# Examining Biases in the Single-Member District Tier of Taiwan's Electoral System 

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#### Abstract

Two elections to the Legislative Yuan have been held under a mixed parallel system. While there have been criticisms that this new set of rules leads to a considerable disparity between parties' vote and seat shares in the district tier, in so far as the new electoral system has been accepted and therefore treated as given by both parties and voters, its fairness should be assessed not by the degree of proportionality, but rather by examining various sources of potential bias. These include differences in electorate sizes and turnout rates across districts, and the efficiency by which votes for the main parties' candidates are distributed. The present study investigates how "fair" the functioning of Taiwan's new mixed parallel system was in the 2008 and 2012 legislative elections by simulating equal and reverse vote scenarios at the district level, and measuring the magnitude of each component of electoral bias. The results show that the operation of the electoral system entails no marked partisan bias, since it does not consistently confer an advantage to either of the main parties or camps.


Keywords: electoral system; single-member districts; partisan bias; mixed parallel system; legislative elections.

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 In August 2004, the Taiwanese legislature passed a law that replaced the existing single non-transferable vote (SNTV) system with a mixed parallel system (also known as a mixed member majoritarian system, or MMM). Since then, two elections for the Legislative Yuan have been held under this new set of rules, thus allowing scholars and practitioners to observe what impact it can exert on both parties and voters. While a number of both journalistic and academic accounts have focused on the disparity between parties' vote and seat shares under MMM, ${ }^{1}$ a more fundamental question beyond the immediate gains or losses accruing to individual parties at specific elections concerns whether the new rules conform to common standards of fairness. The present study addresses this issue by examining possible partisan biases in the functioning of the electoral system through empirical analysis and simulations of vote and seat distributions in the 2008 and 2012 legislative elections.

The relationship between votes and seats is invariably mediated by the choice of electoral systems, such as plurality, proportionality, or mixed rules, and the magnitude of each electoral district. ${ }^{2}$ With few exceptions where an entire country constitutes one single electoral unit, the drawing of district boundaries is an inherently political exercise even when administered by impartial authorities. ${ }^{3}$ Examples of gerrymandering frequently attract attention and criticism, but it is important to note that biases in electoral geography also take other forms involving patterns of vote distribution. As discussed in the following pages, biases are not always caused by political manipulation, and their existence does not necessarily sig-

[^1]nify flaws in an electoral system. Instead, competition in districts can be deemed to contain partisan bias if results consistently confer advantages to a specific party or candidate. ${ }^{4}$

Debates over whether the new electoral system in Taiwan contains biases have often centered on the degree of proportionality, i.e., how closely parties' seat shares correspond to their percentage of the vote. Proportional electoral rules may not only serve as a criterion for measuring fairness, but may also be linked with other institutional features that promote a consensual political system. ${ }^{5}$ Yet this is not necessarily the only consideration in the minds of policy-makers when they discuss and decide on changes in electoral rules. The single non-transferable system (SNTV) long used in Japan and Taiwan yielded relatively proportional results, but also led to problems of personalized and factionalized party politics, thus motivating reforms aimed at creating a system more responsive to the views of the median voter. ${ }^{6}$

With this in mind, Taiwan adopted a mixed parallel system, which was not designed with the goal of enhancing the proportionality of election results. In this study, we do not attempt to address the normative merits or otherwise of the new system, but instead take the new set of rules as given, and investigate the existence and magnitude of any partisan bias through simulations that test how seat shares between parties would change given changes in their vote shares. This is what we set out to do in the empirical section after reviewing the literature and discussing different components of the electoral bias model. The final section summarizes the results and offers concluding remarks.

[^2]
## Literature Review on Sources of Electoral Bias

The single non-transferable vote (SNTV) system for electing members of the Legislative Yuan preceded Taiwan's democratization, and its usage continued until the 2004 election. However, given welldocumented shortcomings of this system, such as intra-party competition and personality—rather than policy-based campaigns, a law was passed in August 2004 that replaced SNTV with a mixed parallel system. ${ }^{7}$ This provides for 73 seats to be allocated in single member districts (SMDs), 6 seats to be allocated in two multi-member districts reserved for aboriginal tribes, and the remaining 34 seats to be distributed proportionally among parties that cross a $5 \%$ threshold. It is clear that, with the preponderance of legislators chosen from SMDs, and the absence of any compensating mechanism between the district and proportional tiers, the results of district contests are likely to determine control of the legislature. In addition, the party list component of the electoral system allocates seats proportionally to parties whose vote shares exceed the legal threshold ( $5 \%$ in Taiwan). Thus, discussion of possible electoral biases naturally focuses on district contests.

One of the most well-known theorems in political science is Duverger's law, which states that plurality rules (also known as first-past-the-post) lead to competition between two viable candidates in each district. ${ }^{8}$ If the two leading candidates in SMDs across the country are nominated by the same two parties - a process referred to as national linkage ${ }^{9}$-then a two-party system would be established. This condition applies to almost all districts in Taiwan. Furthermore, since plurality rules operate under a "winner-takes-all" principle, a party can secure a legislative majority even

[^3]if it does not win a majority of votes. It follows that how votes-and even non-votes (i.e., voters who abstain)—are distributed in each district may potentially affect election outcomes. For example, Tufte raised the question regarding the "swing ratio" and partisan advantage. ${ }^{10}$ The former denotes the likelihood of seat changes as a consequence of vote changes, while the latter pertains to whether a given party could consistently gain more seats even when it does not win more votes.

