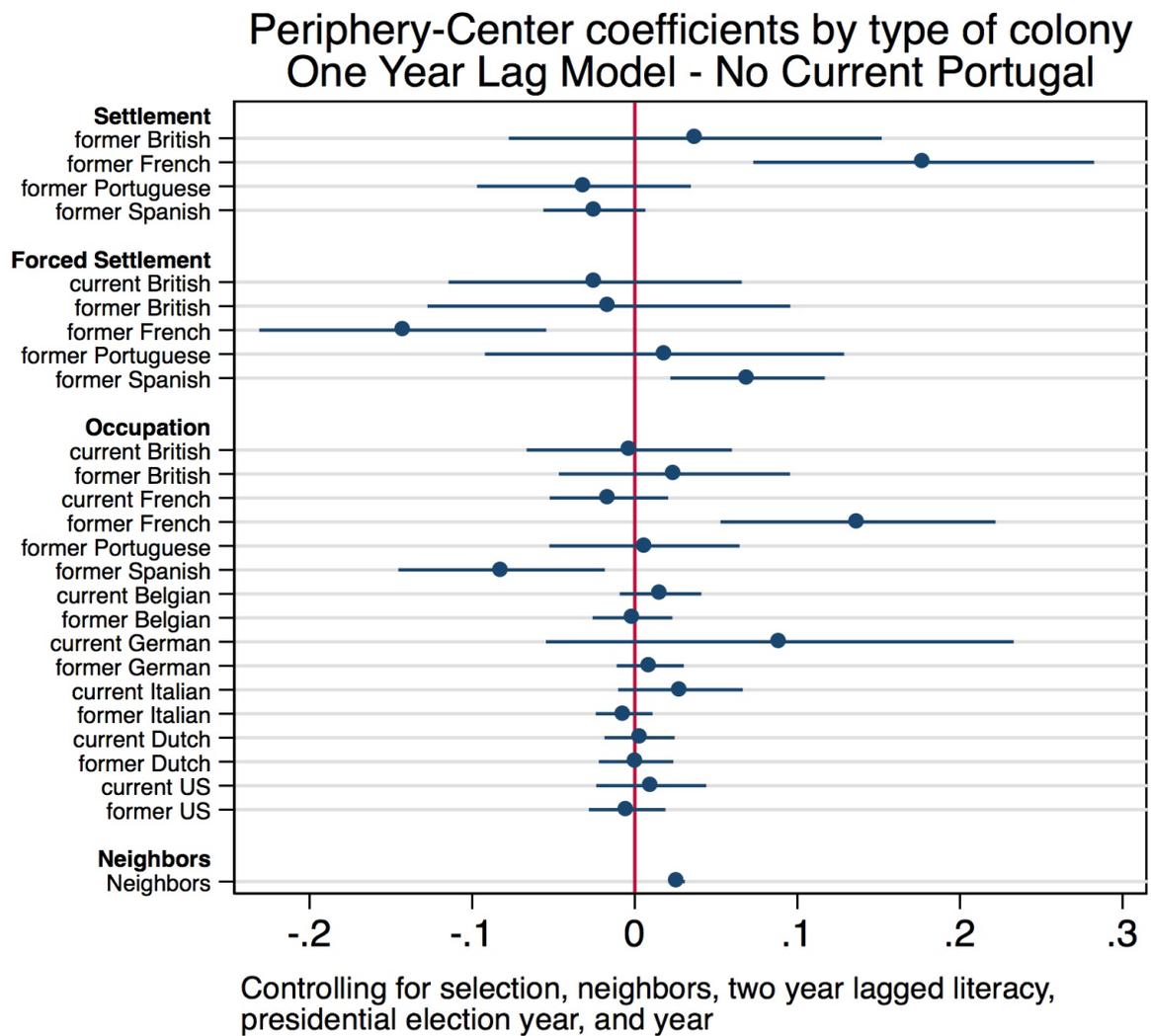


Figure A6 is the same model as Figure A5 above but with Periphery-Center coefficients. Similar results hold as with two year lags. Omits current Portugal for legibility reasons. This illustrates combined with previous three plots that our results are not the result of arbitrarily picking a lag point, but robust to different lag structures.

**Table A2: Colonial Network Model of Electoral Democracy, Controlling for Selection, Presidential Election Year, Neighbors, Adult Literacy and Year Dummies – Transformed DV to Control for Infinite Divergence.**

Intercept	0.002
	0.008
Presidential Election Year	0.010***
	0.018
Adult Literacy	0.0005***
	0.0003
Neighbors	0.613***
	0.034
Year dummies	Output Suppressed
	--
Center-Periphery, former	
British Settlement $t_{-2}$	-0.031
	0.245
French Settlement $t_{-2}$	0.192
	0.308
Portuguese Settlement $t_{-2}$	0.720 **
	0.243
Spanish Settlement $t_{-2}$	0.525***
	0.088
British Forced Settlement $t_{-2}$	-0.067
	0.174
French Forced Settlement $t_{-2}$	-0.092
	0.156
Portuguese Forced Settlement $t_{-2}$	0.899
	0.495
Spanish Forced Settlement $t_{-2}$	-0.144
	0.106
British Occupation $t_{-2}$	0.022
	0.038
French Occupation $t_{-2}$	0.026
	0.041
Portuguese Occupation $t_{-2}$	-0.036
	0.108
Spanish Occupation $t_{-2}$	0.043***
	0.054
Belgian $t_{-2}$	0.327**
	0.126
German $t_{-2}$	-0.017
	0.118
Italian $t_{-2}$	-0.115
	0.089
Dutch $t_{-2}$	0.277*
	0.135
US $t_{-2}$	-0.120
	0.134
Center-Periphery, current	
British Forced Settlement $t_{-2}$	0.011
	0.113
British Occupation $t_{-2}$	0.077
	0.040
French Occupation $t_{-2}$	0.154**
	0.056

