Contamination Effects in Mixed Electoral Systems:
A Meta-Analysis of Measurement Techniques

Abelardo Gómez Díaz

Universitat Pompeu Fabra
Departamento de Ciencias Políticas y Sociales
abelardo.gomez@upf.edu

(Parte de un proyecto de tesis doctoral dirigida por Ignacio Lago Peñas, del Departamento de Ciencias Políticas y Sociales de la Universitat Pompeu Fabra).

Trabajo preparado para su presentación en el X Congreso Latinoamericano de Ciencia Política, de la Asociación Latinoamericana de Ciencias Políticas (ALACIP), en coordinación con la Asociación Mexicana de Ciencias Políticas (AMECIP), y organizado en colaboración con el Instituto Tecnológico de Estudios Superiores de Monterrey (ITESM) del 31 de julio al 3 de agosto de 2019.

Contamination Effects in Mixed Electoral Systems:
A Meta-Analysis of Measurement Techniques

by Abelardo Gómez Díaz

Abstract

There is widespread agreement that both tiers in a mixed electoral system do not operate independently of one another, and that instead they interact, producing contamination effects. These tend to raise the number of parties away from what Duverger's Law or the M+1 rule suggest. However, the field has not yet determined an undisputed methodological approach to answer the following question: raised by how much, exactly? This paper presents a thorough meta-analysis of the three major measurement techniques used so far, herein titled the Difference Approach, the Likeness Approach, and the Simulation Approach. By doing so, it provides a more concise map of each of their logics, their varied implementations, their drawbacks, as well as possible ways forward.

Keywords: Mixed systems; Contamination; Parties; Causal inference.

Introduction

Mixed electoral systems remained anomalous for decades before their wide-spread proliferation from the 1990s onwards. Their perceived benefit was that they offered "the best" of the two systems that dominated the nineteenth- and twentieth-centuries: the single-member district (SMD) and proportional representation (PR) systems (Shugart & Wattenberg, 2003). Today, they are used by over one billion people across thirty-one countries (see Bormann & Golder, 2013; IDEA, 2018), providing – amongst other things – the opportunity to further the study of how electoral arenas interact. In other contexts, these interactions and their consequences are referred to as coattail or spillover effects (see, for example, Miller, 1955; Calvert & Ferejohn, 1983; Campbell, 1986; and Flemming, 1995). However, when it pertains to mixed electoral systems, the interaction between their two built-in arenas[1] (i.e., SMD and PR) is referred to as *contamination*.

[1] Throughout this paper, the terms "tiers" and "arenas" will be used interchangeably.

To be sure, contamination is an essential feature of mixed systems. It occurs when the (in)viability of a party in one arena shapes its decision to compete in the other; as well as when the (in)viability of a party in one arena shapes an individual's decision to vote for it in the other. It also produces a centrifugal force that raises the number of parties above what the traditional literature (see Duverger, 1954; Cox G.W., 1997; Ferrara, Herron, and Nishikawa, 2005; Guinjoan, 2014). But whereas it is clear that the number of parties is, in fact, raised, the field has not yet developed an undisputed method to answer the following question: *raised by how much, exactly?* To date, depending on which method is used, results vary substantially.

The difficulty pertains to what Holland (1986) refers to as *the fundamental problem of causal inference*: when "it is impossible to observe the value of Y_t(u) and Y_c(u) on the same unit and, therefore, it is impossible to observe the effect of *t* on *u*"[2]. Ferrara, Herron, and Nishikawa (2005) described this as "the primary challenge facing the empirical literature on the consequences of electoral systems", because it requires knowing how outcomes in a set of countries, districts, or legislatures would vary if they were to be treated by different electoral rules. In other words, it requires knowing how the size of the party system in the SMD tier would look like if it had remained untreated by contamination.

The purpose of this section is to perform a thorough meta-analysis of the main methodological techniques that have thus far been developed to illuminate this counterfactual and measure contamination. Its importance, for example, pertains to the fact that political engineers can expect a mixed system to produce particular consequences, but – as will be shown – these expectations often derive from a wide array of methodological starting points, thereby reducing their overall validity. In other words, contamination in a particular system can be said to exist, not exist, and be high or minimal, depending on how it is measured. This methodological inconsistency is still an obvious limitation in the study of contamination.

[2] Where *Y* stands for the response variable; *u* stands for units or population; *t* stands for the units that received treatment; and *c* stands for the units left under control (i.e., received no treatment).

To the point, this section proceeds as follows. First, it presents a quick review of the different ways of counting parties. Second, it offers a detailed presentation of the three main approaches used to measure contamination – herein labelled the *Difference Approach*, the *Simulation Approach, and the Likeness Approach*. Each one includes an explanation of its general logic, re-framed within Rubin's model of causal inference (Holland, 1986); various examples of its use in the field, high-lighting each selection of treated and untreated observations; and a review of their drawbacks and limitations. Ultimately, it offers conclusions as to where the field stands on the topic, as well as recommendations for future research.

Counting Parties

In order to identify how much the number of parties is raised by contamination, it is essential to know which parties to count and how to count them systematically. The task is to determine how much electoral strength can make a party relevant enough to be counted, and how much electoral weakness can make a party irrelevant enough to be discarded (see Sartori, 1976). Nevertheless, the literature provides an eclectic variety of counting techniques, often rendering contamination outputs incomparable.

The most common way of counting parties is through Laakso and Taagepera's (1979) index for *effective number of parties* (ENP). It adjusts the total number of parties by their relative size, in terms of their votes received and seats obtained. Per Cox (1999: 148), "it has the property that, if there are *n* equally sized parties, then ENP = *n*. As inequalities in vote share among the *n* parties grow, ENP shrinks. Ultimately, if one of the *n* parties secures all the votes, [then] ENP = 1".

The Laakso-Taagepera Index[3]

$$ENP = \frac{1}{\sum_{i=1}^{n} p_i^2}$$

[3] Where *n* is the number of parties, and p_i^2 is the proportion of votes (or seats) of the ith party.

To briefly illustrate the difference amongst counting techniques, consider the following. If the largest party in a given system obtains over 50% of the vote, the Laakso-Taagepera index could be at least 2.0 if there is enough fragmentation amongst opposition parties; but the alternative index proposed by Molinar (1991) would always be less than 2.0 (Molinar Horcasitas and Weldon, 2003). Additionally, the often-used SF ratio, proposed by Cox (1994), helps reveal the number of wasted votes per election, but it is "biased in favour of big parties and insensitive to smaller ones" (Guinjoan, 2014). The mSF ratio, an adjustment proposed by Selb (2012), presents similar problems. In fact, both would count the same number of parties in two SMD elections "where the distribution of votes were 45-20-20-15 and 45-20-20-5-5-1-1-1-1-1, respectively" (Guinjoan, 2014).

