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Compulsory Voting: What Difference Can Increasing Turnout Make?

Keith Jakee*
Wilkes Honors College
Florida Atlantic University
5353 Parkside Dr.
Jupiter, FL 33458, USA
kjakee@fau.edu
Tel: (+1) 561-799-8131
Fax: (+1) 561-799-8576

Martin Kenneally
Centre for Policy Studies
University College Cork
Cork, IRELAND
m.kenneally@ucc.ie
Tel: (+353) 21-4902572
Fax: (+353) 21-4903658

**Corresponding Author*

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Abstract

Abstract: A number of previous studies have examined the effects of increasing voter turnout, but have yielded ambiguous results. Much of that debate centers on how preferences of voters differ from those of non-voters. We develop a general measure of the potential effects of increasing turnout that can encompass the entire range of assumptions concerning non-voters' preferences. Our "turnout competitiveness index" (*TCI*) and a related "elasticity rule" provide a measure of seat competitiveness that links voluntary voter support for candidates and abstention rates to the potential to alter expected electoral outcomes from increasing turnout alone. This analysis also allows us to create a distinction between what we call the traditional measure of "conventional swing" and our notion of "turnout swing." We analyze the properties of the *TCI* and then, using several stylized examples of competitiveness and turnout rates, we estimate the effects of increasing turnout on seat competitiveness by increasing turnout to 100%. We also demonstrate our analysis in an intuitive graphical form.

Keywords: compulsory voting, elasticity of vote share with respect to turnout, seat competitiveness, turnout competitiveness index, increasing voter turnout.

Introduction

Calls for the imposition of compulsory voting have been on the rise in recent years, presumably due to the perceived problems of low electoral turnout. While most of the interest is concentrated in academic circles, there have been a few policy-level undertakings, such as national commissions and the occasional legislative petition to implement compulsory voting for national elections. For example, the UK's Electoral Commission reported on the topic in 2006 after Labour Minister Geoff Hoon suggested that compulsory voting be seriously considered for UK elections (Birch, 2009: 145; Electoral Commission, 2006). In Canada, a Royal Commission on Electoral Reform and Party Financing examined, then rejected, the idea of introducing compulsory voting in 1991; however, a Senator Mac Harb (Liberal) introduced a bill to introduce compulsory voting in 2004 (Birch, 2009: 146). In France, a bill was introduced into the French Assemblée nationale following the 2002 presidential elections. While remarkable, both the Canadian and French bills were defeated (Birch, 2009: 146).

On the academic side, the "turnout problem" has compelled Lijphart (1997), for example, to condemn the lack of electoral participation among industrialized nations. He argues that enacting a compulsory voting rule (CVR) would make voting outcomes more representative of underlying community preferences. Hill suggests that compulsory voting can

> decisively remedy America's bad and worsening turnout problem and thereby close its gaping [socioeconomic status] voting gap; it can increase the salience of elections and make voting more rational and meaningful and it can enhance and protect such values as representativeness, legitimacy and political equality. It also has the potential to break the counterproductive cycle of low efficacy, alienation, non-participation and state neglect that has led to an increasingly moribund political culture. It may even limit some of the problems associated with campaign finance (2006: 228).

And, Birch argues that

> societal pressure is no longer capable of serving as the social glue that would enforce collective norms, so it may be necessary to rely on legal compulsion to achieve that end. …[And,] given that mandatory electoral participation will mean elections take account of the views of all, rather than the socio-demographically skewed selection of those who vote under voluntary schemes, the policies delivered by the resulting governments will more accurately reflect the needs of the entire population (2009: 138, 139).

In sum, proponents make extensive claims concerning CVR's capacity to remedy a range of perceived electoral flaws. In addition to simply increasing turnout, it is argued that CVRs can improve electoral "representativeness," "salience," "rationality," and "meaningfulness," while providing greater political "legitimacy," and "equality." While there a number of both positive and normative complications associated with such assertions, we focus in this paper on a more fundamental issue concerning forced turnout: under what conditions can a CVR alter expected election outcomes?

Employing a relatively straightforward model of a simple majority election with two candidates, we are able to show how turnout affects electoral outcomes, given initial parameters for expected vote shares and the percentage of eligible citizens that vote under a voluntary voting system. This model yields a convenient "turnout competitiveness index" (*TCI*) and a measure for "elasticity" of vote share with respect to turnout. Either of these indices provide a measure of the potential—from impossible to probable—for election results to be altered by simply moving from a VVR to a CVR.

The point of this exercise is driven by the presumption among the proponents of CVRs that mandatory turnout will better reflect underlying preferences and therefore be more "representative." If a CVR is unlikely to alter—or perhaps *cannot* alter—election outcomes, then the claim that the resulting electoral outcomes are somehow more representative of community preferences is considerably less salient.

Indeed, our analysis speaks to the much wider issue of turnout in general. Even though we couch our examples in the framework of 100% mandatory turnout imposed upon a system that is initially voluntary, this stringent assumption can be relaxed without any loss in generality. Our model is therefore able to provide a measure for potential electoral change resulting from any increase in turnout. We are thus able to shed light on the ongoing debate in that literature concerning the effect that increasing turnout has. Highton and Wolfinger have suggested, for example, that higher turnout does not substantially alter electoral outcomes because voters' "preferences differ minimally from those of all citizens" (2001: 179). This position compels compulsory voting advocates, such as Hill, to assert that "such claims about likely outcomes are largely speculative [because we] cannot really predict how people will behave and think under conditions radically different to those that currently prevail" (2006: 209).

We are able to demonstrate the conditions under which elections can be altered—and cannot be altered—by increasing turnout alone. We can also eliminate the problem of trying to predict how voters will "behave and think" in the calculation of our *TCI*. In other words, our approach enables us to determine *the potential* for altering an election on increased turnout alone, given initial VVR parameters. We believe we can therefore move the debate beyond the veracity of the assumption that "preferences differ minimally from those of all citizens."

In addition, we are able to refine the definition of a "safe" seat (and conversely a "marginal" seat). The conventional definition of seat safety is based solely upon the expected vote share of the two leading candidates in a race. When the difference is greater than 10 percentage points, the seat is deemed "safe." Our analysis allows us to differentiate between what we call "conventional swing" and "turnout swing." *Conventional swing* is perfectly analogous to the traditional definition of seat safety (i.e., the percentage point difference between the two leading candidates); it defines the change in the percentage of expected voluntary voters that is necessary to alter the expected outcome. We define the minimum *turnout swing rate* as the percentage point increase that the trailing candidate (in a two candidate race) must attract to alter the expected outcome *from increased turnout alone*. We can show that a seat that appears safe by the traditional definition may not be when we consider the potential effects of increased turnout. Our distinction suggests that the traditional definition of seat safety is inadequate to describe the degree of competitiveness as we move from lower turnout to higher turnout situations.

A few caveats are in order. We readily acknowledge that our analysis is only a first step, given our strong assumptions of simple majority rule in a single member district with only two candidates. Later, in the *Stylized Applications* section, we also analyze several scenarios comparing actual voluntary voting rates taken from typical US congressional elections with those taken from typical Scandinavian elections. Some commentators have remarked that our formal assumptions imply a US bias, yet we employ Scandinavian voting rates that are associated with fundamentally different electoral systems. While it may be true that our technical model would most closely fit US electoral rules, it is not our intent to produce an American-centric analysis. Rather, the simplifying assumptions that we employ allow us to take a first step in clarifying the relationship between electoral outcomes and increasing turnout in a relatively simple formal model. Doing so yields an intuitive *TCI* index, a turnout elasticity, and easily-interpreted two-dimensional graphical representations.