Portuguese Occupation $t-2$	.162
	.300
Belgian $t-2$	0.685***
	0.146
German $t-2$	-0.363
	0.988
Italian $t-2$	0.507*
	0.218
Dutch $t-2$	0.252*
	0.117
US $t-2$	0.210
	0.134
Periphery-Center, former British Settlement $t-2$	0.319
	0.691
French Settlement $t-2$	1.519*
	0.637
Portuguese Settlement $t-2$	-0.180
	0.389
Spanish Settlement $t-2$	-0.301
	0.251
British Forced Settlement $t-2$	-0.221
	0.656
French Forced Settlement $t-2$	-0.672
	0.518
Portuguese Forced Settlement $t-2$	-0.099
	0.648
Spanish Forced Settlement $t-2$	0.820**
	0.295
British Occupation $t-2$	0.286
	0.432
French Occupation $t-2$	0.564
	0.509
Portuguese Occupation $t-2$	0.255
	0.365
Spanish Occupation $t-2$	-0.721
	0.386
Belgian $t-2$	0.128
	0.161
German $t-2$	0.101
	0.178
Italian $t-2$	-0.053
	0.129
Dutch $t-2$	0.101
	0.022
US $t-2$	-0.331
	0.185
Periphery-Center, current British Forced Settlement $t-2$	-0.411
	0.529
Portuguese Forced Settlement $t-2$	21.428***
	5.536
British Occupation $t-2$	0.070
	0.371

French Occupation $t-2$	-0.044
	0.214
Portuguese Occupation $t-2$	-20.363***
	5.260
Belgian $t-2$	0.171
	0.169
German $t-2$	1.311
	0.932
Italian $t-2$	0.426
	0.246
Dutch $t-2$	0.085
	0.162
US $t-2$	0.003
	0.224
Random Effects Variance Components	
Colony Selection Variance	$2.68 \times 10^{-14}$
	$8.71 \times 10^{-13}$
Colonizer Selection Variance	$8.71 \times 10^{-14}$
	$2.92 \times 10^{-11}$
Constant Variance	0.005
	0.001
Residual Variance	0.258
	0.003
N	13083
N-countries	162
Wald $\chi^2$	1304.39
Prob > $\chi^2$	0.000
Log-Likelihood	-9775.4343
Standard errors below estimates.	
* $p < 0.05$ , ** $p < 0.01$ , *** $p < 0.001$	

Figure A7:

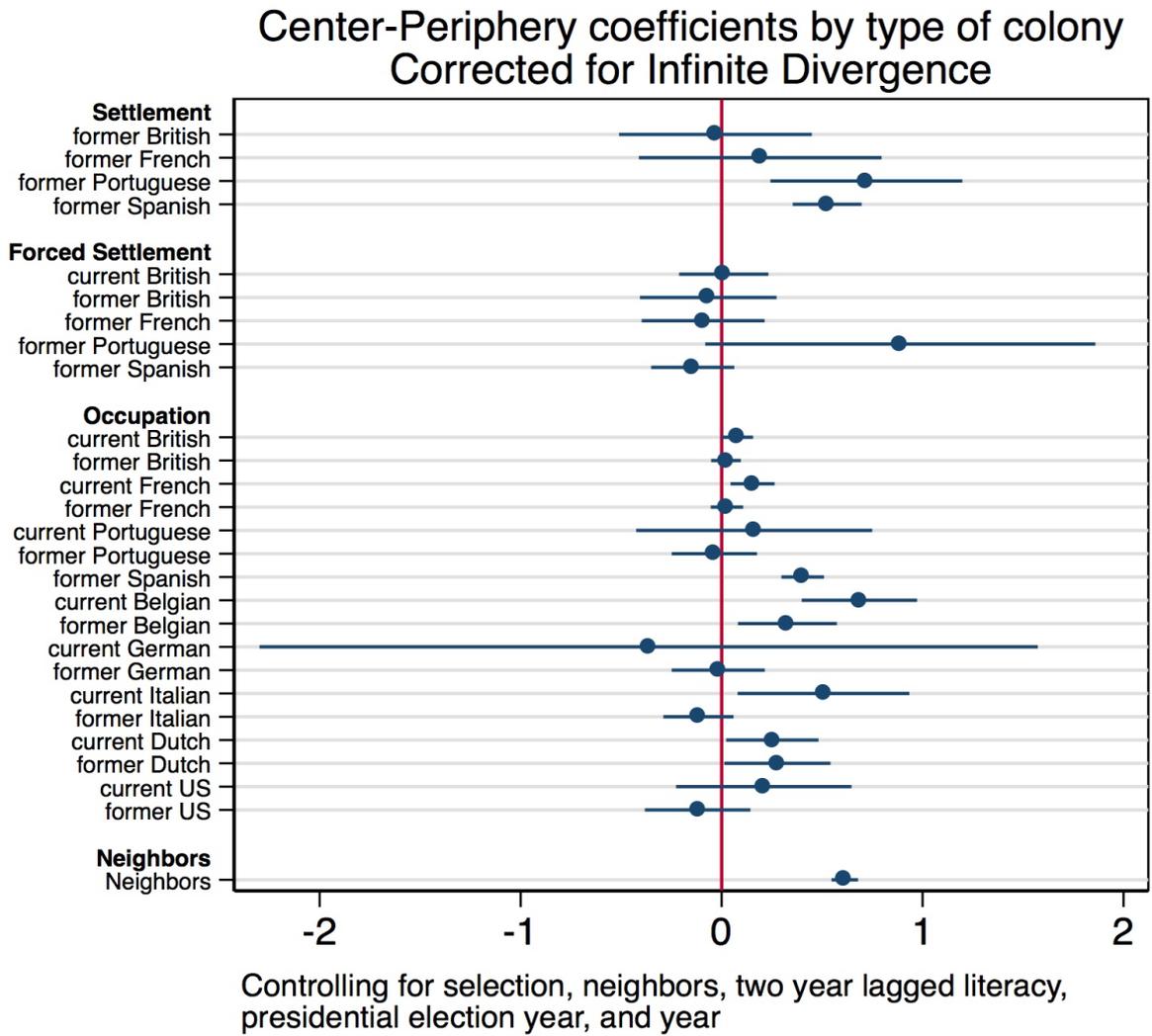


Figure A8:

### Periphery-Center coefficients by type of colony Corrected for Infinite Divergence - No Current Portugal

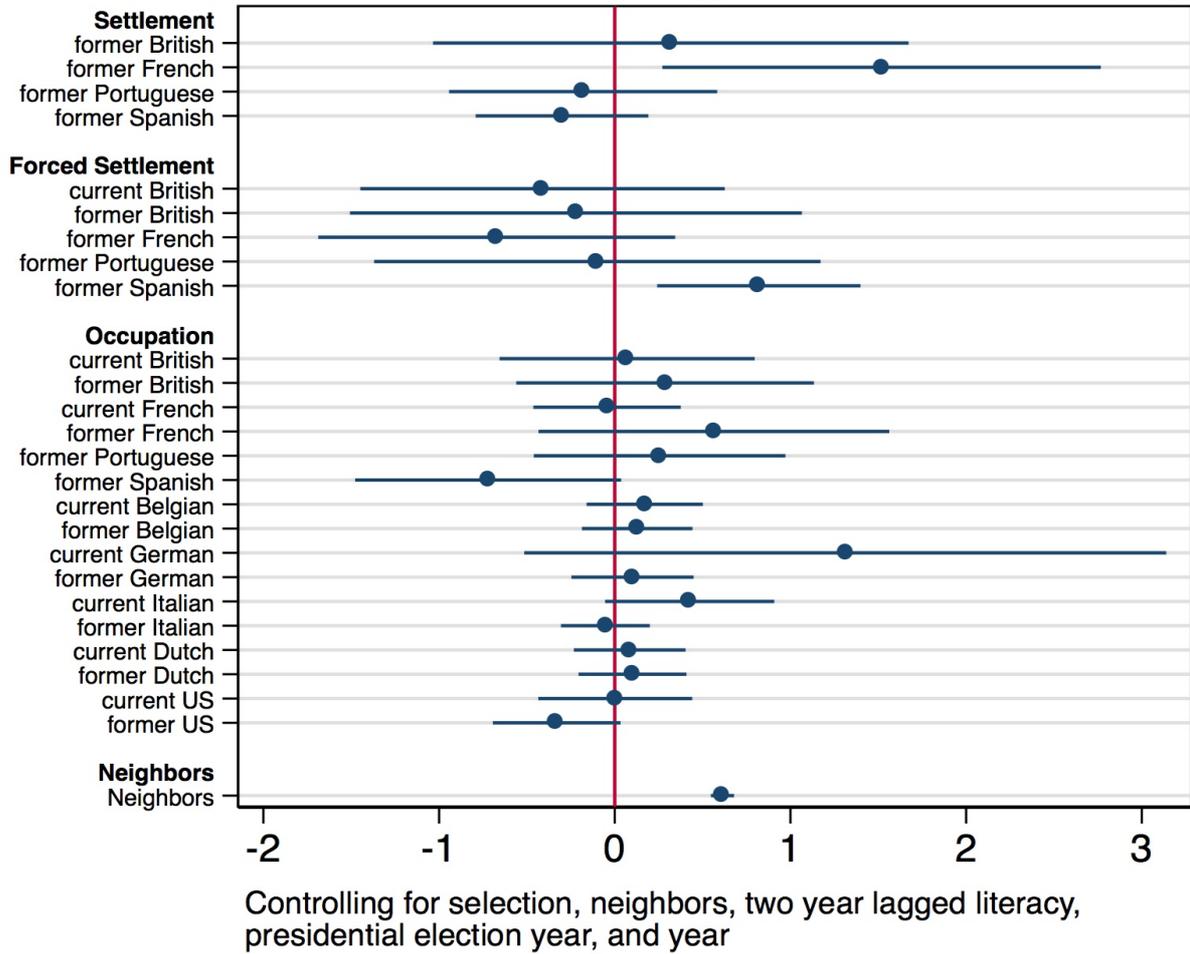
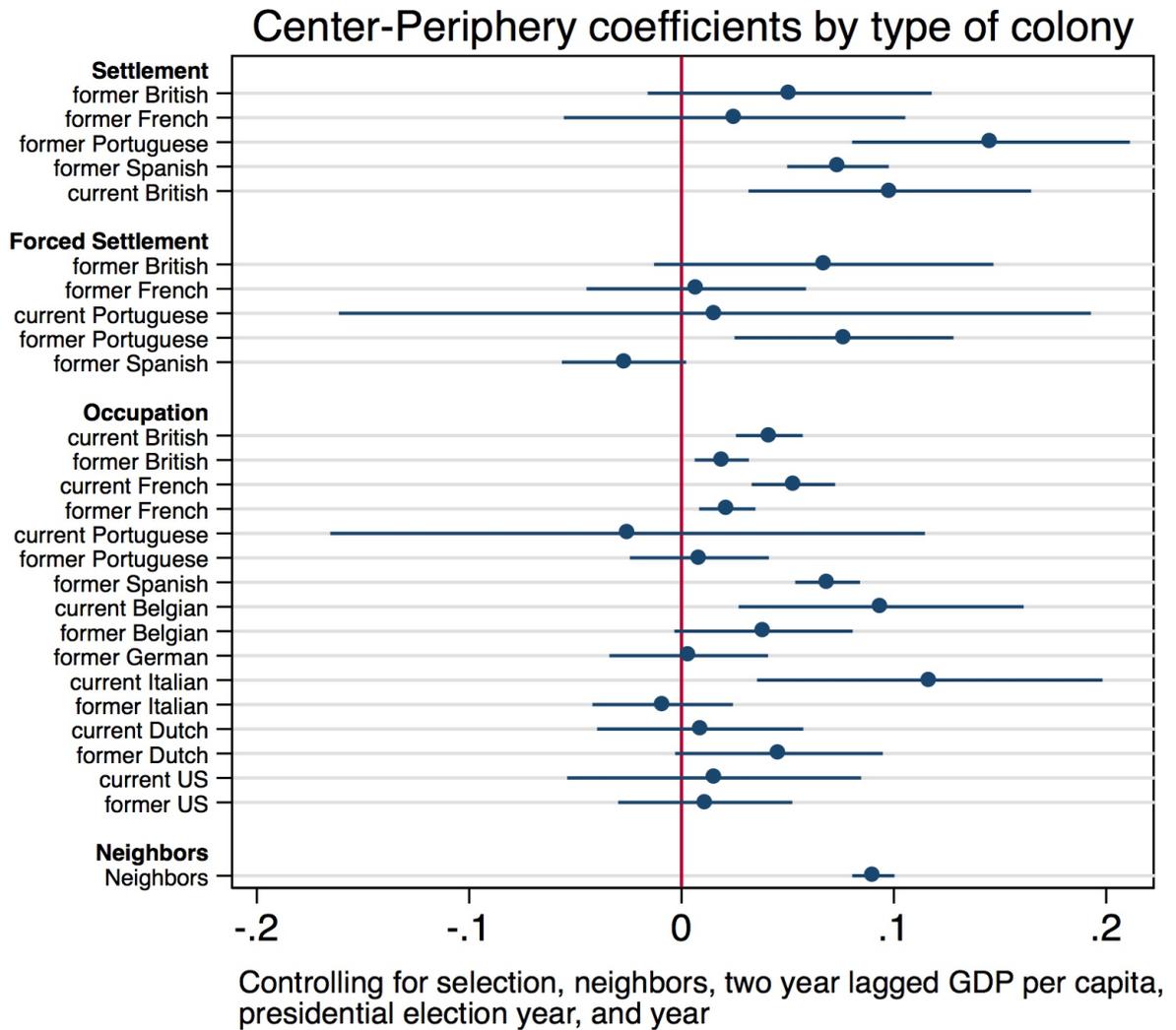
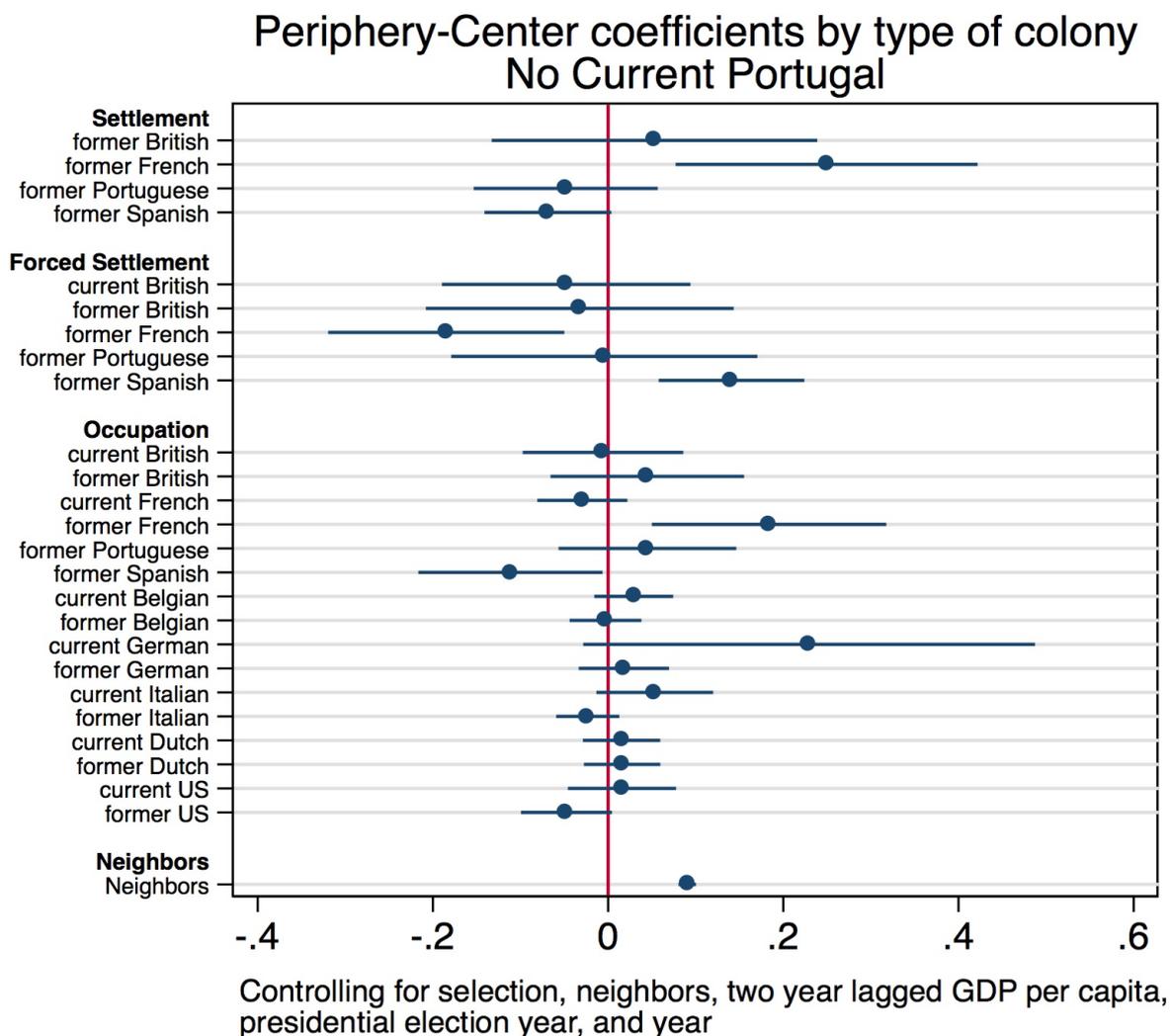