There are two components of electoral bias: the distribution effect and the size effect. The former is exemplified by gerrymandering, which refers to the deliberate demarcation of district boundaries to increase a given party's likelihood of winning. Specifically, boundaries are delineated to render its vote distribution more efficient, meaning that it could win more seats with small pluralities spread over many districts, whereas its opponent with a similar vote share would gain fewer seats because its votes are concentrated in just a few districts. ${ }^{11}$ Analysis of this practice has frequently focused on the United States, ${ }^{12}$ where districts which are often not geographically compact are created either by imposition from the majority party in the legislature, or through collusion between both major parties. By making seats safe for incumbent parties, gerrymandering reduces the probability that changes in votes would lead to corresponding changes in seats, therefore making parties and politicians less responsive to voters.

Efficiency in vote distribution means obtaining a higher share of effective votes while reducing the number of wasted votes. The former is defined as votes that a party requires for its candidates to win in individual

[^4]districts, while the latter refers to votes cast for its losing candidates. Furthermore, a high surplus vote, meaning votes in excess of what is necessary to win, decreases efficiency. By definition, the effective, wasted, and surplus votes add up to $100 \%$. In plurality competition, all that a candidate needs to win is one single vote more than her second-place rival. Thus, in a given district where candidate X receives 70,000 votes to candidate Y 's 30,000 , the effective vote for candidate X is 30,001 , her surplus vote is 39,999 , while all of candidate Y's votes can be deemed wasted.

With this in mind, consider the example of three gerrymandered districts where party X garners $60,000,55,000$, and 25,000 votes, respectively, and the equivalent figures for party $Y$ are $40,000,45,000$, and 75,000 . Party X wins the first two districts, while party Y only takes the third. These district lines, whether drawn deliberately or not, allow party X to gain a $67 \%$ seat share with only $47 \%$ of the votes, while party Y is left with a $33 \%$ seat share despite securing $53 \%$ of the votes. The advantage for party X lies in its more efficient vote distribution: $61 \%$ of its votes are effective (a mere $16 \%$ for party Y), it does not accumulate a high surplus ( $21 \%$ versus $31 \%$ for party Y), and few of its votes are wasted (only $18 \%$, in contrast to $53 \%$ for party Y). This illustrates how distribution effects can influence election outcomes.

The second component of bias comprises four aspects of the size effect. Among these, malapportionment has attracted the most attention and criticism by far. ${ }^{13}$ This refers to the phenomenon of districts containing unequal voting populations but electing the same number of representatives, so that votes in overrepresented districts carry greater weight than those in underrepresented districts. This not only breaches the norm of "one man, one vote," ${ }^{14}$ but may also influence policy-making, for ex-

[^5]ample with regard to the allocation of central government funding for investment, infrastructure projects, or local subsidies. ${ }^{15}$ Rural residents are usually the beneficiaries of malapportionment, ${ }^{16}$ either because governments want to protect these minority demands from being overwhelmed by voices from heavily populated urban centers, or merely due to failure to update district boundaries to reflect population movements away from the countryside.

However, inequality in voting populations is not the only factor that can be categorized under the size effect. Another possible source of bias lies in differences in voter turnout rates across districts. Even where districts contain roughly the same number of voters, a party benefits from an abstention effect if it wins many SMDs where turnout is lower, since it can secure legislative seats with fewer votes. In this sense, districts with higher rates of abstention are "cheaper" to obtain. ${ }^{17}$ Since scholars have repeatedly identified a linkage between education and socioeconomic status on the one hand and electoral participation on the other, ${ }^{18}$ parties supported by poorer or less educated voters are more likely to benefit from this abstention effect.

According to the aforementioned Duverger's law, both mechanical and psychological effects inherent in a plurality system operate to concentrate votes in the top two contenders and squeeze out third parties. ${ }^{19}$

[^6]Yet this does not mean that there are only two candidates in each district. Particularly in countries with mixed electoral systems, a minor party may nominate SMD candidates not in the hope of winning, but instead in order to boost its vote share in the proportional tier. ${ }^{20}$ In addition, independent candidates may choose to enter district races, including those who profess to protect local interests neglected by national parties, as well as politicians who fail to obtain their party's official nomination. Typically, the larger the number of candidates in a district, the lower the vote share required to win. Thus, a major party that wins more multi-candidate races than its main opponent is likely to benefit from a minor-party effect. However, this would be turned into a disadvantage if minor party or independent candidates actually manage to win in these districts.