On the issue of employing Scandinavian turnout examples, our intention is not to suggest that our results can be directly applied to these substantially different systems. We use a few data points from these elections because they have consistently high (voluntary) turnout, while the United States has consistently low turnout. We are merely attempting to illustrate how our model yields different *TCI* values with low turnout versus high turnout assumptions. In sum, we are fully aware that our results must be interpreted cautiously. Electoral systems that utilize more complicated voting schemes or multi-member districts, for example, will require substantially more complex modeling. Such endeavors are left to future research.

The paper proceeds as follows. The next section presents a brief background on the CVR literature. The third section develops our analysis, and we discuss some implications in the section after that. The penultimate section presents several stylized applications and a diagrammatic representation of our results. The final section concludes.

Compulsory Voting: Some Background

The overwhelming bulk of the CVR literature has traditionally focused on the normative or philosophical aspects of voting. In particular, the debate tends to center on whether voting should be interpreted as a civic *duty* that each citizen is obligated to perform (Hill, 2002; Lijphart, 1997; Wertheimer, 1975), or whether it should be interpreted as a *right* that citizens are free to exercise as they chose (Abraham, 1955; Jones, 1954).[1]

The more analytically-inclined studies of CVRs tend have an empirical focus. For example, Jackman (1987), Massicotte et al. (2003), and McAllister (1986) document the extent to which

[1] See Hill (2002) for a summary of these various positions.

CVRs affect voter turnout. Mackerras and McAllister (1999) conclude that Australia's CVR disadvantages right-leaning parties and use survey evidence from the 1996 federal election to argue that compulsory voting reduced the right-leaning Liberal-National coalition's first preference vote by approximately 5%, compared to what it would have been under a voluntary voting rule (VVR). Jackman (1999) also concludes that Australia's Liberal Party would benefit from lower turnout under a VVR, but not as much as conventional wisdom has suggested. He argues that surveys are likely to overestimate the previously-estimated rate of voluntary turnout in the event that compulsory voting were repealed in Australia.

Birch (2009) is one of the most extensive studies of compulsory voting to date. In addition to devoting a chapter each to the history of CVRs and to normative issues surrounding them, she devotes several chapters to empirically examining the relationship between compulsory voting and electoral campaigns, electoral turnout, democratic legitimacy, and political outcomes. We focus, here, on summarizing some of her empirical results only. For example, she finds "scant evidence" of an association between compulsory voting and citizen engagement and—contrary to claims made by proponents—(weak) evidence that citizens under compulsory systems feel less efficacious than those under voluntary ones (p. 77). Consistent with earlier studies, she finds that compulsory voting increases turnout; her evidence suggests that compulsory voting with sanctions increases turnout somewhere between 12 and 13% (p. 96). Her findings on the overall impact of CVRs on "electoral integrity" are ambiguous. She finds no systematic effect of CVRs on "the support won by different types of party" or the increase in female representation, but she does find CVRs promote "the desirable outcomes of greater income equality (at least in Latin America and Western Europe) and reduced corruption" (p. 133).

Other approaches to examining compulsory voting use surveys or simulation techniques to extrapolate the electoral effects that higher turnout or a "full" CVR turnout would have in the United States. The results are mixed. Radcliff (1994) confirms the "folk wisdom" that increasing turnout would favor the Democratic Party. Citrin et al. also argue that the Democrats would fare better if all eligible citizens voted in the United States, but add the caveat that few seats would actually change as a result due to the "dearth of close races" (2003, 75). Nagel and McNulty (2000) argue that the effects of increased turnout on US elections are nuanced: they depend on time-varying, region-varying, and nature-of-the-contest-varying (i.e., presidential, gubernatorial, etc., contests) factors. Highton and Wolfinger analyze American National Election Studies data and conclude that, "Contrary to the expectations of many others, we have found that universal turnout would bring modest changes. Taken as a whole, non-voters appear well represented by those who vote" (2001: 192). DeNardo (1980) develops one of the few formal models in the literature to show that increased turnout can be expected to *harm the majority party* and he uses data on several congressional elections to support his claim. In sum, empirical attempts to discern the effects of universal turnout in the United States tend to lean toward a conclusion of little change, while other studies, such as those focusing on Australian results come to the conclusion that compulsory voting tends to benefit the left-leaning parties.

Crain and Leonard (1993) challenge the presumption in much of the political science literature that CVRs favor left-leaning parties by questioning the assumption that abstainers are necessarily more left leaning. Empirically, they found that government spending grows *more slowly* in CVR countries than in VVR countries, which they interpret as favoring an interest group theory over a median voter theory of government. They argue that the presumption of a leftward shift in electoral outcomes, as a result of imposing a CVR, is driven by a median voter view of politics, since the median voter of the entire voting population is likely to be to the left of the median voter among voluntary voters. If the median voter hypothesis were correct, they argue that CVR countries should experience *greater* government spending growth, which their data do not bear out. Their alternative, interest group hypothesis is driven by a "concentrated benefits-diffused costs" argument. They contend that special interest groups are better able to exploit diffuse taxpayers when a smaller fraction of the population votes under a VVR. As a result, government grows faster under voluntary regimes.[2]

Jakee and Sun (2006) echo Hughes (1966), who is suspicious of the quality of a "democratic" outcome if it is based upon the opinions of an ill-informed, or apathetic section of electors compelled by law to vote. Taking an expressive view of voting, Jakee and Sun formally analyze the voting properties when a CVR compels those who are not particularly interested in, or

[2] For criticisms of Crain and Leonard, see O'Toole and Strobl (1995) and Yeret (1995). See Crain (1995) for a reply.

informed about, the political process to vote. They regard forced votes as "random" and show that as the percentage of forced votes increases, the more likely the electoral result will be random. As the share of the vote that is random increases, so does the prospect that the less popular candidate will be elected as a random outcome. Jakee and Sun conclude that: (i) a compulsory electoral outcome does not guarantee that community preferences are more efficiently represented when those who are forced to vote are uninterested and uninformed; and (ii) CVR advocates have failed to demonstrate how CVRs might "transform" citizens into more politically sentient beings by forcing them to vote, as many CVR advocates suggest.

Fry et al. (2009) use probability analysis to compare VVRs to CVRs and show that an electoral seat can become safer—or less competitive—with the imposition of a CVR, when voter preferences are independent of turnout. When extrapolating to a large number of seats, say at the national level, they conclude that fewer competitive seats are expected under a CVR than under a VVR, everything else equal. Because fewer seats will be "in play", CVRs should exhibit a lower turnover of seats. Also, political suppliers can be expected to more narrowly focus their attention and resources on this smaller set of competitive seats than would be expected under a VVR. Their results are, however, dependent upon the statistical assumption of "independence of irrelevant alternatives," which effectively formalizes the Highton and Wolfinger claim that voters' preferences are not unlike non-voters' preferences.