Figure A9:



The mode presented in Figure A9 utilizes the lagged and logged GDP per capita measure that reduces the sample size as discussed in footnote 18, and illustrates that the results remain similar.

Figure A10:



Same as model A9 above, but the periphery-center coefficients. The results largely remain the same but fewer coefficients are significant.

Figure A11:

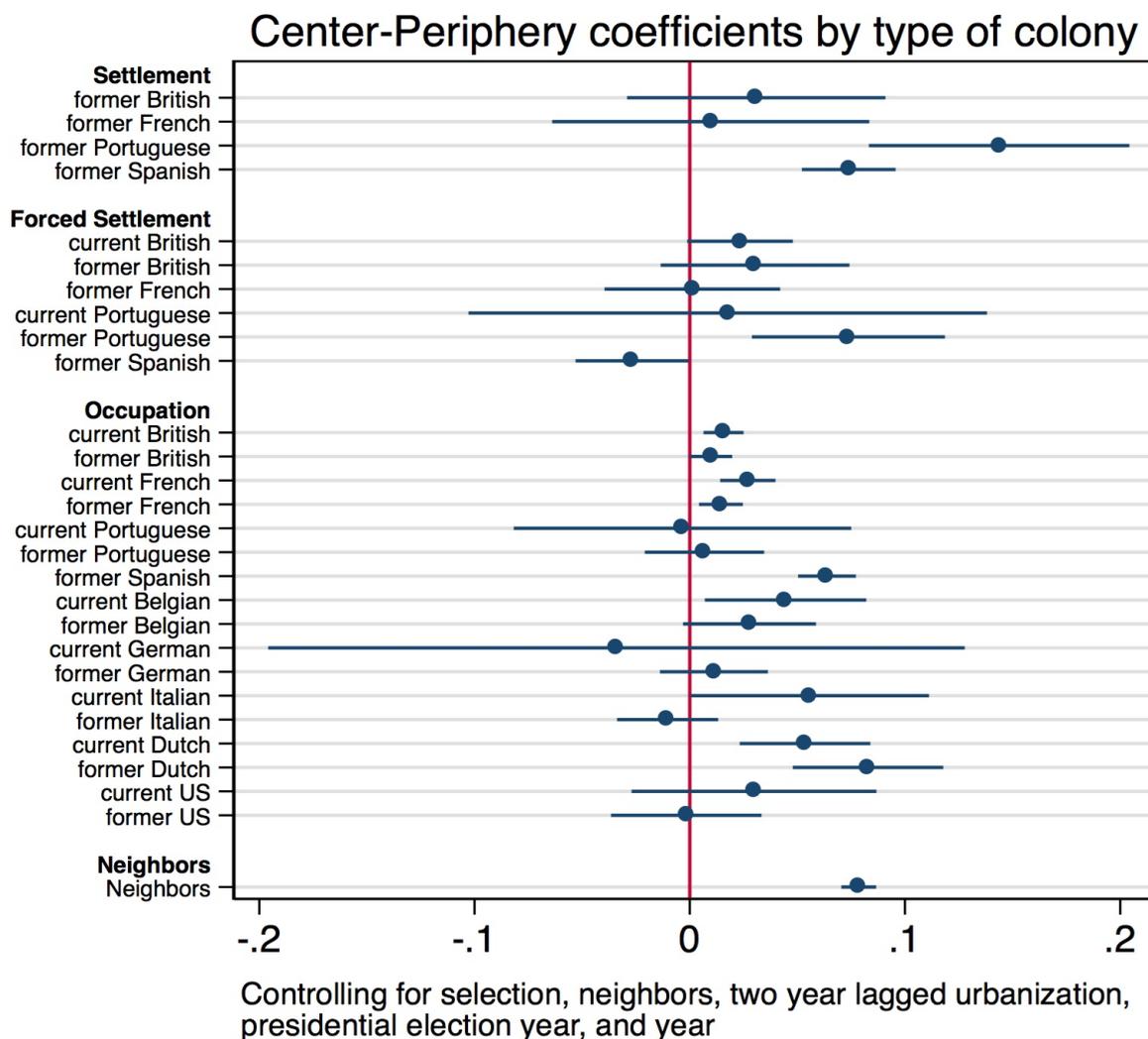


Figure A11 presents the center-periphery coefficients from the second model discussed in footnote 13 that uses lagged urbanization instead of adult literacy to proxy GDP per capita. The results largely remain the same.

Figure A12:

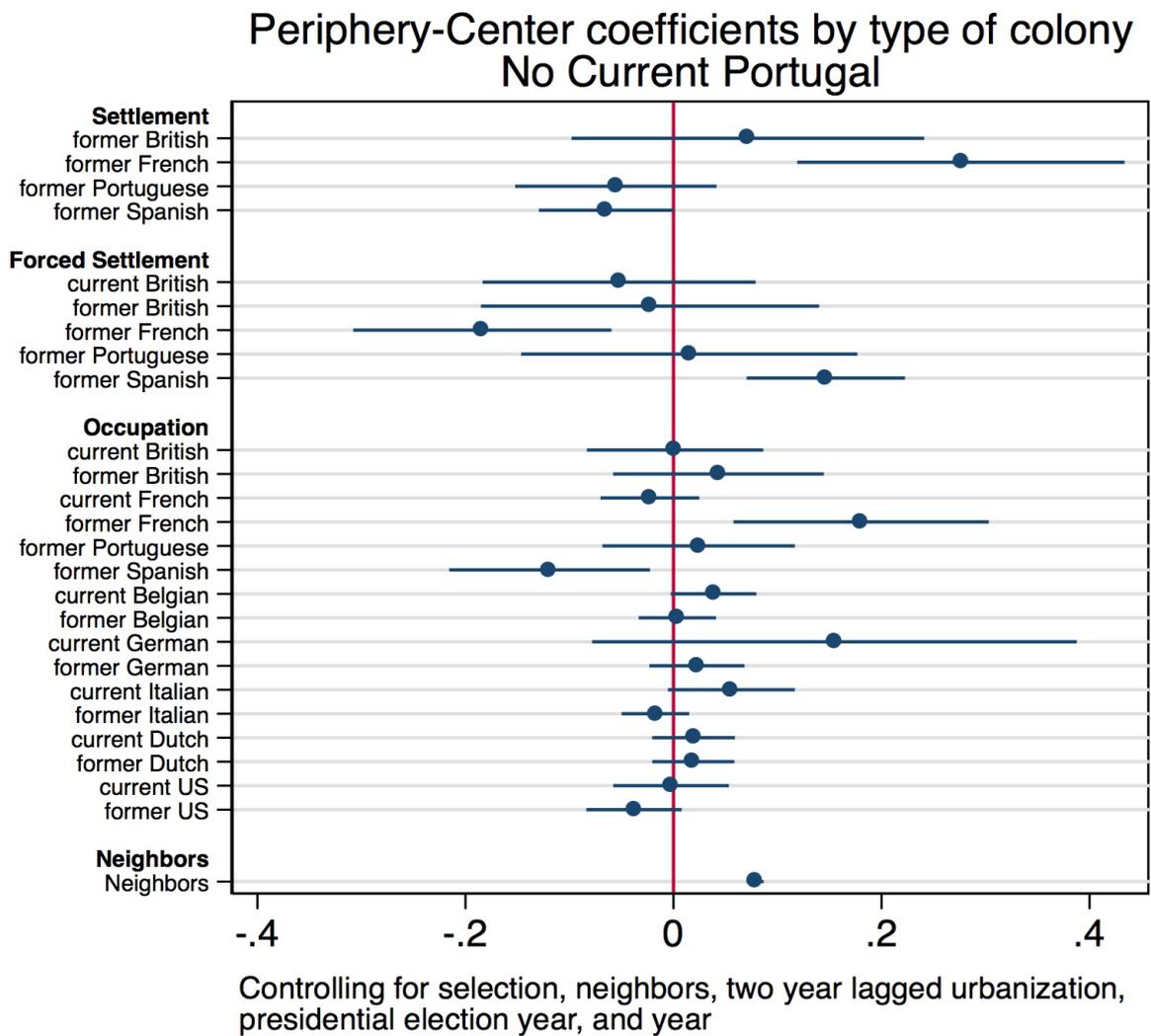


Figure A12 presents the periphery-center coefficients from the same model as Figure A12. Results remain similar.