It is worth emphasizing that the different components of electoral bias do not necessarily combine to profit one party. For example, the Liberal Democratic Party (LDP) in Japan has long been dominant in rural areas where districts contain smaller voting populations, and therefore often benefits from malapportionment. ${ }^{21}$ At the same time, turnout in the countryside is consistently higher than in urban centers, giving the LDP's opponents an advantage due to an abstention effect. One should keep in mind that a small net electoral bias may conceal sizeable biases in specific aspects elucidated in the preceding paragraphs, and districts can be drawn so that different sources of biases cancel each other out to yield relatively "fair" election outcomes. ${ }^{22}$

In the first Legislative Yuan election held under the new mixed parallel system, the Nationalist Party (KMT) won a landslide victory. With slightly more than $50 \%$ of the votes, the KMT swept nearly three quarters of parliamentary seats. This immediately raised criticisms from both a

[^7]number of media outlets and politicians in the main opposition Democratic Progressive Party (DPP) against the "unfair" electoral rules. Yet it is worth remembering that the proposal to introduce the new system passed the legislature with support from both major parties. ${ }^{23}$ More importantly, in view of the fact that most seats are allocated in single-member districts, a high degree of disproportionality was exactly what one would expect. ${ }^{24}$ The difference between parties' vote and seat percentages produced by the mixed parallel system was particularly glaring when compared with elections held under the previous single non-transferable vote (SNTV) system, since the latter yielded largely proportional results. ${ }^{25}$ By employing a commonly used formula with higher values indicating greater disparity between vote and seat shares, disproportionality ranged between 2.5 and 4.0 in Legislative Yuan elections during 1995-2004, but increased dramatically to 18.3 in the 2008 election, and remained high at 11.0 in the 2012 election. ${ }^{26}$ Yet since disproportional results are an inherent corollary of majoritarian systems, the analysis below focuses not on proportionality but instead on partisan asymmetries as a measure of electoral bias.

While scholars discussing the ramifications of electoral reform in Taiwan have examined aspects of structural incentives induced by a mixed parallel system, including effects on the party system, ${ }^{27}$ the question of whether and how the new rules operate to the advantage of any given party

[^8]has received relatively little attention. To systematically analyze electoral biases, it is necessary to identify and measure its different components. First, it is necessary to clarify what is meant by "fairness." We define this as an electoral system "in which, if one party received $y \%$ of the seats for $x \%$ of the votes, then the other party would be allocated the same $y \%$ of the seats if it were to receive $x \%$ of the votes. ${ }^{\circ 28}$

Following the same logic, another measure of fairness would be to test whether two parties would receive the same proportion of seats if they were to win the same percentage of the votes. Thus, we can calculate bias using two simulations. First, if both parties X and Y were to win $50 \%$ of the votes, would they then obtain the same seat shares (equal vote scenario)? Second, if party X were to receive $a \%$ of the seats with $60 \%$ of the votes, and party Y $b \%$ of the seats with $40 \%$ of the votes, would party X secure $b \%$ of the seats, and party Y get $a \%$, if their vote shares were reversed (reverse vote scenario)? It is important to stress that equivalent seat shares given the same percentage of votes does not imply a proportional outcome. Instead, one can point to an absence of any inherent partisan bias in the electoral system as long as biases can work to the advantage of either party.

## Evaluating Electoral Bias in Taiwan's Single-Member Districts

The above scenarios assume a two-party system. To satisfy this assumption, one may examine whether patterns of district level competition in Taiwan meet two conditions: 1) there are usually only two candidates in each district with a realistic chance of victory; 2) one of these candidates represents the government, and the other represents the main opposition. ${ }^{29}$ While there were more than two candidates in many SMDs in

[^9]both the 2008 and 2012 elections, most party elites and ordinary voters were well aware that either a KMT or a DPP nominee would win in most cases. Applying the widely-used formula for the effective number of parties ${ }^{30}$ to district candidates, the average "effective" number of candidates per SMD was 2.09 in the 2008 election, and 2.18 in 2012. There were only two districts in 2008, and four in 2012, where this figure (slightly) exceeded 3.0. This indicates that the first condition is met. Concerning the second condition, together the KMT and DPP won 95.9\% and $97.3 \%$ of all SMDs in the 2008 and 2012 elections, respectively. Even in the remaining few cases, minor party candidates often emerged triumphant only due to backing from one of the major parties. Thus, the second condition is also satisfied.

However, in a few districts either the KMT or the DPP did not nominate a candidate, in most cases due to arrangements made with allied minor parties. These districts are excluded from the initial analysis below, since one cannot measure vote swings between candidates from the two main parties where a recipient is absent. Specifically, there were three SMDs where the KMT did not field a candidate in the 2008 election, and two such districts in 2012; the equivalent figures for the DPP were four in both elections. In view of this, the first part of the following section only analyzes 66 out of 73 districts in 2008, and 67 districts in 2012. The definition of two-party competition is then relaxed to encompass the two broad camps, the KMT-led pan-blue and the DPP-led pan-green forces, to take into account districts where the main parties allowed their minor junior partners a free run.