The current paper extends the formal analysis of compulsory voting rules—and turnout in general—by analyzing the conditions under which a CVR can alter expected VVR outcomes. Specifically, the next section develops our "turnout competitiveness index" and a measure for turnout "elasticity."

An Analysis of Compulsory and Voluntary Voting

We introduce our model by acknowledging that while real-world CVRs register substantially higher turnouts than VVRs, mandatory turnout is typically less than a full 100% (see, i.e., Blais and Dobrzynska, 1998). For example, Crain and Leonard (1993) report average turnout in CVRs to be greater than 90% versus approximately 50% for voluntary systems. Notwithstanding the many subtleties around the issue of measuring turnout, the fact that turnout is not the same as voting, and the fact that CVRs may encourage more spoiled ballots, among others, we develop our analysis by assuming a 100% CVR *turnout*, which we use synonymously with *voting*. The fact that CVR turnout is not, in reality, 100% and the fact that voting is not, in reality, the same as turnout are clearly worthy of attention, in and of themselves, but we cannot entertain those nuances here: simply put, it would make the exposition much too cumbersome. We thus simplify the problem of voting and turnout in order to concentrate on the variable of greatest interest: increasing turnout. Moreover, the fact that we assume 100% turnout, rather than some more realistic figure such as 90%, should not raise any strong objections because *our model is generalizable to any increase in turnout* over some initial set of exogenous parameters. Again, comparing some level of voluntary turnout (which is assumed to be less than 100%) to a 100% CVR turnout makes the exposition considerably easier throughout. It might be useful to keep in mind, therefore, that while the discussion is couched in terms of less-than-100% VVR turnout versus 100% CVR turnout, we are really describing a model that examines the potential to change electoral outcomes under any scenario in which turnout is increased.

As noted in the *Introduction*, we assume that there are just two candidates (representing two parties)—denoted candidate 1 and candidate 2—that run for office in a single-member district using simple majority voting. We start with a VVR, for which we know the percentage of the vote each candidate expects to receive and the percentage of the electorate that is expected to abstain. These expectations are consistent with those formed through pre-election attempts to predict the election's outcome using a variety of means, such as opinion polls, previous election results, or even Internet-based betting markets. Next, we introduce two different, hypothetical election scenarios in order to motivate our *TCI*. These scenarios help to illustrate the nature and operation of the index. Further below, we develop an elasticity measure and apply our analysis to a number of specific electoral scenarios.

Scenario One

Let P_1 and P_2 represent the percentage of the *total eligible* electorate that is expected to vote for candidates 1 and 2, respectively. P_3 is the percentage that is expected to abstain. By definition, $P_1 + P_2 + P_3 = 1$. Without any loss of generality, we assume $P_1 > P_2$, so that candidate 1 is always the leading candidate and candidate 2 is always the trailing candidate. Further assume the following arbitrary election expectations: $P_1 = 49.5\%$, $P_2 = 45.5\%$, and $P_3 = 5\%$.

There are two ways of calculating the *initial* "marginality," "closeness," or "competitiveness" of the expected electoral outcome *under a VVR*. The first is simply the difference ($P_1 - P_2$), which in this case is 4%. Given the predicted abstention rate, 2% of the total electorate would have to "swing" from candidate 1 to candidate 2 for candidate 2 to tie the race under a VVR. Note that, for ease of exposition, we focus throughout the paper on the case of an election tie as the tipping point of the expected election outcome away from candidate 1's favor.

The second, more conventional measure of marginality is based on the difference between the percentage of *cast* votes that each candidate expects. That is,

$$\frac{P_i}{P_1 + P_2} = p_i, \qquad \text{where } i = 1, 2. \qquad (1)$$

For candidate 1, $p_1 = 49.5/(49.5 + 45.5) \approx 52.1\%$. For candidate 2, $p_2 = 45.5/(49.5 + 45.5) \approx 47.9\%$. The second, more common measure of marginality is based on the difference ($p_1 - p_2$) ≈ 4.2%, in our example. The margin, ($p_1 - p_2$), can never be smaller than ($P_1 - P_2$). Moreover, scaling the candidates' votes by the percentage turnout ($P_1 + P_2$), rather than by the total electorate, necessarily ensures that ($p_1 + p_2 \equiv 1$). This identity highlights the zero sum nature of what we call "conventional swing:" an increase in candidate 2's share of *cast* votes must be matched by an identical fall in candidate 1's share of *cast* votes (i.e., $\Delta p_2 \equiv -\Delta p_1$). To tie the election on the basis of this *conventional swing*, candidate 2 must increase his share of cast votes by $1/2(p_1 - p_2)$, because $p_2 + 1/2(p_1 - p_2) = 1/2 = 50\%$ of cast votes. In other words, holding turnout constant, the trailing candidate would need $1/2(p_1 - p_2)$ percent vote swing from voters who were expected to vote for the leading candidate 1 in order to alter the expected outcome by tying.

The commonly accepted definition of a competitive or "marginal" seat is one in which the vote shares of the top two parties in a district is less than or equal to 10 percentage points. Given our assumption that there are only two candidates, this means that a marginal seat is one in which p_1—the expected percentage vote going to the leading candidate—ranges to, at most, 55%. A "safe" seat is therefore defined as one in which the expected percentage vote going to the frontrunner exceeds this threshold. Note that our imaginary election is competitive (or "marginal"), since p_1 falls below the 55% standard.

We now consider the situation in which all eligible citizens are forced to vote through compulsion by investigating the conditions under which a CVR would change the expected VVR outcome. Recall that we concentrate on the case of the trailing candidate tying the election as an example of altering the expected outcome. Because we are interested in the specific effects of increased turnout, we take the expected voting intentions of those who vote under a VVR (p_1 and p_2) as given and ask, what percentage of votes candidate 2 needs from increased turnout—or would-be abstainers—to alter (tie) the expected outcome of the election? This is easily calculated as

$$50\% - P_2 = S \,, \qquad (2)$$

where S is what we call "turnout swing" from newly compelled voters that candidate 2 needs to tie the race. In our example, 45.5% of the total electorate is expected to vote for candidate 2 voluntarily, so he must attract an additional 4.5% of the *total* electorate—once compulsory voting is imposed—to alter the expected VVR outcome.

It is critical to note the distinction between *turnout swing* that is derived from new voters who would have abstained in a VVR, and the *conventional swing* that is derived from existing voluntary voters. Our analysis largely focuses on turnout swing, although we draw the two concepts together in the penultimate section of the paper. In order to isolate the implications of turnout swing, we assume for now that the voting intentions of *voluntary* voters remain unchanged at P_1 = 49.5% and P_2 = 45.5%. Hence, the 4.5 percentage points of swing that candidate 2 needs to tie the race must come from the new voters who had previously abstained under the VVR. In other words, to change the outcome, candidate 2 must attract s percentage of abstainers, calculated as follows:

$$\frac{S}{P_3} = s \,. \tag{3}$$

We define *s* as the minimum *turnout swing rate*—expressed as a percentage of the *forced* vote—that candidate 2 must attract to alter the election result under a CVR. In this example, $s = 4.5\% / 5.0\% = 90\%$, and therefore candidate 2 needs to attract 90% of the abstainers to tie the race and alter the expected VVR outcome. Note that under voluntary voting, candidate 2 is only able to attract an expected 47.9% of voters under the given scenario: garnering 90% of abstainers is likely to pose a significant challenge. Indeed, we derive an expression to capture the relationship between the trailing candidate's *expected vote share under a VVR* and *the necessary vote share he must obtain under a CVR* in order to change the electoral result:

$$TCI = \frac{p_2}{s} \,. \tag{4}$$

We define *TCI* as the *turnout competitiveness index*. The *TCI* is the ratio of the trailing candidate's voluntary vote share, p_2, to the swing rate, *s*, that the trailing candidate needs to tie the election; it is expressed as a percentage of the "abstention" vote. In this example, the $TCI = 48\% / 90\% \approx 53\%$, which suggests that candidate 2 receives barely over half the support from *voluntary* voters that he needs from *involuntary* voters to tie the election. Table 1 provides a convenient listing of the variables presented along with the values introduced in both this scenario and the next.