The Molinar Index[4]

$$NP = 1 + N\,\frac{\left(\sum_{i=1}^{n} p_i^2\right) - p_1^2}{\sum_{i=1}^{n} p_i^2}$$

To be sure, the Laakso-Taagepera index can be described as "somewhat flawed", but it also has "few rivals" (Dunleavy and Boucek, 2003). Per Dunleavy and Boucek (2003), the Molinar index is so problematic that they advice for it to "not be further employed in political science" at all. For these reasons, and the fact that "some kind of weighting is necessary" (Lijphart, 1994), ENP van be considered the best possible measure of the size of a given party system. However, in terms of measuring contamination, the ENP only works as a "baseline" (Guinjoan, 2014), because contamination would exist within the distance between the ENP (i.e., the real-life scenario) and the Duvergerian counterfactual, or Y_c(u).

Use of Dependent Variables

Moreover, in contamination studies, ENP is often selected as the main dependent variable (Herron and Nishikawa, 2001; Nishikawa and Herron, 2004; Ferrara and Herron, 2005; Ferrara, 2006; Lago and Martínez, 2007; Lago and Montero, 2009; Rich, Banerjee, and Recker, 2014; Rich, 2015), but not always.

[4] Where *N* is $1/\sum_{i=1}^{n} p_i^2$ and p_i^2 is the proportion of votes of the winning party, squared.

As presented by Herron, Nemoto, and Nishikawa (2018), depending on their particular research objectives, other contamination studies prefer using list vote shares (Ferrara, 2004; Hainmueller and Kern, 2008); SMD performance (Krauss, Nemoto, and Pekkanen, 2011; Fortin-Rittberger and Eder, 2013; Shin, 2014); strategic/split-ticket voting (Gschwend, Johnston, and Pattie, 2003); and women's representation (Golosov, 2014). Certainly, as will be covered below, findings can vary substantially depending on which selection is made.

The Difference Approach

Logic

Mixed SMDs are ones that are 'treated' by their interaction with the PR tier. Therefore, where the treatment (*t*) causes the effect $Y_t(u) – Y_c(u)$, the mixed SMD becomes $Y_t(u)$. But because the value of Yc(u) is unknown, a pure SMD is placed in its stead. In simple terms, $Y_t(u) – Y_c(u)$ represents the difference between the number of parties that the mixed SMD actually produces, and the number of parties that would perhaps have been produced if it had run under pure SMD rules. This difference represents the treatment effect, within which the level of contamination could be said to exist[5]. Nevertheless, this difference would also include the potential effects of variables that are typically considered in these analyses, such as ethnic diversity, democratic experience, or economic indicators – not to mention any potential omitted variables[6].

Use

An early example of this approach came from Cox and Schoppa (2002), who sought to prove that ENP levels in mixed SMDs were "significantly higher" than ENP levels in pure SMD systems – something which, they argued, would confirm contamination. To this end, their treated observations consisted in ENP levels from mixed SMDs in Germany (2.25), Italy (2.64), and Japan's upper (2.52)

---

[5] Maeda (2008), for example, proposed using what he referred to as "the treatment-effects model" in the study of contamination effects.

[6] One must consider that mixed systems vary considerably in terms of history, tier linkage, electoral threshold, and institutional contexts (e.g., if they have presidential, federal, or bi-cameral arrangements) (Rich, 2015). In fact, it is why – depending on their particular objectives – contamination studies tend to control for potential exogenous and endogenous factors that could also influence the rise in number of parties (see Herron and Nishikawa, 2001; Kostadinova, 2002; Thames and Edwards, 2006; Riera, 2012; Rich, 2015).

and lower (2.86) chambers; and their Duvergerian counterfactual consisted of an average ENP level from pure SMDs in the United Kingdom (2.27), Canada (2.40), India (2.49), New Zealand (2.56), and the United States' upper (1.91) and lower (1.81) chambers[7]. The positive difference between each mixed ENP level and 2.24 – which they used as their $Y_c(u)$ – confirmed their expectations.

Kostadinova (2002) used a more sophisticated analysis to prove that mixed systems produced more parties than majoritarian systems, but less than PR ones. She built a model that tested how mixed systems, as well as pure SMD and PR systems, affected "multi-partyism", all-the-while controlling for directly elected presidents and ethnic diversity. She used ENP level data from fifty-six lower house elections in sixteen Central and Eastern European countries[8]. Twenty-one of those elections were held under mixed rules, nine under pure SMD, and twenty-six under pure PR. But perhaps most importantly, she compared the ENP levels from her mixed systems to the ENP levels from their previous pure selves, thereby fixing her $Y_t(u)$ and $Y_c(u)$, respectively. Ultimately, a generalized least square regression (random coefficients) confirmed her hypothesis.

Nishikawa and Herron (2004) ran a similar analysis, albeit adding sub-types of electoral systems. They predicted that ENP levels would be highest in PR systems (with and without d'Hondt formulas), followed by mixed systems with linked tiers, mixed systems with unlinked tiers, and pure SMDs. They calculated ENP level data from fifty-three different countries and compared each of the aforementioned types to a pure SMD category (i.e., their counterfactual). The results from five different statistical models[9] – which controlled for assembly size,

---

[7] The sample was based on Chhibber and Kollman's (2004) study of federalism and party competition in Canada, Great Britain, India, and the United States.

[8] She used a GLSE instead of an OLS because the latter would "not recognize the pooled nature of the data set" (Kostadinova, 2002). The model was $Multi\text{-}partyism = b_1 Mixed + b_2 SMD + b_3 MMD + b_4 DirPresident + b_5 Ethnicity + e$, and it expected $b_3 > b_1 > b_2$.

[9] They used "OLS estimation, between-effects regression, random-effects generalized least squares estimation, random-effects maximum likelihood estimation, and feasible generalized least squares estimation with panel heteroscedasticity" (Nishikawa and Herron, 2004). The decision to run multiple models was drawn from Jones (1999).

presidentialism, ethnicity, and post-Communist states – supported their hypothesis.

Bochsler (2009) also tested if mixed systems led to more party fragmentation than pure SMD or PR systems. He took ENP level data from eighty-two elections in nineteen Central and Eastern European countries, and mostly compared mixed systems to PR systems – i.e., his $Y_t(u)$ and $Y_c(u)$, respectively. Additionally, he tested for both the traditional mean distribution of the dependent variable *and* the within-group variation using a maximum likelihood estimator. He used the type of electoral system as the main explanatory variable, and controlled for democratic experience, GDP per capita, unemployment rate, and economic growth. Ultimately, the mean distribution test revealed that mixed ENP levels *did* fall between those from pure PR and SMD systems; but the variance test revealed (perhaps expectedly) that “the outcome of mixed systems varied substantially from country to country” (Bochsler, 2009).

Maximum Likelihood Estimator[10]

$$\text{Outcome: } N \sim (\mu, \sigma^2)$$

$$\mu\,(y) = \alpha + \beta X$$

$$\sigma(y)^2 = \exp\,(\alpha_0 + \gamma Z)$$

More directly, Crisp, Potter, and Lee (2012) sought to measure contamination using a particularly unique design. They compared ENP level data from mixed SMDs in Scotland and Wales to the pure SMD in the United Kingdom. The SMDs used to elect the Scottish Parliament and Welsh Assembly, however, occupy *the same* geographical space as the SMDs used to elect the British House of Commons[11]. In this way, they were able to “[hold] the district and all its characteristics constant” and rely on “relatively simple statistics” to run their tests (Crisp, Potter, and Lee, 2012). In this particular scenario, they found that the

[10] Per Bochsler (2009: 747), “X is the vector of the explanatory variables for the mean function; Z the vector for the variance function, and β, γ are vectors of parameters for both functions. α is the constant in the mean term, and α_0 the constant in the variance term”.
[11] To my knowledge, this is the only design of the sort in contamination studies, although clearly not electoral studies as a whole (see Cox, Rosenbluth, and Thies, 2000; Ansolabehere, Snyder, and Stewart, 2000; or Fauvelle-Aymar and Lewis-Beck, 2008).

increase in ENP levels was “not sufficient to drive the systems much beyond the expected two parties” (Crisp, Potter, and Lee, 2012). In other words, contamination was essentially non-existent.