Based on vote counts in districts where both the KMT and DPP nominated candidates, ${ }^{31}$ table 1 provides a summary of vote distribution

[^10]Table 1
Actual District Results in the 2008 and 2012 Elections - KMT vs. DPP

|  | 2008 |  |  | 2012 |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
|  | KMT | DPP | KMT | DPP |  |
| vote share | $54.9 \%$ | $40.6 \%$ |  | $48.7 \%$ | $45.9 \%$ |
| Seats | 53 | 12 |  | 41 | 26 |
| average electorate size in districts won | 233121 | 244152 |  | 249792 | 248927 |
| average turnout in districts won | $58.9 \%$ | $59.0 \%$ |  | $75.0 \%$ | $74.3 \%$ |
| average surplus votes per seat won | 24480 | 6753 |  | 23450 | 23708 |
| average wasted votes per seat lost | 60595 | 51014 |  | 77153 | 73836 |
| average independent/third party vote in | 6005 | 5543 |  | 13168 | 4603 |
| seats won |  |  |  |  |  |
| effective vote | $56.9 \%$ | $21.5 \%$ |  | $50.5 \%$ | $35.5 \%$ |

Note: Only seats contested by nominees from both major parties are included. One seat was won by an independent candidate in 2008.
efficiency for the two main parties in 2008 and 2012. It is worth noting that DPP votes were distributed relatively efficiently in 2008, in the sense that it had much fewer surplus votes in districts that it won, and also fewer wasted votes in constituencies where it lost, compared to the KMT. This did not help the party gain more seats, however, since while losing by large margins increases efficiency by reducing the number of wasted votes, it does not contribute to securing victories. In fact, a staggering $76.2 \%$ of all DPP district votes were wasted, in contrast to only $16.1 \%$ for the KMT. Nevertheless, one should bear in mind that, given a less efficient distribution (e.g., if the party had a few thousand more votes in districts where it lost heavily but a few thousand less votes in districts where it won narrowly), the same vote share could have left the DPP with an even more tenuous parliamentary foothold.

Regarding size effects, turnout differential among districts did not work in either party's favor, since the KMT secured both rural seats with low turnouts (Taitung, Hualien, and the two Nantou districts) and those metropolitan and provincial SMDs that saw the highest rates of voter participation (Changhua 1, Chiayi 1, and most seats in Taipei). By contrast, the KMT appears to have had a slight advantage with respect to electorate
size. Excluding the three offshore island districts which contain unusually small electorates (Penghu, Jinmen, and Lianjiang), ${ }^{32}$ the KMT swept all ten SMDs with the lowest number of eligible voters, while the DPP took four of the ten most populous districts. That is, nearly a third of the party's few victories were concentrated in seats that required more votes to win. The number of votes garnered by minor parties or independent candidates was about the same in districts won by the KMT and DPP, and thus did not benefit either party.

Turning to the 2012 election, one observes near parity with respect to the efficiency of vote distribution. Unlike four years previously, the DPP's surplus votes per district won, and wasted votes per district lost, now matched those of its main rival, reflecting in part the fact that the party had become more competitive in a larger number of SMDs. While wasted votes still constituted slightly more than half ( $53.6 \%$ ) of all votes cast for DPP district candidates, this was a considerable improvement over 2008. Another indicator of the party's recovery of electoral viability can be seen by comparing its proportion of effective votes in the two elections (rising from $21.5 \%$ in 2008 to $35.5 \%$ in 2012). Concomitantly, the KMT now recorded more wasted votes since it did not win as many districts, although it still managed to translate a majority of district votes into seat gains.

Turnout climbed markedly in 2012 compared with four years before, but this did not have a large effect on the overall seat distribution, since the increase occurred across districts won by both major parties. Nevertheless, while the KMT won exactly half of the 20 (mostly rural and provincial) SMDs with the lowest turnout, it took three-quarters of the 20 districts, including many seats in Taipei and the surrounding New Taipei City, where the highest turnout was recorded. The apparent disadvantage for the DPP four years previously disappeared, as the party not only did well in traditional strongholds with large electorates such as districts in Tainan, but also gained a number of seats with fewer eligible voters from

[^11]the KMT. In addition, one now observes a significantly higher number of votes garnered by minor party and independent candidates in districts won by the KMT, whereas the equivalent figure for DPP seats remained at the same level as in the previous election. A closer look reveals that most independent candidates with high vote shares were actually KMT members (or came from political families affiliated with the KMT) who failed to win official party endorsement. This indicates coordination problems faced by the KMT in several districts, although the party managed to keep these seats. ${ }^{33}$

As described in the previous section, one can assess the fairness of the electoral system through simulations for situations where the two main parties' vote shares are equal or reversed. Starting with the former scenario in 2008, if both the KMT and DPP had received exactly the same percentage of votes (47.75\%) in the 66 SMDs where both parties nominated candidates, and assuming equal swings across districts, the results of the simulation show that the KMT would have gained 31 seats, and the DPP 33, with an independent still winning Jinmen, and the minor People First Party (PFP) taking Lianjiang from the KMT (see table 2). In other words, the combination of distribution and size effects in 2008 favored the DPP by a small margin. The right columns in table 2 show what would have happened if their vote shares had been reversed in 2008. Under this scenario, the DPP would have achieved a landslide victory with 54 SMDsone more than what the KMT actually won-while the number of seats kept by the KMT would have been in single digits, i.e., it would have suffered an even more crushing defeat that the DPP. ${ }^{34}$ This suggests once again that, even though the DPP suffered from disproportionality between the vote and seat shares inherent under plurality rule, it was not a victim