{Insert Table 1: A Summary of Analysis Under Two Electoral Scenarios}

Our *TCI* has the property that a higher value implies a greater likelihood that imposing a CVR will, in and of itself, alter the expected electoral outcome. Second, it must be the case that $TCI \leq 1$. In the limiting case, as $p_2 \rightarrow s$, $TCI \rightarrow 1$. This describes a "cliff-hanger" election ($p_1 = p_2$). More generally, we expect *TCI* < 1. In the scenario just presented, the turnout swing that candidate 2 needs to tie the election, *S*, is less than the percentage of abstainers, $S/P_3 = s < 1$. If $S > P_3$, the *turnout swing* needed to tie the election is *greater* than the percentage of abstainers and the election outcome *cannot be altered* by the increased turnout that a CVR generates alone. In order to alter such an election, the trailing candidate would need to attract the entire abstention vote *plus* $(50\% - P_2 - P_3)$ per cent of the electorate, the latter necessarily coming from a *conventional swing* toward the trailing candidate from *voluntary* voters who were expected to vote for the leading candidate; in other words, the initial P_i's must be allowed to vary.

Scenario Two

This example is intended to clarify further the interpretation and discussion of the *TCI*. In this second scenario, assume that P_1 = 25%, P_2 = 19%, and P_3 = 56% under a VVR; turnout is therefore 44%, considerably lower than scenario one. We calculate that the common measure of marginality, $p_1 - p_2 = 57\% - 43\% = 14\%$, compared to 4.2% in the first case. The second seat is clearly considered *safe* by traditional measures, since $p_1 - p_2 > 10\%$ and it is considerably more safe than our first scenario.

If we impose a full turnout CVR regime, candidate 2 needs to swing S = 31 percentage points (of the entire electorate) in order to tie the election. The percentage of the newly-compelled voters who must choose the trailing candidate to tie is s = 31%/56% ≈ 56%. Thus, candidate 2 only needs to attract 56% of all the would-be "abstention votes" in order to tie the election; contrast this 56% to s = 90% in scenario one. Attracting 56% of abstainers is obviously more likely than attracting 90%, as we can see from scenario two's higher *TCI* value of $43\% / 56\% \approx 77\%$.

The implication is *this seat is considerably less safe when we take account of the increased turnout generated by a CVR* than our scenario-one example, which appeared less safe than scenario two based on *conventional swing* alone. When we increase turnout through a CVR, the trailing candidate needs just over half (i.e., 56%) of the abstention vote to tie; and he is already receiving 77% of the total required swing rate from voluntary voters. In sum, the scenario-two seat is safer than the scenario-one seat under the constant-turnout assumption of a VVR, whereas the scenario two seat is less safe than the scenario one seat under the increasing turnout assumption of a CVR.

This result highlights the point that the traditional definition of seat safety, ($p_1 - p_2$), is inadequate to describe the degree of competitiveness if we want to account for both conventional swing *and* the potential effect of increased turnout. Our more robust measure of competitiveness, the *TCI*, takes account of the potential effects of increasing turnout by accounting for the rate of initial (voluntary) abstention.

Some Implications

We can easily manipulate our *TCI* to yield a useful *elasticity* interpretation, or the capacity to express the percentage response of one variable to a percentage change in some other variable. How "elastically" must candidate 2's vote share respond to increased turnout for him to tip the election (i.e., *tie* the election) when we impose a VVR? We would define such an elasticity such:

$$E^*_{P_2,T} = \frac{\text{\% change in votes necessary for losing candidate to draw}}{\text{\% change in turnout moving from a VVR to a CVR}} \quad .$$

The gain in votes that candidate 2 needs to tie under a CVR, expressed as a percentage of his current non-compulsory electoral support, is $\left(\frac{0.5 - P_2}{P_2}\right)$. If we define $T = (P_1 + P_2)$ as the percentage turnout under the VVR, then the percentage increase in turnout—when voting is made compulsory—expressed as a percentage of non-compulsory turnout, is $\left(\frac{1-T}{T}\right)$. The required elasticity, $E^*_{P_2,T}$, to alter the expected election outcome by imposing a CVR is therefore:

$$E^*_{P_2,T} = \frac{\left(\frac{0.5 - P_2}{P_2}\right)}{\left(\frac{1-T}{T}\right)} . \qquad (5)$$

We define $E^*_{P_2,T}$ as the *elasticity of vote share with respect to turnout*. Note, moreover, the required elasticity is simply the inverse of our *TCI*:

$$\frac{1}{E^{*}_{P_2,T}} = \frac{\left(\frac{1-T}{T}\right)}{\left(\frac{0.5-P_2}{P_2}\right)} = \frac{1}{\left(\frac{0.5-P_2}{P_2}\right)\Big/\left(\frac{1-T}{T}\right)} = TCI\ . \tag{6}$$

The required elasticity in scenario one is 1/0.53 = 1.88, which can be interpreted as follows: for every 1% change in turnout—driven by imposing a CVR—the losing candidate must get 1.88% more votes than he already has in order to tie the race. Thus, the *larger* the elasticity, the lower the potential for the trailing candidate to come from behind to tie the election as turnout is increased when moving to a CVR. This 1.88 elasticity is larger than the corresponding 1.29 elasticity in the second scenario, implying that, in scenario two, the losing candidate needs to attract only 1.29% more votes for every 1% increase in the turnout.

We can also link our elasticity calculation to the issue of when an increase in turnout alone can alter an expected election outcome and when and increase in turnout alone *cannot* alter an expected outcome. One of the necessary conditions for increased turnout alone to alter the election is $s \leq 1$. Note that, in both scenarios one and two, the turnout swing that candidate 2 needs to tie the election, S, is less than the percentage of abstainers, P_3, and therefore $S/P_3 = s < 1$.

If $s > 1$, the trailing candidate requires the entire abstention vote plus $(50\% - P_2 - P_3)$ percent of voters who were expected to vote for the leading candidate under the VVR (i.e., out of P_1). In these circumstances, because $TCI < p_2$, the required elasticity, $E^{*}_{P_2,T}$, explodes. If $s > 1$, *the electoral outcome cannot be changed* by imposing a compulsory system alone. Hence, if $TCI < p_2$, the VVR turnout is already sufficiently high (i.e., a low P_3), and the margin between the candidates sufficiently low, that imposing a CVR cannot change the electoral outcome. In this case, even though the election might be "competitive" under a VVR, it is not possible for the losing candidate to tie the election from increased turnout alone.