Limitations

Ideally, comparisons should be made amongst units that are similar in almost every relevant category, except in how they elect their legislatures (see King, Keohane, and Verba, 1994). In this sense, Cox and Schoppa (2002) could be said to have lacked the controls to make proper comparisons. Whereas the logic behind using mixed and pure SMDs as $Y_t(u)$ and $Y_c(u)$ was sound, they provided no methodological justification, for example, for comparing ENP levels from two lower house elections in Japan to an average ENP level from a myriad of elections in four vastly different Commonwealth countries, as well as the United States' Congress and Senate. Moreover, they did not differentiate between the different *types* of mixed systems they used to create their $Y_t(u)$ (see Shugart and Wattenberg, 2003). Therefore, even if the treatment effect revealed the inflation of ENP levels under mixed systems, it is unclear how much of it was *actually due* to contamination.

Kostadinova (2002) compared mixed systems to the last pure versions of themselves, but there is enough evidence to suggest that swift changes in electoral rules (such as in countries that transitioned from undemocratic to democratic, or from pure to mixed systems) generate initial voter uncertainty (see Duch, 2001; Johnston and Pattie, 2002; Tavits and Annus, 2006; Tavits, 2007; Gallego, Rico, and Anduiza, 2012; Lago and Martinez i Coma, 2012; and Lago, 2017). This uncertainty, in turn, affects the size of the party system. Accounting for learning processes and democratic experience is, therefore, crucial. Otherwise, the difference between $Y_t(u)$ and $Y_c(u)$ would reveal skewed levels of contamination. Bochsler (2009), on the other hand, controlled for democratic experience but only included two pure SMD elections for comparison, relying mostly on PR elections as his $Y_c(u)$.

Herron and Nishikawa's results varied depending on the definition of mixed systems they used: be it Reynolds and Reilly's (1997), Massicotte and Blais'

(1999), or Shugart and Wattenberg's (2003). Moreover, Crisp, Potter, and Lee (2012) compared weighted electoral results from two mixed *national* chambers to those from a pure *supra-national* one. As mentioned, comparisons should be made amongst observations that are similar in almost every relevant category, except in how they elect their legislatures. Their approach, however, deviates in terms of the *level* in which the Y_t(u) and Y_c(u) elect their legislatures. Plus, the uniqueness of their design makes it impossible to replicate. In all, combined with the fact that *measuring* contamination was not always a main objective in every study mentioned in this section, it is clear that the *Difference Approach* needs additional work in terms of methodological consistency.

The Simulation Approach

Logic

As mentioned, mixed SMDs are ones that are treated by their interaction with the PR tier. Therefore, where the treatment (*t*) causes the effect Y_t(u) – Y_c(u), the mixed SMD becomes Y_t(u). However, because we cannot observe the value of Y_c(u), this approach uses observations from a *simulated* pure SMD in its stead. In this way, Y_t(u) – Y_c(u) represents the difference between the number of parties that the mixed SMD *actually* produces, and the number of parties that would *perhaps* have been produced if it had run under majoritarian rules. In this scenario, as with the *Difference Approach*, contamination could be revealed within the difference between Y_t(u) – Y_c(u) (i.e., the treatment effect).

Use

Hainmueller and Kern (2008) used a regression-discontinuity design to measure the effects that party and legislator incumbency had on "spillover effects" in Germany[12]. They assumed that "if voters reward incumbents for good district service", then popular incumbents could "attract additional PR votes to their parties" (Hainmueller and Kern, 2008). Simply put, the treatment was incumbency, and "assignment to treatment [was] a deterministic function of

[12] Per the paper, whereas Thistlethwaite and Campbell (1960) were the first to use a regression-discontinuity design, Lee (2008) was the first to use it in electoral studies. In all, they selected it over "conventional regression models" because "it is not sensitive to omitted variables" and "it mimics a randomized experiment in this respect" (Hainmueller and Kern, 2008).

whether a party's margin of victory[13] in the previous election [exceeded] 0". Results showed that incumbency increased SMD vote shares between 1.5% and 1.9%, but had a more "sizeable" positive effect on the PR side. Subsequently, they calculated how seat distribution would have looked like "in the absence of spillover" (Hainmueller and Kern, 2007). Y_t(u) was created using a function that took the actual results from both arenas, and the Y_c(u) simulation was created using one that took "the original vote counts for all parties in the SMD tier at *t* – 1, in order to determine the incumbent party in each district. Then, [it took the] PR vote counts in the election at time *t* and [redistributed] them, with the incumbent party losing votes according to [the] spillover effect estimates for the [two strongest parties][14]. These votes [were] then re-allocated to all other parties in the same district having positive vote shares (so parties that received zero votes [did] not receive any additional votes)" (Hainmueller and Kern, 2007: 4). Ultimately, spillover effects were strong enough to shift between 10 and 15 seats in the parliament.

Lago and Martínez (2007) looked at a "coordination dilemma" in Spain's upper and lower houses, which operate "simultaneously using significantly different rules". Concretely, they tested whether both systems operated independently from one another, or if there was any interaction. To do so, they compared actual ENP levels to those from a counterfactual simulation – or Y_t(u) and Y_c(u), respectively. This simulation was created using an equation offered by Taagepera and Shugart (1993), where N equalled 2.15 $M^{3/16}$ (M = district magnitude). Per the authors, the formula "[calculates] the effective number of parties nationwide as a function of district magnitude alone (i.e., in a pure Duvergerian world)" (Lago and Martínez, 2007). Finally, a regression analysis revealed evidence of contamination effects between both systems, even though Duvergerian behaviour could not be discarded altogether.

---

[13] For the winning party, margin of victory was the difference between its vote share and that of the first loser. For the others, it was the difference between the winner's vote share and their own. The former was given positive values and the latter was negative. The threshold was zero.

[14] The authors focused on Germany's two strongest parties: The SDP and the CDU/CSU. The reason was that, even though small parties received a share of the vote, estimating incumbency effects was not possible because "they never win district seats" (Hainmueller and Kern, 2008). For further evidence of incumbency and spillover effects see Kang, Park, Song (2018).