[^12]Table 2
Simulations for the 2008 Election: KMT vs. DPP

|  | equal vote share |  |  | reverse vote share |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
|  | KMT | DPP |  | KMT | DPP |
| vote share | $47.7 \%$ | $47.7 \%$ |  | $40.6 \%$ | $54.9 \%$ |
| Seats | 31 | 33 |  | 9 | 54 |
| average electorate size in districts won | 237725 | 239639 |  | 230645 | 240476 |
| average turnout in districts won | $59.1 \%$ | $58.8 \%$ |  | $57.2 \%$ | $59.2 \%$ |
| average surplus votes per seat won | 14425 | 14637 |  | 10902 | 25458 |
| average wasted votes per seat lost | 56190 | 54910 |  | 52501 | 47095 |
| average independent/third party vote in <br> seats won | 6519 | 5473 |  | 3220 | 5623 |

Note: One seat each is won by independent and PFP candidates under the equal share scenario; one PFP and two independent seats under the reverse share scenario.
of electoral bias. Indeed, the equal and reverse vote scenarios suggest that the electoral system worked slightly in its favor.

Applying the same simulation formula to the 2012 legislative election yields the results listed in table 3. If the two main parties had received the same vote share (47.32\%) in the 67 SMDs where each fielded a standard-bearer, the KMT would have ended up with 35 seats against 32 for the DPP. Note that the KMT's disadvantage in terms of more surplus votes in districts where it won would have still remained. Reversing the two main parties' vote shares would have given 30 seats to the KMT and 37 to the DPP. It is notable that the difference of seven seats under this scenario is only half the margin that the KMT actually enjoyed ( 15 seats more than the DPP). In sum, the simulation results suggest that, contrary to four years ago, in 2012 the combination of distribution and size effects operated to the advantage of the KMT, awarding the party several more seats than its main rival if the two had garnered the same number of votes, and shielding it from a heavy defeat if the vote shares had been reversed.

Up to this point the analysis has been limited strictly to candidates nominated by the two main parties. However, political contestation in Taiwan is often discussed in terms of two opposing coalitions, i.e., the KMT-led pan-blue and DPP-led pan-green camps. This is reflected in nomination

Table 3
Simulations for the 2012 Election: KMT vs. DPP

|  | equal vote share |  |  | reverse vote share |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
|  | KMT | DPP |  | KMT | DPP |
| vote share | $47.3 \%$ | $47.3 \%$ |  | $45.9 \%$ | $48.7 \%$ |
| Seats | 35 | 32 |  | 30 | 37 |
| average electorate size in districts won | 250781 | 248007 | 252446 | 247032 |  |
| average turnout in districts won | $75.2 \%$ | $74.3 \%$ |  | $75.1 \%$ | $74.5 \%$ |
| average surplus votes per seat won | 21969 | 24029 |  | 19894 | 25525 |
| average wasted votes per seat lost | 75563 | 75329 |  | 74454 | 76601 |
| average independent/third party vote in <br> seats won | 12982 | 6412 |  | 13450 | 6921 |

patterns in a number of districts. The clearest example can be found if one looks at the Non-Partisan Solidarity Union (NPSU). The pan-blue leanings of this nominally non-partisan small party are evident not only through its legislators' voting behavior, but also the fact that the KMT refrained from nominating anyone in almost all SMDs where an NPSU candidate was standing. Relations between the DPP and the minor Taiwan Solidarity Union (TSU) within the pan-green camp were fraught in the lead-up to the 2008 election, and there were nearly a dozen districts featuring contenders from both parties. TSU candidates usually attracted miniscule support, and secured more than $10 \%$ of votes in only three districts-two of which lacked a DPP nominee. The same was true in one SMD where a Green Party candidate secured nearly a quarter of the vote, compared with the $0-3 \%$ that his colleagues received in districts that the DPP contested. In view of this, it makes sense to extend the examination from two-party to two-camp competition.

By replicating the analysis under this more broadly defined condition, the results in table 4 cover 71 and 70 districts in the 2008 and 2012 elections, respectively. In the remaining few SMDs (2 in 2008, 3 in 2012), there was neither a DPP nominee nor an independent candidate who was affiliated with the pan-green camp. ${ }^{35}$ Compared with the statistics shown

[^13]Table 4
Actual District Results in the 2008 and 2012 Elections - pan-blue vs. pan-green

|  | 2008 |  |  | 2012 |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
|  | pan-blue | pan-green |  | pan-blue | pan-green |
| vote share | $55.1 \%$ | $40.2 \%$ |  | $49.1 \%$ | $45.5 \%$ |
| Seats | 57 | 13 |  | 43 | 27 |
| average electorate size in districts won | 230092 | 247315 |  | 250110 | 242558 |
| average turnout in districts won | $58.8 \%$ | $58.9 \%$ |  | $75.1 \%$ | $73.8 \%$ |
| average surplus votes per seat won | 25357 | 8500 |  | 24904 | 22943 |
| average wasted votes per seat lost | 60952 | 49401 |  | 75064 | 73266 |
| average independent/third party vote in | 6385 | 5116 |  | 13104 | 4433 |
| seats won |  | $56.0 \%$ | $22.1 \%$ |  | $50.4 \%$ |
| effective vote |  |  |  |  |  |

Note: In seats contested by multiple parties belonging to the same camp, only the leading party (KMT or DPP is counted). One seat was won by an independent candidate in 2008.
in table 2, in 2008 the pan-blue camp enjoyed a bigger electorate size bonus over its rival coalition, but at the same time suffered from a slightly larger disadvantage in terms of voters for minor party and independent candidates (albeit not sizeable enough to affect the outcome in any district). In 2012, it was the pan-green camp's turn to draw greater benefit from winning in SMDs with fewer eligible voters. The observation above that there were no systematic differences in turnout in favor of either main party also applies under two-camp competition.