We can summarize this result by suggesting that a compulsory voting rule is most likely to alter the electoral outcome when: (i) P_3 is large, and/or (ii) $(p_1 - p_2)$ is small. When the abstention rate is large, the losing candidate does not need such a large percentage of those abstentions to tie the race as turnout is increased, especially if $(p_1 - p_2)$ is small and the seat is already marginal before imposing the CVR. When *conventional swing*, $(p_1 - p_2)$, is large under a VVR, the seat is extremely safe and the expected result is unlikely to be altered by imposing a CVR, unless the group of abstainers, P_3, is exceptionally large and the trailing candidate captures enough of them.

Stylized Applications

The examples in the previous section were chosen to assist us in developing the *TCI* and exploring some of its characteristics. The examples in this section help us to draw out the electoral implications of increasing turnout in a variety of stylized electoral contests. Table 2 provides four such applications of our analysis and we refer to these as *applications* one through four. We treat the expected electoral support for candidate 1, p_1, and the rate of abstention, P_3, as exogenously given and then calculate the values of the remaining variables listed in Table 1, including the *TCI* and elasticity.

These calculations allow us to gauge the effects of increasing turnout by imposing a CVR on both a safe seat and a marginal seat under both high and low turnout conditions. The two exogenously-determined variables—turnout and expected electoral support for candidates—are drawn from actual elections around the world. As a result, the exogenous electoral variables that we employ are taken from widely differing electoral systems. As noted in the *Introduction*, our analysis strictly applies to a system that conforms to our limiting assumptions and therefore we are not suggesting that our results can be directly applied to any of the electoral systems from which the data points are extracted. Nonetheless, we employ the real-world election data to provide a sense of how our *TCI* and elasticity measures perform in the four situations described above.

The entries in columns 1 and 2 of Table 2 exemplify a *safe* seat and suggest that the leading candidate, 1, expects 80%, of the vote (i.e., $p_1 = 0.8$). The entry in Row 1, Column 1 of Table 2 implies that candidate 1 expects 80% of the votes that will be cast under a VVR. This value happens to correspond to the percentage of the vote that Nancy Pelosi, Speaker of the House of Representatives in the US Congress, received in the 2006 elections. For a representative *marginal* (i.e., *competitive*) seat, we employed a value of 51% (Columns 3 and 4 of Table 2), which corresponds to a number of congressional seat results in the 2006 elections, such as those held by Florida Representative Ron Klein and Tennessee Senator Bob Corker. Our marginal seat values are also reasonably close to the 2007 French presidential election in which Nicolas Sarkozy obtained approximately 53% of the votes cast compared to his opponent's 47%.

{Insert Table 2: Comparison of Safe versus Marginal Seats …}

For turnout, we employ two sample abstention rates (P_3), 47% and 10%. The 47% abstention figure implies a 53% turnout rate and is typical of the turnout for US presidential-year congressional elections from the late 1960s through 2006.[3] The 90% turnout rate (P_3 = 10%) is approximately average for parliamentary elections in Iceland between 1946 and 2007. Indeed, all the Scandinavian countries and Germany tend to have quite high voluntary turnout rates, averaging in the upper 80% range (Blais and Dobrzynska, 1998). Note that the first two rows of Table 2 present the assumed p_1 and P_3 values, while the remaining rows present the other calculations in a convenient order of calculation.

The pattern that emerges under these four applications is instructive. In application one—the case of a safe seat (p_1 = 80%) and a low turnout (P_3 = 47%)—the percentage of abstainers, *S*, who must vote for the losing candidate in order to alter the election under a CVR, is 84%. As a consequence, the *TCI* takes a value of approximately 24%. Moreover, the trailing candidate must receive an $E^*_{P_2,T} = 4.19$ percentage increase in vote share for each 1% increase in turnout as a result of imposing the CVR in order to tip the race from turnout alone. This particularly high elasticity suggests that the likelihood of candidate 2 changing the expected outcome through the increased turnout that a CVR can deliver is exceptionally small. This result is driven by the fact that the $TCI \approx 24\%$ is close to its lower bound of $p_2 = 20\%$ (recall that the typical range is

[3] The midterm congressional election turnout is considerably lower for this time period, averaging approximately 38%.

expected to be $p_2 \leq TCI \leq 1$). The electoral outcome is, in this case, *highly insensitive to increased turnout* under a CVR: this seat is not only safe in a VVR, but it remains extremely safe when considering the potential of increasing turnout through a CVR. In sum, an extremely safe seat under a VVR, even when combined with low turnout, yields a low *TCI* value and a high required elasticity of vote share.

Our second application (column 2 of Table 2) represents an extremely safe seat, but this time it is combined with high turnout under voluntary voting. The leading candidate expects to get 80% of voluntary votes ($p_2 = 20\%$), but now the projected turnout rate is at the Northern European level of 90% (i.e., P_3 = 10%). In this case, only 18% of the total electorate is expected to vote for the trailing candidate voluntarily, and he therefore needs an additional 32 percentage points to tie once a CVR is introduced. As the abstention rate is only 10 percentage points, the *TCI* = 6% falls below its typical lower bound of p_2 = 20%. It is therefore *impossible* for candidate 2 to tie the race based on increasing turnout alone: the number of abstainers he needs to attract is greater than the number of abstainers available.

In this situation, the trailing candidate can only tie the race through *conventional swing*, in other words, by attracting votes from those who were expected to vote voluntarily for candidate 1 (which would necessarily alter the given values of P_1 and p_1). Candidate 2 needs $(50\% - P_2 - P_3) = 22\%$ of voters who were expected to vote for candidate 1, in addition to receiving the entire abstention vote, P_3, to tie the race. With our measure of *TCI*, we are therefore able to distinguish between the swing needed to alter the election outcome from increased turnout alone (i.e., the "turnout vote" or "abstention vote"), which corresponds to $TCI \geq p_2$, and the additional conventional swing that must come from voluntary voters who were initially expected to vote for the leading candidate 1.

In applications three and four, (columns 3 and 4 of Table 2), we adopt the same abstention rates (i.e., P_3 = 47% and P_3 = 10%), but examine highly competitive seats (i.e., p_1 = 51%). With low turnout (P_3 = 47%), the trailing candidate only needs to garner 51% of the would-be-abstainers to tie the election, once we impose compulsory voting. The $TCI = 96\%$, and $E^*_{P_2,T} = 1.04$, the latter implying the trailing candidate only needs 1.04% more votes per every 1% change in increased turnout to alter the election result.

Application four assumes a marginal seat (p_1 = 51%) and a very high turnout (i.e., P_3 = 10%). In order to alter the result, the trailing candidate needs to swing 59% of increased turnout voters after imposing a CVR. Compared to application three, this is clearly a higher hurdle for candidate 2, but presumably not an impossible one: the *TCI* remains relatively high at 83% and the required elasticity of votes with respect to turnout is a reasonably low 1.20%.