A Duvergerian Baseline and a Simulation of Duvergerian Gravity

Laakso and Taagepera

$$\text{ENP} = \frac{1}{\sum_{i=1}^{n} p_i^2}$$

Taagepera and Shugart

N = 2.15 $M^{3/16}$

(*Where M is the mean district magnitude*)

Rich, Banerjee, and Recker (2014) tested whether Lesotho's elections in 2002, 2007, and 2012 were consistent with "the contamination thesis". To do so, they calculated the ENP for both the national and district levels, and compared them to the two-party scenario expected by Duverger's Law – or $Y_t(u)$ and $Y_c(u)$, respectively. At the national level, they extended the sample of ENP to include all elections after independence in 1966 (including non-mixed elections), and determined that Duverger's Law held when the ENP fell "under three" (Rich, Banerjee, and Recker, 2014). At the district level, however, he used Nagayama triangles[15] to "graph and evaluate Duvergerian expectations". Results showed that the ENP for the district elections tended to disperse away from the top tip of the triangle (i.e., to have "viable candidates beyond the top two"), thus confirming contamination (Rich, Banerjee, and Recker, 2014).

Maškarinec (2018) used Hungary's 2014 mixed elections and compared them to two simulated Duvergerian thresholds using ENP levels. The first was from Taagepera (2007), who submitted that ENP levels between 1.5 and 2.5 were consistent with Duverger's Law. The second was from Chhibber and Kollman (2004), who argued that ENP levels above 2.5 were inconsistent with Duverger's Law. Each of these thresholds posed as an $Y_c(u)$ of sorts. Therefore, because the (real) mean ENP level was 3.10, with only one district falling between 2.01 and 2.50, contamination effects were said to exist somewhere between the weighted results (i.e., 3.10) and the selected Duvergerian range. A further calculation of Cox's SF ratio and Singer's TF ratio (in which an approach to zero

[15] It is a tool designed by Nagayama (1997) to graph candidate strength in SMDs. Per Taagepera (2004: 301), the left side of the triangle "denotes perfect parity of the top two contestants, while its right side denotes the dominance of the strongest contestant over a single opponent. At the peak, the two contestants have equal strength, and there are no others. The left corner area of the triangle corresponds to the presence of multiple contestants"

is consistent with Duverger's Law, and an approach to one is not[16]), offered additional empirical support to the results.

Limitations

In electoral studies, replacing Y_c(u) with a simulation is relatively common (see Lijphart et al., 1986; Christensen and Johnson, 1995; Gabel, 1995; Ellis, 1999; Baker and Scheiner, 2007; Raymond, 2015; Eggers and Lauderdale, 2016), but *not* when it pertains to measuring contamination. The studies in this section do aim to measure contamination effects directly, but beyond a general pattern of using a Y_t(u) and Y_c(u) approach, they differ in almost everything else. Hainmueller and Kern (2008), for instance, measured contamination using a regression discontinuity design and a particular type of simulation. Such a design certainly benefits from an as-if random assignment, and there being no need to include controls[17]. However, aside from it being a strong design that shows that incumbency is, in fact, a source of spillover effects in Germany, it is not representative of the entire population and it cannot be extrapolated for external validity. Lago and Martínez (2007), on the other hand, measured contamination using the difference between ENP levels in a "real Spain" and a "simulated Duvergerian Spain". But while they used a Y_t(u) and Y_c(u) approach, it was in the context of a pure PR system; and they built their simulation using a specific formula offered by Taagepera and Shugart (1993).

Additionally, Rich, Banerjee, and Recker (2014) relied on a very general Y_c(u), as it ranged anywhere between 2 and 3 ENP. And while the Nagayama triangles helped distinguish patterns between two- and multi-party competitions, it did not reveal their causes. In other words, even if there was multi-party

[16] Maškarinec (2018) selected Cox's SF-ratio, for example, in order to obtain "insight into the electoral behaviour at the lowest level of aggregation" as well as "the various degrees of strategic defection from less competitive to more competitive districts across SMDs" (see Moser and Scheiner, 2009).

[17] Per Hainmueller and Kern (2008), "the complication that makes the interpretation of prior results ambiguous is the possibility that there exists some unobserved Z that we cannot control for. Since Z is likely to be correlated with MV, estimates of β tend to be biased. For the RD design, in contrast, local random assignment ensures that our estimate of β is unconfounded at the threshold, and we do not need to control for any covariates. Just as in randomized experiments, the inclusion of covariates should not appreciably affect our estimates of β (apart from increasing their precision)."

competition, contamination (i.e., the inflation of ENP as a result of the interaction between the SMD and PR tiers) was not actually measures. Similarly, Maškarinec (2018) was thorough in his use of various baseline measures (i.e., the ENP, the SF ratio, and the TF-ratio), but vague in defining Y_c(u) (as it ranged anywhere between 1.5 and 2.5 ENP).

The Likeness Approach

Logic

This approach compares mixed SMDs amongst themselves – often in large-N analyses. These are conducted considering their differences in terms of, for example, their formulaic structures, their levels of linkage, thresholds, or their use of (un)fused ballots. In other words, the approach focuses on observing *the conditions* under which party system size shows any variation. In these scenarios, the counterfactuals – i.e., the Y_c(u) – are not always neatly defined. Instead, Y_t(u) is often compared to general notions of Duvergerian gravity or to what is typically observed in pure scenarios.

Use

Ferrara (2004) analyzed tier interaction in Italy's 1994 and 1996 elections. Specifically, he assumed that Italy's mixed SMD tier behaved as a pure SMD system and produced a Duvergerian equilibrium. The dependent variable was an adjusted version of ENP offered by Taagepera (1997), which revealed a mean ENP outcome of 3.12 for the election in 1994, and of 2.43 for the election in 1996. He argued that the former did not actually indicate contamination, but an "inability to effectively aggregate in two major blocks" due to inexperience (since it was the first election under the new mixed system) (Ferrara, 2004). The second one, he argued, offered more accurate proof that Italy's mixed SMD was consistent with Duverger's Law[18]. However, while Y_t(u) was the selected version of ENP, Y_c(u) was an unspecified version of a Duvergerian counterfactual. In fact, he "confirmed" Duverger's Law using Cox's (1997) SF ratio, where a result closer to 0 indicates a Duvergerian equilibrium, and a result closer to 1 indicates the opposite. Ultimately, results supported his hypothesis.

[18] As well as with findings by Reed (2001).

Adjusted version of ENP[19]

$$\frac{p^2}{RP_L + \sum p_i^2} \quad \text{and} \quad \frac{p^2}{R + \sum p_i^2}$$

Ferrara and Herron (2005) sought to reveal the conditions under which mixed systems "[encouraged] the proliferation of SMD candidacies". To this end, they took one SMD election from multiple mixed countries and divided them into MMP and MMM systems. They ran both Poisson and OLS models using two unique dependent variables[20]: the first helped "identify the kinds of mixed systems that… encourage parties to run candidates in as many districts as possible, [or] to forego the PR vote boost generated by 'go it alone' strategies in SMD" (Ferrara and Herron, 2005). The second helped "[measure] coordination more directly by considering the number of candidacies relative to the number of parties taking part in the election" (Ferrara and Herron, 2005). Their explanatory variables considered the effects of single and dual ballot systems; seat linkage; percentage of SMD seats; PR threshold; PR district magnitude; if mixed systems had replaced pure PR systems; post-communism; district marginality; as well as incumbency. Ultimately, they found that the "institutional features of mixed systems [generated] outcomes that [differed] from those generally observed under 'pure' SMD and PR" (Ferrara and Herron, 2005).