Given equal district vote shares between the two camps in 2008 ( $47.65 \%$ each), the KMT and NPSU together would have emerged victorious in 33 SMDs against 36 for the DPP (the TSU would not have received enough votes to win in any district) (table 5). Note that while the remaining two seats would have been won by a PFP candidate (in Lianjiang) and an independent who later joined the PFP (in Jinmen), they are not counted in the pan-blue column for the purpose of this study, since they stood against official KMT nominees. Under a reverse vote simulation,

[^14]Table 5
Simulations for the 2008 Election: pan-blue vs. pan-green

|  | equal vote share |  |  | reverse vote share |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | pan-blue | pan-green |  | pan-blue | pan-green |
| vote share | $47.6 \%$ | $47.6 \%$ |  | $40.2 \%$ | $55.1 \%$ |
| Seats | 33 | 36 |  | 11 | 57 |
| average electorate size in districts won | 236091 | 236990 |  | 233287 | 237552 |
| average turnout in districts won | $59.0 \%$ | $58.6 \%$ |  | $57.5 \%$ | $59.1 \%$ |
| average surplus votes per seat won | 15892 | 15565 |  | 11712 | 26895 |
| average wasted votes per seat lost | 54822 | 53957 |  | 51056 | 47851 |
| average independent/third party vote in | 6306 | 6119 |  | 6452 | 5392 |

Note: One seat each is won by independent and PFP candidates under the equal share scenario; one PFP and two independent seats under the reverse share scenario. The PFP is not included in the pan-blue camp because its candidate ran against an official KMT nominee.
the pan-green coalition would have secured 57 seats against just 11 for the pan-blue camp, i.e., two fewer than the number the DPP actually won. This supports the finding reported above that the combination of distribution and size effects conferred a (small) advantage to the DPP/pan-green camp in 2008. In 2012, both the equal and reverse vote share simulations under two-camp competition yielded exactly the same SMD distribution as reported in table 3, meaning that the electoral system was beneficial to the KMT and its allies (see table 6).

## Calculating the Magnitude of Each Component of Electoral Bias

The preceding page provides details of how the new mixed parallel system in Taiwan has functioned in practice, taking into account institutional rules (electorate size), party strategies (minor party nominations), and individual behavior (turnout, vote choice). In short, the simulations above integrate both the distribution and size effects detailed in the literature review section. However, while the results in tables 2-6 offer suggestions regarding how the electoral rules operated to confer advantages or disadvantages to the two main parties, they do not permit one to pinpoint

Table 6
Simulations for the 2012 Election: pan-blue vs. pan-green

|  | equal vote share |  |  | reverse vote share |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
|  | pan-blue | pan-green |  | pan-blue | pan-green |
| vote share | $47.3 \%$ | $47.3 \%$ |  | $45.5 \%$ | $49.1 \%$ |
| Seats | 36 | 34 |  | 29 | 41 |
| average electorate size in districts won | 252184 | 241917 |  | 254063 | 242340 |
| average turnout in districts won | $75.3 \%$ | $73.9 \%$ |  | $75.1 \%$ | $74.2 \%$ |
| average surplus votes per seat won | 22702 | 24045 |  | 20681 | 25700 |
| average wasted votes per seat lost | 73363 | 75326 |  | 71724 | 77801 |
| average independent/third party vote in | 13277 | 6035 |  | 11445 | 8567 |

precisely the substantive impact of each source of potential bias. So we now take a further step to measure the exact magnitude of the electoral bias and, furthermore, disaggregate the contribution of each distribution and size effect to the overall result. The formula, first proposed more than half a century ago to examine bias in New Zealand's first-past-thepost electoral system, ${ }^{36}$ and later applied to the United Kingdom and the United States, ${ }^{37}$ is as follows:
$G=[\{y(P x / Q y-1)\}-\{x(Q y / P x-1)\}] / 2$
$E=[\{y(S / R-1)\}-\{x(R / S-1)\}] / 2$
$T=[y\{(R /(R-C))\{(C / R)-(D / S)\}\}-x\{(S /(S-D))\{(D / S)-(C / R)\}\}] / 2$
$M=[y\{(R /(R-U))\{(U / R)-(V / S)\}\}-x\{(S /(S-V))\{(V / S)-(U / R)\}\}] / 2$ $W=(x-b)-(y-f)$