What the four applications illustrate is that safe seats that have low turnout rates under a VVR will yield low *TCI* values and are unlikely to change when compulsory voting increases turnout. Safe seats are, moreover, virtually impossible to change if voluntary turnout rates are already reasonably high. The seats that are most prone to change from increasing turnout through a CVR are those that are already marginal in constituencies where voluntary turnout rates are low.

We can represent our analysis graphically by rewriting our *TCI* in terms of p_2 and P_3:

$$TCI = \frac{(p_2)}{\left(\frac{0.5 - p_2(1-P_3)}{P_3}\right)} = \frac{p_2 P_3}{0.5 - p_2(1-P_3)}. \tag{7}$$

Solving equation 7 for p_2 allows us to generate a family of “iso-swing” curves for various levels of *TCI*. They have the feature that higher-value *TCI* curves indicate higher seat marginality. Any given curve traces out the “trade off” between p_2 and P_3, holding *TCI* constant. Indeed, the trade off between a higher p_2 and a lower P_3, for a given level of *TCI*, can be confirmed by taking the total differential of *TCI* and setting it equal to zero:

$$dTCI = \left(\frac{\partial TCI}{\partial p_2}\right)dp_2 + \left(\frac{\partial TCI}{\partial P_3}\right)dP_3 = 0. \tag{8}$$

Rearranging terms yields the slope for our iso-swing curves:

$$\frac{dp_2}{dP_3} = -\left(\frac{p_2(1-2p_2)}{P_3}\right) \leq 0. \tag{9}$$

As dp_2/dP_3 is ≤ 0, our iso-swing curves are negatively sloped in P_3-p_2 space.

{Insert Figure 1: Graphical Illustration of *TCI* …}

Figure 1 traces several iso-swing curves. The vertical intercept (p_2) value of each iso-swing curve is p_2 = 50%, and the p_2 value at P_3 = 1 (100% abstention) of each curve is (0.5)*TCI* (e.g., for *TCI* = 50%, p_2 = 25% when P_3 = 1). As noted, each curve is negatively sloped, except the special, zero-sloped case of *TCI* = 1; this special case necessarily implies a p_2 = 50%, "dead heat" election throughout the range of P_3. Specifically, the flat *TCI* curve implies the intuitive result that, in perfectly tied VVR elections ($p_1 = p_2$), the likelihood that increasing turnout will alter the expected outcome is at its maximum.

The negative slope between any two points on a given iso-swing curve, say between *A* and *B*, illustrates the trade off between initial seat competitiveness (a higher p_2 indicates greater competitiveness) under a VVR and the abstention rate (P_3), for a given level of *TCI* or iso-swing. In other words, for the same overall rate of *turnout* competitiveness, we expect either a high initial voluntary support rate (a high p_2) and low abstention rate (a low P_3), or a low initial voluntary support rate (a low p_2) and a high abstention rate (a high P_3).

Similarly, we can compare points *A* and *C*, on two different iso-swing curves. We observe that holding the level of initial seat competitiveness constant at $p_2 \approx$ 45%, the higher rate of abstentions = $P_3 \approx$ 10% (point *A*) implies a higher *TCI* than the lower rate of abstentions = $P_3 \approx$ 4% (point *C*). Thus, for a given level of initial seat competitiveness under a VVR, CVRs that can force a higher rate of abstainers to vote are expected to make it more likely that the trailing candidate can catch up to the leading candidate. This logic clearly illustrates that higher iso-swing curves imply more competitive seats; the latter are therefore more likely to change as a result of imposing a CVR than the former.

In addition to being negatively sloped, our *TCI* curves are convex to the origin, as indicated by the positive sign on the second differential:

$$\frac{d^2 p_2}{dP_3^2} = \left(\frac{p_2(1-2p_2)}{P_3^2} \right) \geq 0 , \qquad (10)$$

for $p_2 \leq 50\%$, which we have assumed throughout our analysis. The convexity of the iso-swing curves implies that *there are diminishing marginal returns to increasing either initial competitiveness* (p_2) *or the abstention rate* (P_3) for a given *TCI*. One can think of the slope as measuring the rate at which (p_2) can be "substituted" for (P_3), and vice versa, while fixing the *TCI*. Thus, the rate of substitution (the "amount" of p_2 that must be given up for an increase in P_3) is declining as P_3 increases. This declining "marginal rate of substitution" of seat competitiveness for abstentions can be illustrated by comparing the slopes at points *A* and *B*. The relatively higher slope of the iso-swing curve at point *A* suggests that a relatively large loss in seat competitiveness (p_2) can be offset with only a small increase in P_3 in order to keep the *TCI* constant (i.e., small increases in P_3 have a powerful effect given that turnout is quite high). At relatively large rates of abstentions (low turnout), such as at point *B*, the relative influence of the two factors is reversed: it takes a large percentage of additional abstentions to substitute for a small loss in seat competitiveness (p_2) while keeping the *TCI* constant.

In addition to the *TCI* = 50% and 100%, Figure 1 also illustrates a subset of our stylized applications, described above. For example, a non-competitive seat is consistent with the Pelosi application. In such a case, the expected vote share of the trailing candidate, p_2, is 20% of the votes cast under VVR. In terms of the entire electorate, the trailing candidate has P_2 = 11%, and he needs 39% of the forced voters to tie after the imposition of a CVR. As noted, this gap translates to a *TCI* = 20%/84% = 24%, implying little potential to swing the election his way on increased turnout alone.

We can illustrate the case of Pelosi's opponent (application one) in Figure 1. We see that the actual 2006 election features are represented by the intersection of the *TCI* = 24% curve with the 47% abstention rate, yielding a p_2 = 20%. Moving to the right of P_3 = 47%, on *TCI* = 24%, suggests a higher abstention rate and an even lower rate of initial seat competitiveness in order to maintain the same level of turnout swing that Pelosi's opponent needed in 2006. Moving up the *TCI* = 24% curve, to the northwest implies that the opponent would need a higher level of initial seat competitiveness and a lower abstention rate in order to maintain a constant turnout swing (equal to 24%).

A highly competitive (marginal) seat can be represented by the *TCI* = 96% curve, which might be illustrative of any of the tightly contested congressional elections described above. Consistent with the iso-swing characteristics that we previously described, the *TCI* = 96% curve lies significantly above that of Pelosi's opponent (as well as the *TCI* = 50% example). Of course, the very high *TCI* = 96% signals that the imposition of a CVR can easily alter the election result. This implication is illustrated by the proximity of the 96% iso-swing curve to the limiting (flat) *TCI* = 100%. The third application, which combined this highly competitive seat with a low turnout, is demonstrated by the intersection of this *TCI* = 96% with the abstention rate, P_3 = 47%, yielding a p_2 = 49%.

For illustration purposes, we have also included application two, in which *TCI* = 6%. Note that this extremely low *TCI* = 6% is consistent with a p_2 = 20% and the assumed abstention rate of 10%.

{Insert Figure 2: Electoral Turnout …}

Figure 2 provides a final illustration and application of our approach. It draws on our application two, above, in order to highlight the distinction between our *turnout swing* associated with increased turnout alone and *conventional swing* associated with changes in voluntary voters' choices. It also speaks to the debate, raised in the *Introduction*, over whether non-voters' preferences are like, or unlike, voters' preferences.