Figure A13:

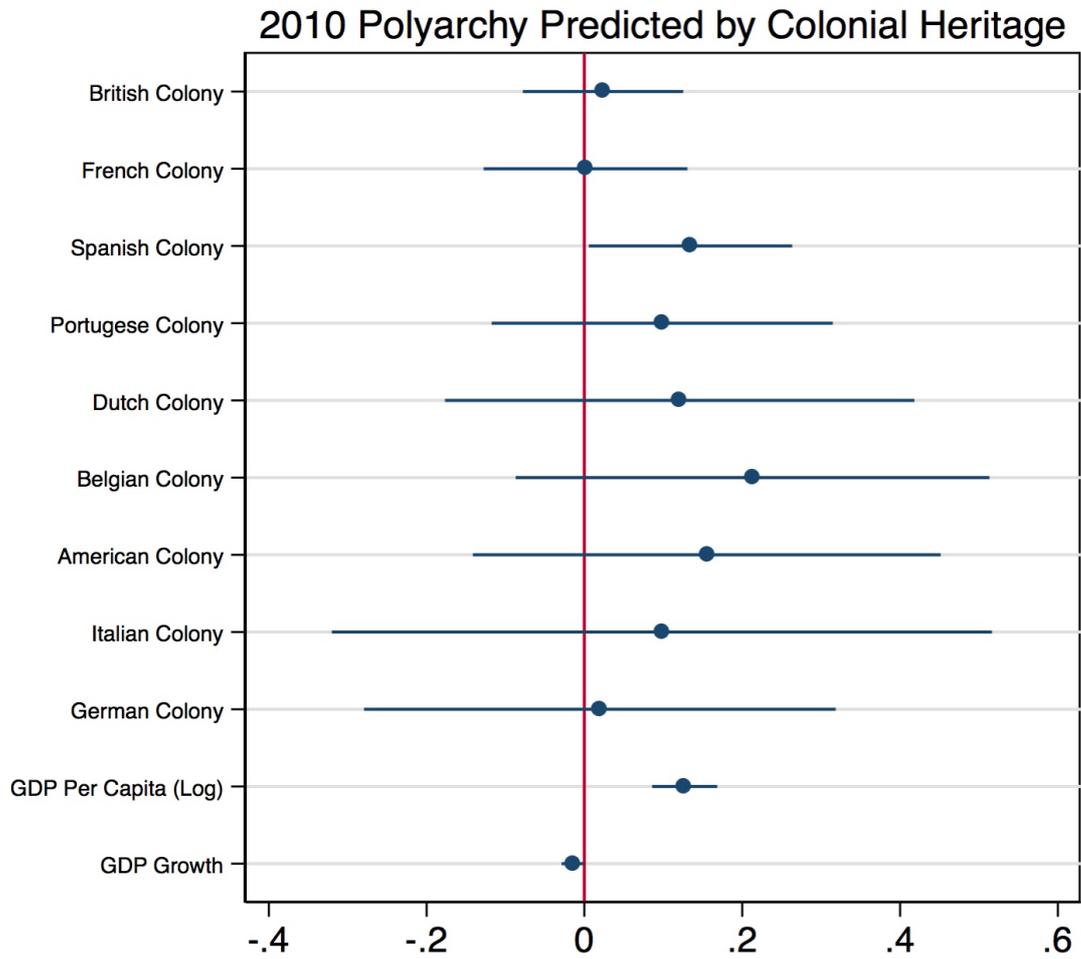


Figure A13 predicts the level of polyarchy in 2010 by colonial heritage controlling for GDP growth and GDP per capita. Only Spanish colonial heritage is positive and significant.

Figure A14:

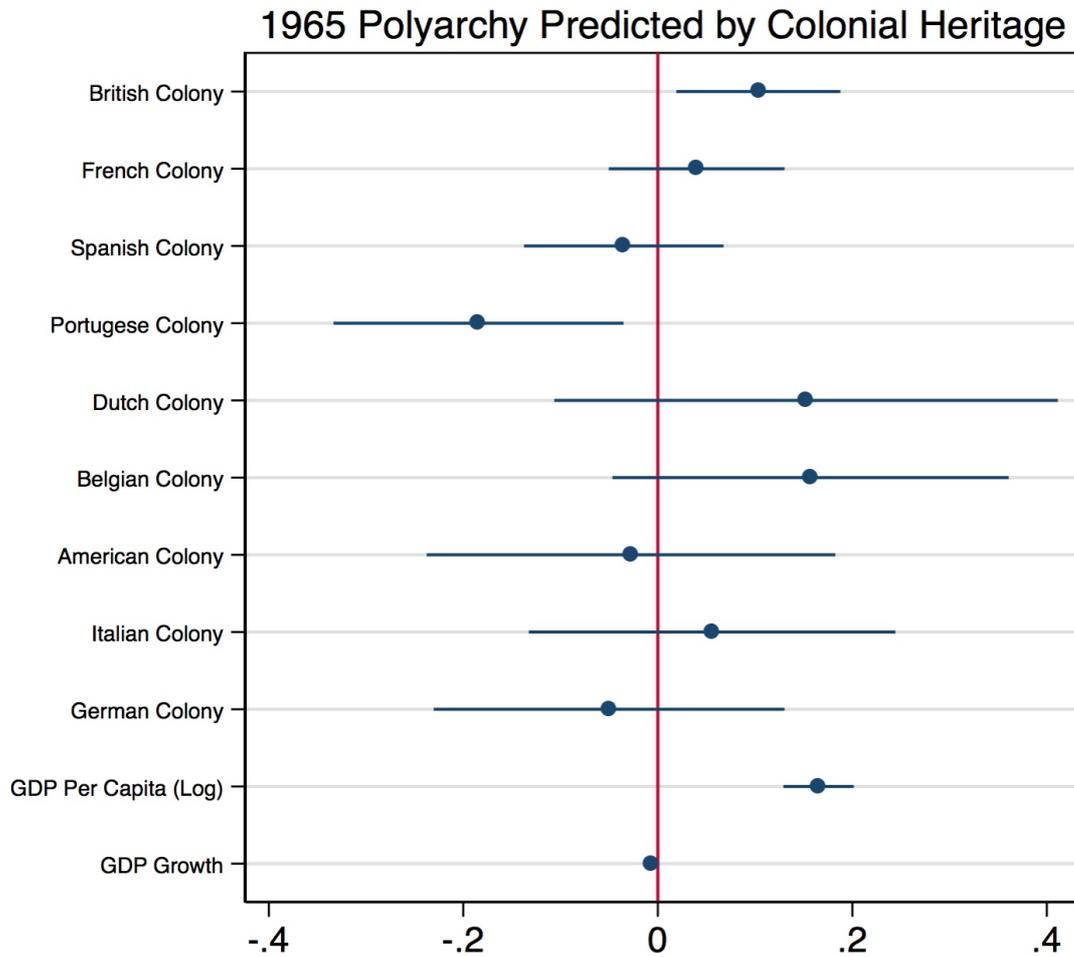
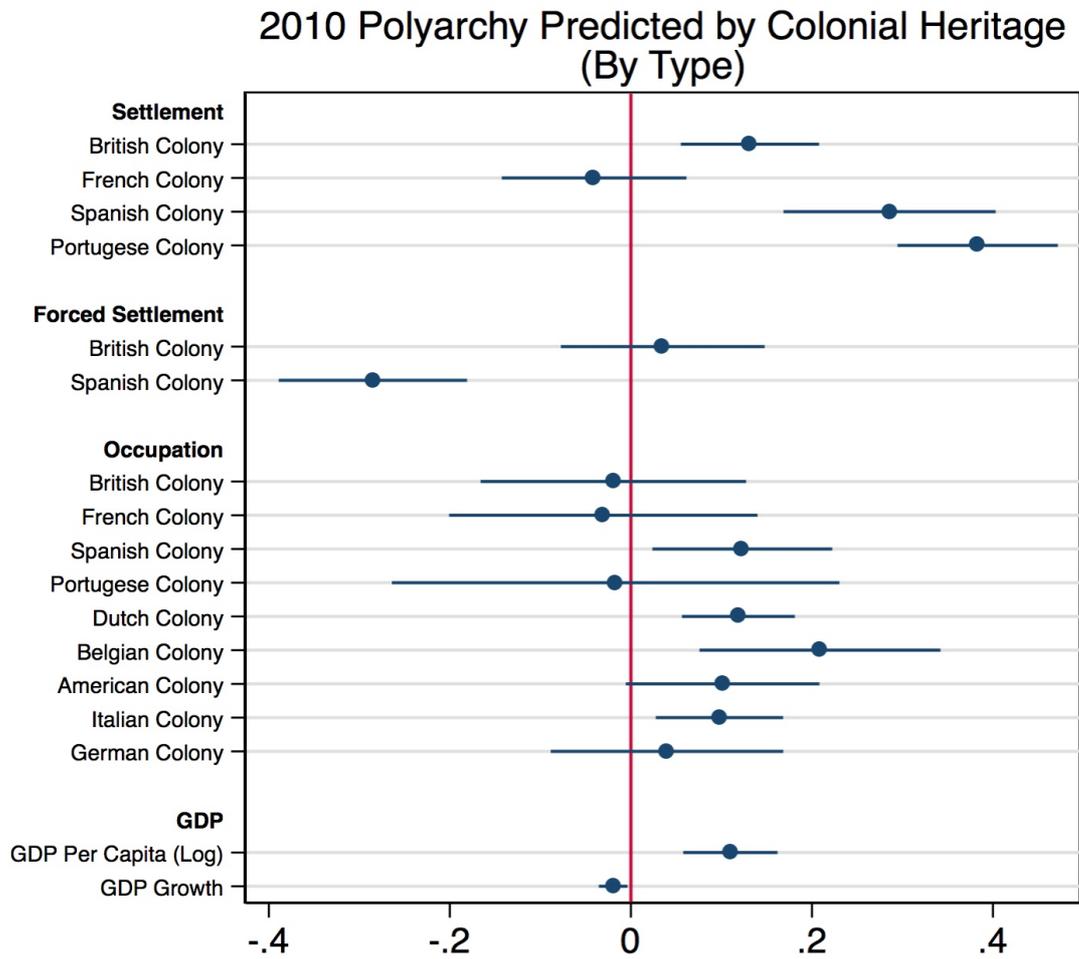


Figure A14 is an OLS model predicting polyarchy in 1965 by colonial . Replication of original finding by Bollen and Jackman. British colonization positively correlated with levels of polyarchy in 1965, whereas Portuguese colonization is negative correlated. Unsurprisingly, Spanish colonization no longer significant.<sup>21</sup> These findings replicate the original Bollen and Jackman findings and illustrate the V-V-Dem electoral democracy measure is largely comparable to other indicators of democracy.

<sup>21</sup> We ran the same model on polyarchy data in 5 year intervals from 1960 to 2010 to replicate the various versions of these models. British colonization is significant from 1965-1975 and in 1985, but insignificant elsewhere. Spanish colonization is significant from 1985 onward.

Figure A15:



OLS model predicting 2010 polyarchy scores by colony type. As expected given previous research, settlement colonies are positive and significant. Spanish and Portuguese colonies largely follow the pattern across all types seen in the diffusion model.<sup>22</sup>

<sup>22</sup> Similar to the colonizer identity OLS models, we ran similar models for 5-year intervals back to 1965 to replicate versions of this model. They are available upon request.