Ferrara's (2006) subsequent study on Italy's mixed system is another good example. At the time, Italy had a single-ballot system for electing the Senate and a dualballot system for electing the Chamber of Deputies. His study of the 1994, 1996, and 2001 elections addressed "the impact of ballot structure" and "the interaction between the SMD and PR components" (Ferrara, 2006). He ran a series of OLS models using dispersed vote, single ballot, PR district magnitude,

---

[19] Where *P* is the total number of valid votes, P_i is the total number of votes received by party *i*, P_L is the number of votes received by the smallest party still listed as separate from 'Other', and *R* is the number of votes in the category 'Other'.

[20] First, they measured pre-electoral coordination by counting "the candidates participating in an SMD race who are affiliated with a party that ran a list in the PR component" (Ferrara and Herron, 2005). Secondly, they "[calculated], for each SMD in [the] sample, the average number of parties supporting each candidate by dividing the number of parties running lists in the corresponding PR constituency by the total number of candidates participating in the SMD race" (Ferrara and Herron, 2005).

incumbency, and average coalition size to explain the absolute number of candidates and the ENP[21]. He found a "substantially" higher number of candidates in single-ballot SMD arenas compared to dual-ballot SMD arenas. Moreover, he found that, in single-ballot mixed systems, SMDs had a higher number of candidates when PR district magnitude increased. In all, he concluded that "SMD and PR components of single-ballot mixed systems [produce] incentives that are different from those that parties and voters face under SMD, PR, and dual-ballot systems" (Ferrara, 2006).

Krauss, Nemoto, and Pekkanen (2011) study of Japan and New Zealand dealt with the effects of PR list ranking on SMD performance[22]. In other words, with how voters may interpret a candidate's ranking on a PR list as a signal of their worth within the party, which could, in turn, affect their voting in the SMD tier. Specifically, they assumed that being low-ranked in the PR tier, or not being dual-listed at all, would significantly increase a candidate's SMD performance. This was found to be true in Japan's MMM system, where candidates "burned their bridges" with the PR tier in order to "spur [SMD] voters" and increase their shares between 2% and 7% (Krauss, Nemoto, and Pekkanen, 2011). Additionally, they assumed that being dual-listed and highly-ranked in the PR tier would lead to a better performance in the SMD tier. This was found to be true in New Zealand, where SMD performance improved between 1% and 13% compared to "pure SMD candidates" (Krauss, Nemoto, and Pekkanen, 2011). In both cases, the comparisons were made between candidates that competed in both tiers and those that only competed in SMDs alone – or Yt(u) and Yc(u), respectively. Ultimately, their different levels of linkage were found to be paramount.

Riera (2012) was "particularly interested in distinguishing [MMP] from [MMM] systems". Specifically, in how seat-linkage and democratic experience

[21] The absolute number of candidates is "the number of candidates who competed in the election in a particular district" (Ferrara, 2006). He uses the ENP measure in other hypotheses, which focus on proving that ENP increases as PR destring magnitude increases; or that vote share for small-party candidates also increases as PR district magnitude increases.

[22] They refer to this phenomenon as "reverse contamination" (Krauss, Nemoto, and Pekkanen, 2011).

affected ENP levels in mixed SMDs, and how those levels held against Duverger's Law. To this end, he calculated ENP levels from fifty-seven mixed elections in fifteen different countries[23], and ran various Poisson and hierarchical linear models using the following explanatory variables: MMM systems; district marginality; democratic age; and presidential and semi-presidential systems. Additionally, he controlled for the winner's performance in the election prior; ethnic fragmentation; the existence of popularly elected heads of state; the decentralization of political power; federal systems; and second order elections. Results showed that Duverger's Law held only under certain conditions. Coordination in young democracies, for example, differed from coordination in old ones given the initial lack of information in the former. Moreover, linked systems were found to have the potential for eventual coordination.

Rich (2015) also tested "the conditions in which Duverger's Law may not hold in mixed systems, rather than assuming an inherent yet unmeasured contamination". He calculated the effective number of candidates (ENC) (a measure similar to ENP) from ninety mixed elections in twenty-three countries, and tested how fused ballots, entry thresholds, and compulsory voting affected party fragmentation. He also considered the effects of d'Hondt formulas; chamber size; ethnic fractionalization; directly elected presidents; post-communist countries; freedom levels; the number of mixed elections; bicameralism; federalism; and the use of regional or national PR lists. After running four different models[24], he found that MMM systems "[correlated] with fewer district candidates"; fused ballots and compulsory voting laws "[had] a larger substantive influence in the opposite direction"; and "the structure of the PR list [had an influence over] its contaminative effects" (Rich, 2015).

[23] Five countries used MMM systems; two used partially compensatory MMM systems; and six used non-compensatory MMM systems.

[24] He ran an OLS model, a RE-GLSE, a Poisson model, and a mixed effects hierarchical model. The objective was to show that "party system fragmentation [would] be higher in systems with SMD-PR linkage mechanisms than in elections conducted under MMM rules" (Rich, 2015)

Banerjee and Rich (2016) tested whether Mexico was an outlier amongst mixed systems *vis-à-vis* Duverger's Law[25]. Specifically, whether institutional factors – in this case, fused ballots and compulsory voting – "[explained] Mexico's deviance or whether the country's complexity [required] additional attention before inclusion in cross-national studies" (Banerjee and Rich, 2016). To this end, they used ENC data from eight Mexican elections and compared them to a dataset of ninety mixed elections in twenty-five countries. They considered "the same major institutional variations within and co-existing with mixed systems" used by Rich (2015), but added a dummy variable for Mexico. In this way, "if institutional factors explain Mexico's perceived divergence, the dummy variable should lack statistical and substantive significance" (and vice versa). A first hierarchical model revealed that the Mexico variable was, in fact, significant. However, this was no longer the case once a subsequent model controlled for fused ballots and compulsory voting laws. This[26] confirmed their hypothesis that Mexico is *not*, in fact, an outlier.

Limitations

In both of his studies on Italy, Ferrara (2004, 2006) considered the possibility of the size of the party system varying due to learning processes. However, even though he calculated a version of the ENP, he "confirmed" contamination using Cox's (1997) SF ratio; which, as covered above, presents important limitations. It is biased towards large parties enough to reject a non-Duvergerian equilibrium in scenarios where, for example, an SMD with three candidates obtains 90%, 5%, and 5%, respectively (see Plescia, 2018). Evidently, results should be treated with considerable caution. The second study, on the other hand, did not consider the effect of mixed systems themselves. Instead, he compared the difference between two versions of mixed systems from two different chambers.

[25] Classifying Mexico amongst mixed systems has been the subject of much debate, given its country-specific context and characteristics. Banerjee and Rich considered the debates in Reynolds and Reilly (1997), Massicotte and Blais (1999), and Shugart and Wattenberg (2001).

[26] An additional test including graphing the weighted results on Nagayama triangles.