The vertical axis on the left is candidate 2's initial polling rate as a percentage of the entire electorate (P_2). The vertical axis on the right represents candidate 2's range of potential polling rates after a CVR is imposed, measured in terms of percentage of turnout (p_2); note that $p_2 = P_2$ under a compulsory system.

Point *A* represents our application two, in which the expected electoral turnout in a VVR is 90% and P_2 = 18% (and the initial p_2 = 20%). Imposing a CVR pushes the turnout rate to 100%. Point *C* represents the case where involuntary voters under a CVR have *identical preferences* to voluntary voters: candidate 2 will therefore receive 20% of the votes of the *total* electorate (i.e.,

p_2 = 20% after the CVR is imposed, which is equal to the original $P_2/(1 – P_3)$ = 18%/90%). In other words, the candidate's support moves along the ray *AC* at the same rate (slope) as he did under the VVR.

Point *D* represents the case where candidate 2 receives *all* the involuntary votes, which suggests the preferences of non-voters are considerably different from those of the voluntary voters. In this case, the trailing candidate increases his polling rate to 28% (i.e., 18% of the voluntary electorate plus all 10 percentage points of the involuntary voters).[4] Note that, under this scenario, the *rate of support* under the CVR (beyond point *A*) must increase relative to the rate under a VVR, which implies that the slope of *AD* is necessarily steeper than that of *AC*.

In order to tie the race, candidate 2 needs a 32 percentage point electoral gain (or *BE*). However, a maximum of only 10 percentage points (distance *DB*) is available from the increased CVR turnout (P_3 = 10%). Therefore, candidate 2 requires a 22 percentage point *conventional swing* from voluntary voters who were expected to vote for candidate 1 to give candidate 2 any chance of drawing level. These 22 percentage points are represented by the distance between the 50% of the total electorate needed to tie (point *E*) and the maximum that candidate 2 can possibly receive from the compelled voters (point *D*). This result is consistent with our earlier claim that when $TCI < p_2$, candidate 2 requires some conventional swing in addition to 100% of the increased turnout.

A higher initial P_2 support rate for the trailing candidate and/or a lower VVR turnout rate would drive points *B* and *C* closer to point *E*, and, if sufficiently large, would drive position *D* above point *E*. Thus, in the case of a sufficiently high *TCI*, candidate 2 enjoys an improved prospect of overtaking the trailing candidate might overtake the leading candidate.

[4] *DAB* is an isosceles triangle so the involuntary turnout of *AB* = 10% also equals candidate 2's 10% maximum electoral gain under a CVR.

Finally, we can usefully define the *TCI* in terms of the line segments in Figure 2, maintaining application two as our example:

$$TCI = \frac{p_2}{\left(\frac{1/2 - P_2}{P_3}\right)} = \frac{OC}{\left(\frac{BE}{AB}\right)} = \frac{OC}{\left(\frac{BE}{DB}\right)} = \frac{0.20}{\frac{0.32}{0.10}} \approx 0.06 \,. \qquad (11)$$

Conclusion

A number of studies, which are typically based on historical data or on simulations, have examined the implications of increasing voter turnout. The empirical results are ambiguous and depend largely on assumptions concerning how the preferences of non-voters might differ from those of (voluntary) voters. While our study complements these earlier ones, we take a different approach and formally examine the conditions necessary to alter electoral outcomes by increasing voter turnout. Unlike most of these other studies, we are able to generalize the potential effects of increasing turnout to encompass the range of assumptions concerning voter and non-voter preferences.

We develop a turnout-competitiveness index, *TCI*, that links turnout and seat competitiveness: higher *TCI* values imply seats are more vulnerable to upset as a result of increased turnout. In addition, we develop a related elasticity measure, $E^{*}_{P_2,T}$, that identifies the percentage change in vote share that the trailing candidate must receive in order to tie the race as turnout is increased. By taking account of both initial seat marginality and the potential for abstention rates to affect outcomes, our *TCI* and elasticity measures can be thought of as more comprehensive measures of seat competitiveness when turnout is increased than relying on the traditional measure, which is based on initial seat marginality alone: this process allows us to refine the concept of “swing” by distinguishing *conventional swing* from *turnout swing*. We also identify the condition under which an election outcome *cannot* be altered by increasing turnout, unless—in addition to receiving a 100% turnout swing—the trailing candidate receives *conventional swing* votes of (50% – P_2 – P_3) from those voters who are expected to vote for his opponent.

We provide some illustrative examples of our *TCI* by employing several stylized examples of seat competitiveness and turnout rates. We are then able to derive a potential range of effects that increasing turnout would have. We graph our *TCI* functions by developing smooth iso-swing curves in P_3-p_2 space to illustrate the properties of the *TCI*.

As we noted in our *Introduction*, the alleged lack of "representativeness" is advanced as a key rationale for supporting the imposition of a CVR. However, we find that it may be surprisingly difficult to alter electoral outcomes by increasing turnout through a CVR, particularly where seats are extremely safe under voluntary voting. Indeed, in the country that tends to come under the greatest criticism for its low turnout, the United States, its (voluntary) congressional elections exhibit a large percentage of extremely safe seats. Robbins and Norpoth (2008), for example, confirm a number of other empirical results that find a relatively small number of competitive seats in Congress. They conclude that, "during most historical periods… one of the major parties has the upper hand" (2008: 1). Citrin et al. corroborate that there were a "dearth of close races" in US Senate elections in the 1990s (2003: 75). In fact, barring three elections (i.e., 1974, 1992 and 1994), incumbents' rate of reelection in the House of Representatives exceeded 90% between 1968 and 2004 and has overwhelmingly been greater than 80% since 1790 (Huckabee, 2003: 19).

Our results suggest that, even in the case of low turnout rates, increasing turnout through compulsory voting is unlikely to have more than a minor impact because of the degree and number of extremely safe seats. Safe seats will remain safe and beyond the reach of challenger candidates, even under a compulsory system, as Citrin et al. (2003) and Highton and Wolfinger (2000) have suggested. And, in cases where turnout is already very high, increasing turnout further is likely to have *even less impact* on seat turnover because the pool of abstainers upon which the trailing candidate must draw is small.

Consequently, election observers who are dissatisfied with current low rates of voter turnout may have to look to institutional changes other than compulsory voting to change what they view as unrepresentative election outcomes. Other measures for strengthening seat representativeness might include redistricting, or institutional changes, such as term limits, campaign spending reform, proportional representation, multi-seat districts, or rules governing the incumbent advantages of pork barrel spending. We are not actively endorsing any of these changes, since attempts to increase seat representativeness in the context of redistricting congressional boundaries, for example, comes with an additional set of problems (Buchler, 2007). In any case, compelling more citizens to vote is unlikely to have the effects desired by those who lament low voter turnout rates. Indeed, if increased turnout is unlikely to have little effect on low-turnout results, it is reasonable to question the value of imposing the costs of compulsion on both the abstainers and the electoral commission responsible for detecting and enforcing a compulsory vote.