[^15]where
$x=$ the number of seats won by party A with a certain percentage of the votes cast
$y=$ the number of seats won by party B with the same percentage of the votes cast
$b=$ the number of seats in which party A has more votes than party B
$f=$ the number of seats in which party B has more votes than party A
$P=$ the average number of votes cast for parties A and B in seats won by A
$Q=$ the average number of votes cast for parties A and B in seats won by B
$R=$ the average electorate in seats won by A
$S=$ the average electorate in seats won by B
$C=$ the average abstention in seats won by A
$D=$ the average abstention in seats won by B
$U=$ the average number of minority party/independent votes in seats won by A
$V=$ the average number of minority party/independent votes in seats won by B

G indicates the distribution effect, commonly referred to as gerrymandering. This is the component over which policy-makers can exercise some influence, either by drawing district boundaries themselves or influencing independent commissions charged with this task. The other four elements comprise the size effect: electorate size (E), turnout (T), votes for minor party and independent candidates $(\mathrm{M})$, and seats won by these candidates (W).

Using this formula, table 7 summarizes, in terms of seats, how much impact each element of electoral bias had in the district tier of Taiwan's electoral system. Positive values indicate that the electoral system operated in favor of the KMT/pan-blue camp, while negative values denote an advantage for the DPP/pan-green camp. By restricting the analysis to districts that featured an official nominee from both main parties, the DPP

Table 7
Calculation of Electoral Bias

|  | KMT vs. DPP |  |  | pan-blue vs. <br> pan-green |  |
| :--- | :---: | :---: | :--- | :---: | :---: |
|  | 2008 | 2012 |  | 2008 | 2012 |
| Distribution effect | -2.28 | 2.51 |  | -2.92 | 2.53 |
| $\quad$ electorate size | 0.26 | -0.37 |  | 0.13 | -1.46 |
| turnout | -0.23 | -0.39 |  | -0.26 | -0.50 |
| minor party/independent vote | 0.15 | 0.90 |  | 0.03 | 1.01 |
| minor party/independent wins | -2 | 0 |  | -2 | 0 |
| Total size effect | -1.82 | 0.14 |  | -2.10 | -0.95 |
| NET BIAS (distribution + size effects) | $\mathbf{- 4 . 1 0}$ | $\mathbf{2 . 6 5}$ | $\mathbf{- 5 . 0 2}$ | $\mathbf{1 . 5 8}$ |  |

Note: Results displayed refer to the number of districts. Positive net bias = favoring KMT/ pan blue camp; negative net bias $=$ favoring DPP/pan-green camp.
gained four more seats in 2008 thanks to electoral bias, saving the party from an even more devastating defeat in a year when it was heavily punished by voters. The sources of this bias lie primarily in 1) distribution effects, namely, fewer surplus votes in constituencies where it won, and fewer wasted votes where it lost, and 2) minor party and independent candidates taking seats that the KMT would otherwise have won. By contrast, in 2012 it was the KMT that benefited from electoral bias, gaining close to three extra seats. The KMT's votes were more efficiently distributed, and ballots marked for minor party and independent candidates also worked in the party's favor, although this was partly offset by electoral size and turnout effects.

Expanding the analysis to capture the dynamics of pan-blue vs. pangreen competition, table 7 shows a more pronounced electoral bias toward the DPP in 2008, which would give the party five extra seats. In addition to minor party and independent candidates winning SMDs where the KMT led the DPP, there is now a stronger distribution effect that benefits the latter. The operation of the electoral system would still have favored the KMT in 2012, but with a smaller magnitude compared with the previous table. This is mainly attributable to the DPP now enjoying a greater advantage with respect to electorate size, i.e., winning in districts with fewer eligible voters.

## Summary and Discussion

This study has systematically investigated whether and how biases operate in the district tier of Taiwan's electoral system by simulating SMD results in the two legislative elections (2008 and 2012) held since the country switched from an SNTV to a mixed parallel system. Whereas there have been criticisms from both politicians and media outlets about the unfairness of the new rules, comments that focus on the lack of parity between parties' vote and seat shares reveal insufficient understanding of the mechanisms of a primarily first-past-the-post system. It has long been well-known that plurality rule in single member districts naturally awards the winner a disproportionate share of seats, ${ }^{38}$ and that the smaller the number of SMDs, the greater this disproportionality becomes. ${ }^{39}$ Instead of the ambitious goal of adjudicating which electoral system is most fair and appropriate for Taiwan, we focus on the more modest objective of exploring the existence and magnitude of partisan bias resulting from the operation of the current rules.

Moreover, while recognizing the importance of gerrymandering (particularly in the United States which most of the literature on this topic focuses on), this is just one among several factors which one needs to take into account. In recognition of this, the present study examines electoral bias by identifying each specific component that may confer an advantage to a certain party, simulating how parties would have performed given equal or reverse vote shares, and specifying the magnitude of each component that contributes to overall bias.