Furthermore, Ferrara and Herron (2005) used two unique dependent variables, and relied exclusively on one mixed election per country (not accounting for any possible variation caused by learning processes). Krauss, Nemoto, and Pekkanen (2011) used SMD performance as their main independent variable, and focused on how rank in the PR tier affected voting in the SMD tier. In other words, they were concerned with a type of contamination that did not involve the consequences on the number of parties. Rich (2015) and Banerjee and Rich (2016) used the measure of ENC (and not ENP) as their dependent variable. Even if appropriate for their particular cases, their use of ENC cannot not be properly extrapolated and re-applied elsewhere, precisely because it "aggregates all candidates beyond the top two as a third party" (Banerjee and Rich, 2016). As they admit, the ENC cannot identify if divergence with Duverger's Law is due to a large-enough third party or various smaller contestants.

In all, these studies used different counting techniques; different dependent variables; different controls; and different methodologies altogether. Also, none of them used an exact $Y_c(u)$ as their point of comparison. They compared $Y_t(u)$ to those "generally observed under 'pure' SMD and PR" (Ferrara and Herron, 2005), or to general notions of Duverger's Law. Rich, for example, expected Duverger's Law to hold if ENP levels fell "near two" (Rich, 2015). In other words, while they revealed that there should be contamination within those differences, contamination was not exactly measured. The vagueness regarding the required parameters (i.e., $Y_t(u)$ - $Y_c(u)$ calculations with no certainty about the correct starting points), therefore, prevented any answers to the question of *how much contamination is there, exactly?*

Conclusion

It is clear, from the above, that even though the data is crucial, "the content is the method" (King, Keohane, and Verba, 1994)[27]. In the case of contamination

[27] King, Keohane, and Verba (1994) refer to Pearson's (1892) assertion that "the field of science is unlimited; its material is endless; every group of natural phenomena; every phase of social life; every stage of past or present development is material for science. The unity of all science consists alone in its method, not in its material".

studies, it is best to think of measurement techniques in terms of counterfactual analysis – imperfect as it may be (see Weber, 1905; King, Keohane, and Verba, 1994). In all, this paper arrives at two main conclusions. First, that even within each of the three approaches (which use similar data), there is a wide variety of measurement techniques. This variety pertains to the use of different cases; different use of data; different dependent and independent variables; different statistical models; and even different research objectives altogether. Naturally, these inconsistencies lead to widely disparaging answers to the question: *contamination raises the number of parties, but by how much, exactly?*

Second, because contamination studies are interested in knowing how the size of the mixed party system would have looked like if it had run under pure system rules, it would be beneficial to re-frame contamination studies within what Holland (1986) called "Rubin's model for causal inference". In other words, into the $Y_t(u)$ - $Y_c(u)$ approach where the former is replaced with weighted data from mixed systems, and the latter is replaced with weighted data from pure systems, simulations of pure systems, or other mixed systems. In this way, the difference between both observations (provided proper controls) should encapsulate the treatment, or contamination effects. But, most importantly, a clearer methodological frame would allow the study of contamination to be honed into a less heterogeneous (and more useful) space.

Finally, it can be argued that another way of identifying why parties choose to enter or withdraw from an electoral contest (thereby increasing or decreasing the number of parties in a system) is by *asking* them directly. Guinjoan (2014), for example, conducted in-depth interviews with national and sub-national party strategists in Canada and Spain[28] to determine why "parties either took a Duvergerian or non-Duvergerian strategy when facing a context of non-viability". These interviews revealed that the "overlap" of national and sub-national arenas affected parties' decisions to compete or withdraw. The same logic could, and perhaps *should* be applied to mixed electoral systems. Any of the aforementioned quantitative tests could certainly benefit from the support of

[28] Spain uses a pure PR system, and Canada uses a pure FPTP system.

qualitative methods, because they share the same scientific “logic of inference” (King, Keohane, and Verba, 1994) that could increase the validity of future findings in contamination studies.

Bibliography

Amorim Neto, O., & Cox, G. W. (1997). Electoral institutions, cleavage structures, and the number of parties. *American Journal of Political Science, 41*, 149-174.

Ansolabehere, S., Snyder, J. M., & Stewart, C. (2000). Old Voters, New Voters, and the Personal Vote: Using Redistricting to Measure the Incumbency Advantage. *American Journal of Political Science, 44*(1), 17-34.

Baker, A., & Scheiner, E. (2007). Electoral system effects and ruling party dominance in Japan: A counterfactual simulation based on adaptive parties. *Electoral Studies, 26*(2), 477-491.

Banerjee, V., & Rich, T. S. (2016). District level competition in Mexico’s chamber of deputies: an embedded analysis. *Journal of Elections, Public Opinion and Parties, 26*, 412-422.

Best, R. E., & Lem, S. B. (2011). Electoral volatility, competition and third-party candidacies in US gubernatorial elections. *Party Politics, 17*(5), 611-628.

Bielasiak, J. (2002). The Institutionalization of Electoral and Party Systems in Postcommunist States. *Comparative Politics, 34*(2), 189-210.

Bochsler, D. (2009). Are Mixed Electoral Systems the Best Choice for Central and Eastern Europe or the Reason for Defective Party Systems? *Politics & Policy, 37*(4), 735-767.

Bormann, N.-C., & Golder, M. (2013). Democratic Electoral Systems Around the World, 1946-2011. *Electoral Systems*, 360-369.

Brambor, T., Clark, W. R., & Golder, M. (2007). Are African party systems different? *Electoral Studies, 26*(2), 315-323.

Brinegar, A., Morgenstern, S., & Nielson, D. (2006). The PRI's Choice: Balancing Democratic Reform and its Own Salvation. *Party Politics, 12*(1), 77-97.

Calvert, R. L., & Ferejohn, J. A. (1983). Coattail Voting in Recent Presidential Elections. *American Political Science Association, 77*(2), 407-419.

Campbell, J. E. (1986). Predicting Seat Gains from Presidential Coattails. *American Journal of Political Science, 30*(1), 165-184.

Cantu, F., & Desposato, S. (2012). The New Federalism of Mexico's Party System. *Journal of Politics in Latin America, 4*(2), 3-38.

Chhibber, P., & Kollman, K. (2008). *The Formation of National Party Systems: Federalism and Party Competition in Canada, Great Britain, India, and the United States.* Princeton: Princeton University Press.

Christensen, R. V., & Johnson, P. E. (1995). Toward a Context-Rich Analysis of Electoral Systems: The Japanese Example. *American Journal of Political Science, 39*(3), 575-598.

Clark, W. R., & Golder, M. (2006). Rehabilitating Duverger's theory: Testing the mechanical and strategic modifying effects of electoral laws. *Comparative Political Studies, 35*(9), 1027-1053.

Cox, G. W. (1994). Strategic Voting Equilibria Under the Single Nontransferable Vote. *The American Political Science Review, 88*(3), 608-621.

Cox, G. W. (1999). Electoral Rules and Electoral Coordination. *Annual Review of Political Science, 2*(1), 145-161.

Cox, G. W. (2012). *Making Votes Count: Strategic Coordination in the World's Electoral Systems.* Cambridge: Cambridge University Press.

Cox, G. W., Rosenbluth, F. M., & Thies, M. F. (2000). Electoral Rules, Career Ambitions, and Party Structure: Comparing Factions in Japan's Upper and Lower Houses. *American Journal of Political Science, 44*(1), 115-122.