A final speculation concerns information and turnout. If abstainers are less interested and less informed about the political process, as per Jakee & Sun (2006), Lacy and Burden (1999), or Lassen (2005), then it is even less clear that increasing their presence in the election is a desirable objective. The reason is that their votes can effectively be treated as "random" (Jakee and Sun, 2006) and, if this assumption is accurate, forcing them to vote causes the CVR outcome to become increasingly random, as the percentage of involuntary voters (P_3) increases. Indeed, this specific scenario of a very high abstention rate and high conventional marginality is one, according to our analysis, in which a CVR actually *can* make a difference compared to a VVR. Implementing a CVR in this case, however, moves the election outcome in the direction of a pure coin toss as the percentage of purely random votes increases. Determining an election by something akin to a random coin toss hardly implies an electoral result that is reflective of any underlying community preferences: surely such a result would be difficult to endorse by either side of the compulsory voting debate.

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TABLES

Table 1: A Summary of Analysis Under Two Electoral Scenarios

Definition	Variable	Scenario 1 (rounded)	Scenario 2 (rounded)
Candidate 1's expected percentage of total electorate	P_1	0.495	0.25
Candidate 2's expected percentage of total electorate	P_2	0.455	0.19
Percentage of total electorate expected to abstain	P_3	0.05	0.56
Seat marginality based on <u>total</u> electoral percentages	$P_1 – P_2$	0.04	0.06
Candidate 1's expected share of voluntary voters	p_1	0.52	0.57
Candidate 2's expected share of voluntary voters	p_2	0.48	0.43
Seat marginality based on share of turnout	$p_1 – p_2$	0.042	0.14
Electoral percentage gain needed for candidate 2 to tie	$S = 0.5 – P_2$	0.045	0.31
Share of forced (abstention) votes candidate 2 needs to tie	$s = \frac{S}{P_3}$	0.90	0.55
Turnout-competitiveness index	$TCI = \frac{p_2}{s}$	0.53	0.77
Elasticity	$\mathrm{E}^*_{P_2,T} = \frac{1}{TSI}$	1.88	1.29

Note: some values are rounded for convenience. P_1, P_2, and P_3 are exogenously given. All other values are authors' calculations.

Table 2: A Comparison of Safe versus Marginal Seats under Low and High Turnout

	Safe Seat (i.e., p_1 = 80%)		Marginal Seat (i.e., p_1 = 51%)	
	Low Turnout (e.g., P_3 = 47%)	High Turnout (e.g., P_3 = 10%)	Low Turnout (e.g., P_3 = 47%)	High Turnout (e.g., P_3 = 10%)
$\boldsymbol{p_1}$	**0.80**	**0.80**	**0.51**	**0.51**
$\boldsymbol{P_3}$	**0.47**	**0.10**	**0.47**	**0.10**
p_2	0.20	0.20	0.49	0.49
$p_1 - p_2$	0.60	0.60	0.02	0.02
P_1	0.42	0.72	0.27	0.46
P_2	0.11	0.18	0.26	0.44
$P_1 - P_2$	0.32	0.54	0.01	0.02
S	0.39	0.32	0.24	0.06
$s=S/P_3$	0.84	3.20	0.51	0.59
TCI	0.24	0.06	0.96	0.83
$\mathrm{E}_{P_2,T}$	4.19	16.00	1.04	1.20

Note: The values for p_1 and P_3 (bolded) are provided as examples. A large p_1 implies the seat is initially safe under a VVR, and a large P_3 implies a low turnout under voluntary voting. All other values are authors' calculations.

FIGURES

Figure 1: Graphical Illustration of *TCI* (Iso-Swing) Curves

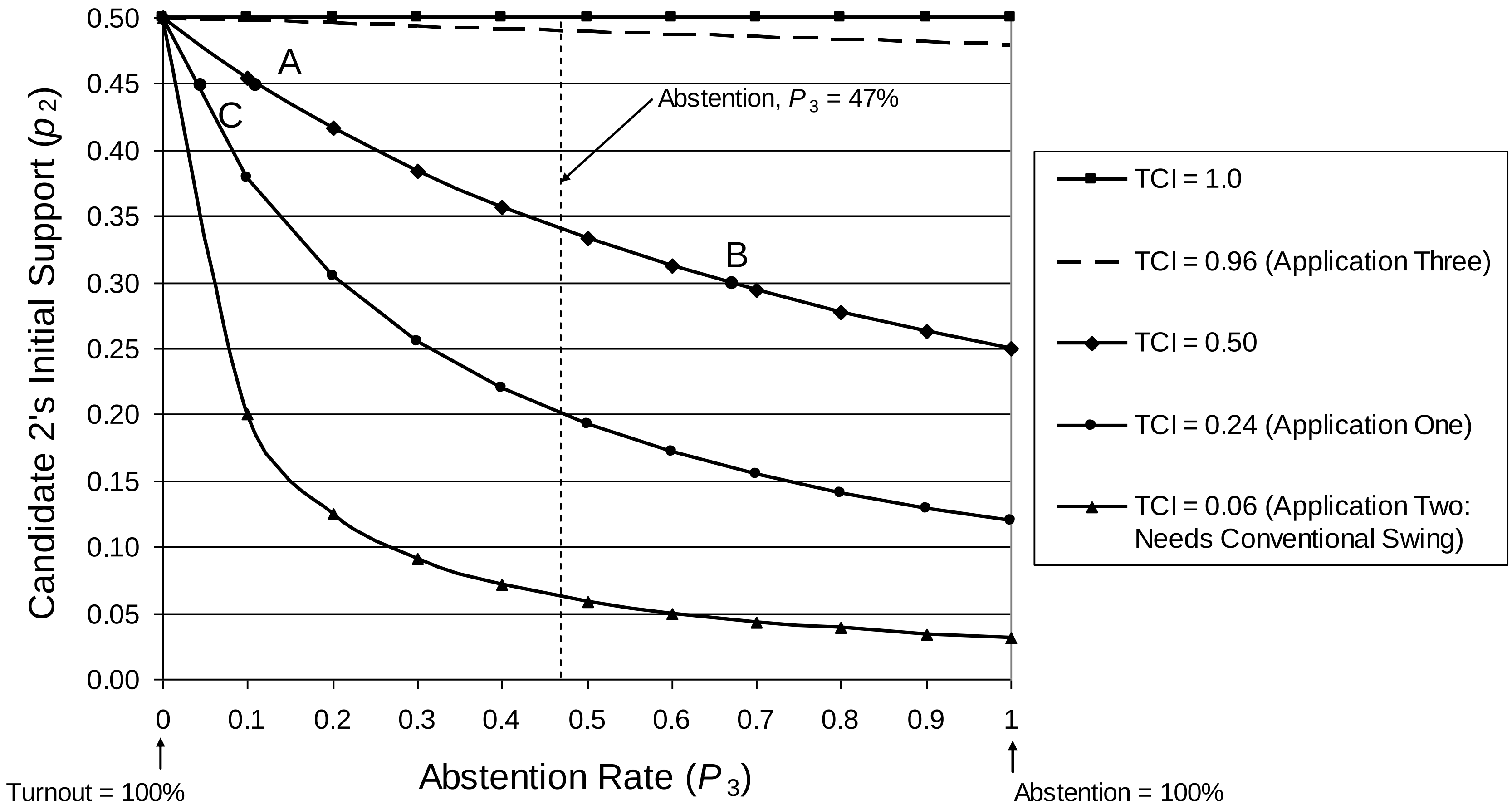

Figure 2: Electoral Turnout: Conventional Swing versus Turnout Swing