Cox, K. E., & Schoppa, L. J. (2002). Interaction Effects in Mixed-Member Electoral Systems: Theory and Evidence From Germany, Japan, and Italy. *Comparative Political Studies, 35*(9), 1027-1053.

Crisp, B. F. (2007). Incentives in Mixed-Member Electoral Systems: General Election Laws, Candidate Selection Procedures, and Cameral Rules. *Comparative Political Studies, 35*(9), 1460-1485.

Crisp, B. F., Potter, J. D., & Lee, J. J. (2012). Entry and Coordination in Mixed-Member Systems: A Controlled Comparison Testing the Contamination Hypothesis. *The Journal of Politics, 74*(2), 571-583.

Duch, R. M. (2001). A Development Model of Heterogenous Economic Voting in New Democracies. *American Political Science Review, 98*, 895-910.

Dunleavy, P., & Boucek, F. (2003). Constructing the Number of Parties. *Party Politics, 9*(3), 291-315.

Duverger, M. (1954). *Political Parties: Their Organization and Activity in the Moern State.* New York: Wiley.

Eggers, A. C., & Lauderdale, B. E. (2016). Simulating Counterfactual Representation. *Political Analysis, 24*(2), 281-290.

Ellis, A. (1999). Indonesia: Continuity, Deals and Consensus. En A. Reynolds, B. Reilly, & A. Ellis, *Electoral System Design: The New International IDEA Handbook* (págs. 45-49). Stockholm: International IDEA.

Fauvelle-Aymar, C., & Lewis-Black, M. S. (2008). TR versus PR: Effects of the French double ballot. *Electoral Studies, 27*(3), 400-406.

Fearon, J. (2003). Ethnic and cultural diversity by country. *Journal of Economic Growth, 8*(2), 195-222.

Ferrara, F. (2004). Electoral coordination and the strategic desertion of strong parties in compensatory mixed systems with negative vote transfers. *Electoral Studies, 23*(3), 391-413.

Ferrara, F. (2006). Two in one: Party competition in the Italian single ballot mixed system. *Electoral Studies, 25*(2), 329-359.

Ferrara, F., & Herron, E. S. (2005). Going It Alone? Strategic Entry under Mixed Electoral Rules. *American Journal of Political Science, 49*(1), 16-31.

Ferrara, F., Herron, E. S., & Nishikawa, M. (2005). *Mixed Electoral Systems: Contamination and its Consequences.* New York: Palgrave Macmillan.

Filippov, M. G., Ordeshook, P. C., & Shvetsova, O. V. (1999). Party Fragmentation and Presidential Elections in Post-Communist Democracies. *Constitutional Political Economy, 10*(1), 3-26.

Flemming, G. N. (1995). Presidential Coattails in Open-Seat Elections. *Legislative Studies Quarterly, 20*(2), 197-211.

Gabel, M. J. (1995). The Political Consequences of Electoral Laws in the 1990 Hungarian Elections. *Comparative Politics, 27*(2), 205-214.

Gallego, A., Rico, G., & Anduiza, E. (2012). Disproportionality and voter turnout in new and old democracies. *Electoral Studies, 31*, 159-169.

Golder, M. (2006). Presidential coattails and legislative fragmentation. *American Journal of Political Science, 50*(1), 34-48.

Golosov, G. V. (2009). The Effective Number of Parties: A New Approach. *Party Politics, 16*(2), 171-192.

Gschwend, T. (2008). Studying Contamination Effects in Multi-Level Systems of Governance: First Thoughts about Hypothesis and Research Data. En C. van der Eijk, & H. Schmitt, *The Multilevel Electoral System of the EU* (págs. 229-240). Mannheim: CONNEX Report Series.

Guinjoan, M. (2014). *Parties, Elections and Electoral Contests: Competition and Contamination Effects.* London: Routledge.

Hainmueller, J., & Kern, H. L. (2007). *Incumbency as a Source of Spillover Effects in Mixed Electoral Systems: Evidence from a Regression-Discontinuity Design (Web Supplement).* Recuperado el 15 de September de 2018, de Stanford.edu: http://web.stanford.edu/~jhain/Paper/ES2008Sup.pdf

Hainmueller, J., & Kern, H. L. (2008). Incumbency as a source of spillover effects in mixed electoral systems: Evidence from a regression-discontinuity design. *Electoral Studies, 27*, 213-227.

Herron, E. S., & Nishikawa, M. (2001). Contamination effects and the number of parties in mixed-superposition electoral systems. *Electoral Studies, 20*(1), 63-86.

Holland, P. W. (1986). Statistics and Causal Inference. *Journal of the American Statistical Association, 81*(396), 945-960.

IDEA. (2018). *Electoral System Design Database.* Obtenido de International Institute for Democracy and Electoral Assistance: https://www.idea.int/data-tools/question-view/130355

Johnston, R. J., & Pattie, C. J. (2002). Campaigning and split-ticket voting in new electoral systems: the first MMP elections in New Zealand, Scotland and Wales. *Electoral Studies, 21*(4), 583-600.

Jones, M. P. (1999). Electoral laws and the effective number of candidates in presidential elections. *Journal of Politics, 61*(1), 171-184.

Kerevel, J. (2010). The Legislative Consequences of Mexico's Mixed-Member Electoral System, 2000-2009. *Electoral Studies, 29*(4), 691-703.

Kesselman, M. (1966). French Local Politics: A Statistical Examination of Grass Roots Consensus. *American Political Science Review, 60*, 963-973.

King, G., Keohane, R. O., & Verba, S. (1994). *Designing Social Inquiry: Scientific Inference in Qualitative Research.* Princeton: Princeton University Press.

Klesner, J. (2005). Electoral Competition and the New Party System in Mexico. *Latin American Politics and Society, 47*(2), 103-142.

Klesner, J. (2007). The 2006 Mexican Elections: Manifestation of a Divided Society? *Latin American Politics and Society, 47*(2), 17-32.

Kostadinova, T. (2002). Do Mixed Electoral Systems Matter? A Cross-National Analysis of Their Effects in Eastern Europe. *Electoral Studies, 21*(1), 23-34.

Lago, I. (2017). The psychological effect of electoral systems in founding elections. *Party Politics*.

Lago, I., & Martínez i Coma, F. (2012). Forgetting to make votes count: The role of previous democratic experience. *Electoral Studies, 31*(2), 413-421.

Lago, I., & Martínez, F. (2007). The importance of electoral rules: Comparing the number of parties in Spain's Lower and Upper Houses. *Electoral Studies, 26*, 381-391.

Lee, D. S. (2008). Randomized experiments from non-random selection in U.S. house elections. *Journal of Econometrics, 142*(2), 675-697.

Lijphart, A. (1994). Democracies: Forms, Performance, and Constitutional Engineering. *European Journal of Political Research, 25*(1), 1-17.

Lijphart, A., López Pintor, R., & Sone, Y. (1986). The Limited Vote and the Single Nontransferable Vote: Lessons from the Japanese and Spanish Examples. En B. Grofman, & A. Lijphart, *Electoral Laws and Their Political Consequences.* New York: Agathon Press.

Lipset, S. M., & Rokkan, S. (1967). *Party systems and voter alignments: cross-national perspectives.* New York: Free Press.

Maeda, K. (2008). Re-examining the contamination effect of Japan's mixed electoral system using the treatment-effects model. *Electoral Studies, 27*(4), 723-731.

Mainwaring, S., & Shugart, M. S. (1997). *Presidentialism and democracy in Latin America.* Cambridge: Cambridge University Press.

Mainwaring, S., & Zoco, E. (2007). Political Sequences and the Stabilization of Interparty Competition: Electoral Volatility in Old and New Democracies. *Party Politics, 13*(2), 155-227.

Maškarinec, P. (2018). Strategic Voting in the Hungarian Elections of 2014: Evidence for Duverger's Law under the Compensatory Mixed Electoral System? *Studia Politica, 18*(1), 9-34.

Massicotte, L., & Blais, A. (1999). Mixed Electoral Systems: A Conceptual and Empirical Survey. *Electoral Studies, 18*(3), 341-366.

Miller, W. E. (1955). Presidential Coattails: A Study in Political Myth and Methodology. *Public Opinion Quarterly, 19*(4), 353-368.

Molinar Horcasitas, J., & Weldon, J. A. (2003). Reforming Electoral Systems in Mexico. En M. S. Shugart, & M. P. Wattenberg, *Mixed-Member Electoral Systems: The Best of Both Worlds?* Oxford University Press.

Molinar, J. (1991). Counting the Number of Parties: An Alternative Index. *American Political Science Review, 85*(4), 1383-1391.

Moser, R. G., & Scheiner, E. (2004). Mixed electoral systems and electoral system effects: controlled comparison and cross-national analysis. *Electoral Studies, 23*, 575-599.

Moser, R. G., & Scheiner, E. (2009). Strategic voting in established and new democracies: Ticket splitting in mixed-member electoral systems. *Electoral Studies, 1*, 51-61.

Nishikawa, M., & Herron, E. S. (2004). Mixed electoral rules' impact on party systems. *Electoral Studies, 23*(4), 753-768.

Ordeshook, P. C., & Shvetsova, O. V. (1994). Ethnic Heterogeneity, District Magnitude, and the Number of Parties. *American Journal of Political Science, 38*(1), 100-123.

Pearson, K. (1892). *The Grammar of Science.* London: Dover Publications.

Przeworski, A., Álvarez, M. E., Cheibub, J. A., & Limongi, F. (2000). *Democracy and development: Political institutions and wellbeing in the world, 1950-1990.* New York: Cambridge University Press.

Raymond, C. D. (2015). In defiance of Duverger: The class cleavage and the emergence of district-level multiparty systems in western Europe. *Research and Politics*, 1-8.

Reif, K., & Schmitt, H. (1980). Nine second-order national elections: A conceptual framework for the analysis of European election results. *European Journal of Political Research, 8*(1), 3-44.

Remington, T. F., & Smith, S. S. (1996). Political Goals, Institutional Context, and the Choice of an Electoral System: The Russian Parliamentary Election Law. *American Journal of Political Science, 40*(4), 1253-1279.

Remmer, K. L. (1991). The Political Impact of Economic Crisis in Latin America in the 1980s. *American Political Science Review, 85*(3), 777-800.

Reynolds, A., & Reilly, B. (1997). *The International IDEA Handbook of Electoral System.* Stockholm: International IDEA.

Rich, T. S. (2015). Duverger's Law in mixed legislative systems: The impact of national electoral rules on district competition. *European Journal of Political Research, 54*, 182-196.

Riera, P. (2012). Electoral coordination in mixed-member systems: Does the level of democratic experience matter? *European Journal of Political Research, 52*(1), 119-141.

Roberts, K. M., & Wibbels, E. (1999). Party Systems and Electoral Volatility in Latin America: A Test of Economic, Institutional, and Structural Explanations. *American Political Science Review, 93*(3), 575-590.

Sartori, G. (1976). *Parties and Party Systems: A Framework for Analysis.* Cambridge: Cambridge University Press.

Selb, P. (2012). Strategic adaptation to new electoral systems. *European Journal of Political Research*(51), 583-606.

Shugart, M. S., & Carey, J. M. (1992). *Presidents and assemblies: Constitutional design and electoral dynamics.* Cambridge: Cambridge University Press.

Shugart, M. S., & Wattenberg, M. P. (2003). Introduction: The Electoral Reform of the Twenty-First Century. En M. S. Shugart, & M. P. Wattenberg, *Mixed-Member Electoral Sytems: The Best of Both Worlds?* Oxford University Press.

Shugart, M. S., & Wattenberg, M. P. (2003). Mixed-member electoral systems: A definition and typology. En M. S. Shugart, & M. P. Wattenberg, *Mixed-member electoral systems: The best of both worlds?* Oxford: Oxford Scholarship Online.

Singer, M. M. (2013). Was Duverger Correct? SingleMember District Election Outcomes in Fifty-three Countries. *British Journal of Political Science, 43*(1), 201-220.

Smets, K., & van Ham, C. (2013). The embarrassment of riches? A meta-analysis of individual-level research on voter turnout. *Electoral Studies, 32*(2), 344-359.

Taagepera, R., & Shugart, M. S. (1989). *Seats and Votes: The Effects and Determinants of Electoral Systems.* New Haven: Yale University Press.

Taagepera, R., & Shugart, M. S. (1993). Predicting the number of parties: a quantitative model of Duverger's mechanical effect. *American Political Science Review, 87*, 455-464.

Tavits, M. (2005). The Development of Stable Party Support: Electoral Dynamics in Post-Communist Europe. *American Journal of Political Science, 49*(2), 283-298.

Tavits, M. (2007). Principle vs. pragmatism: Policy shifts and political competition. *American Journal of Political Science, 51*(1), 151-165.

Tavits, M., & Annus, T. (2006). Learning to make votes count: the role of democratic experience. *Electoral Studies, 25*(1), 72-90.

Thames, F. C., & Edwards, M. S. (2006). Differentiating Mixed-Member Electoral Systems: Mixed-Member Majoritarian and Mixed-Member Proportional Systems and Government Expenditures Government Expenditures. *Comparative Political Studies, 39*(7), 905-927.

Thistlethwaite, D. L., & Campbell, D. T. (1960). Regression-discontinuity analysis: An alternative to the ex post facto experiment. *Journal of Educational Psychology, 51*(6), 309-317.

Vowels, J. (2010). Electoral system change, generations, competitiveness and turnout in New Zealand, 1963-2005. *British Journal of Political Science, 40*, 875-895.

Weber, M. (1905). Objective Possibility and Adequate Causation in Historical Explanation. En E. Shils, & H. Finch, *The Methodology of the Social Sciences* (págs. 164–188). Glencoe: Free Press.

Wildgen, J. (1971). The Measurement of Hyperfractionalization. *Comparative Political Studies, 4*, 233-243.

Wuhs, S. T. (2006). Democratization and the Dynamics of Candidate Selection Rule Change in Mexico. *Mexican Studies/Estudios Mexicanos, 22*(1), 33-56.