To summarize, the results show that in districts where both main parties nominated candidates, the electoral system worked to the DPP's advantage in the 2008 election, while benefiting the KMT four years later,

[^16]albeit to a smaller extent. This still holds true when one takes their allies into account (at least in SMDs where there was only one candidate from both the pan-blue and pan-green camps). In other words, the operation of the district component of Taiwan's electoral system, taking into account not only institutionally determined rules (the drawing of district boundaries) but also the patterns of aggregate voting behavior (turnout), does not contain a partisan bias, since it does not consistently help a particular party. The conclusion indicates that Taiwan compares favorably with a number of long-standing democracies where legislators are chosen through singlemember districts. ${ }^{40}$

One major cause behind a partisan bias that has persisted in countries such as Great Britain and Japan lies in differential turnout rates between urban and rural districts, with city dwellers more inclined to abstain. Consequently, parties whose core support is concentrated in conurbations areas would enjoy a turnout advantage. ${ }^{41}$ One can also observe an urban-rural disparity in turnout in Taiwan, although in this case higher abstention rates are mostly found in rural districts. The reason why this has not led to partisan bias in Taiwan is that neither of the main parties has a lock on rural SMDs. Instead, competition between the two main parties "more or less cuts the island politically in half on a north-south axis,,"42 with each side of the geographical divide containing both urban and rural districts.

Finally, we must note a few shortcomings of this study. First, the analysis is not applicable to the multi-number aboriginal districts, since a party can field more than one candidate (as the KMT has always done), whereas the formula used above operates under the assumption of one district nominee per party. Yet the two aboriginal constituencies contain

[^17]fewer voters than the average SMD, and turnout tends to be lower, so parties that perform well in these districts enjoy distinct electorate size and turnout advantages. In practice, parties from the pan-blue camp have been dominant among aboriginal voters, ${ }^{43}$ and thus one can identify a partisan bias in this component of the electoral system.

Second, the formula would be useful only under conditions of twoparty (or two-camp) competition. As examples from patterns of districtlevel contests in Canada and Japan have demonstrated, one should be cautious about taking the perpetuation of an existing two-party system for granted. Recently, scholars have extended methods for calculating partisan bias in single-member districts to a three-party system, based on the same principles of disaggregating each source of bias as shown above. Instead of treating minor party candidates as merely part of the equation for computing major party seat distributions, these works approach candidates from a third party as viable challengers to the two main parties. ${ }^{44}$ However, in contrast to countries such as Canada and Great Britain, minor parties in Taiwan (e.g., PFP, TSU, and NPSU) have had very few district nominees under the current electoral system (except in cases of preelectoral agreements with one of the two main parties), so the method for calculating bias in a third-party setting is inapplicable.

Lastly, the data analyzed in this study only cover the 2008 and 2012 Legislative Yuan elections, and it may be too early to draw definitive conclusions from just two cases. A scholar has pointed out that once new electoral rules are adopted, they should be used for at least three elections, so that "an electoral system has time to develop." ${ }^{45}$ Since it takes time for

[^18]both parties and voters to become accustomed to an unfamiliar set of rules, what tactics parties might adopt to maximize seat gains under the new electoral system, and whether more voters would choose to vote (or abstain) strategically, are questions that can only be answered by analyzing future election results.

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[^1]:    ${ }^{1}$ For example, see Daniel C. O'Neill, "Electoral Rules and the Democratic Progressive Party's Performance in the 2004 and 2008 Legislative Elections in Taiwan," Journal of Asian and African Studies 48, no. 2 (April 2013): 161-79.
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    ${ }^{26}$ For details on the disproportionality formula, see Michael Gallagher, "Proportionality, Disproportionality and Electoral Systems," Electoral Studies 10, no. 1 (March 1991): 33-51. Calculations are based on parties' vote shares in the proportional tier, and thus exclude votes for independent candidates.
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    ${ }^{29}$ These conditions are taken from Steven R. Reed, "Duverger's Law Is Working in Japan,"

[^10]:    Senkyo Kenkyu 22 (2007): 96-106. Reed mentions a third condition, that the government must be formed by one of the two main parties, but this does not apply to Taiwan since it is not a parliamentary system.
    ${ }^{30}$ Markku Laakso and Rein Taagepera, "'Effective' Number of Parties: A Measure with Application to West Europe," Comparative Political Studies 12, no. 1 (April 1979): 3-27.
    ${ }^{31}$ Districts excluded from analysis are Taipei County 9, Taichung County 2 and 4, Tainan County 2, Hsinchu County, Taitung, and Penghu in 2008, and Taipei 7, Taichung 2, Taoyuan 6, Penghu, Jinmen (Quemoy), and Lianjiang (Matsu) in 2012.

[^11]:    ${ }^{32}$ Each of these districts comprises a county, and thus cannot be merged with other SMDs because each county is entitled to have at least one district.

[^12]:    ${ }^{33}$ The DPP was confronted with the same problem in the Kaohsiung 9 district, famously losing this stronghold to the KMT because its core support was split between its official nominee and a high-profile independent who is the son of a former DPP president.
    ${ }^{34} \mathrm{An}$ independent would win in Jinmen, and the PFP party would take Lianjiang. There were two KMT candidates standing in the Miaoli 2 district. In this study, only the actual KMT winner is classified as the party nominee. Under the reverse vote share scenario, the second-placed KMT candidate, classified as an independent here, would have won.

[^13]:    ${ }^{35}$ These are the Hsinchu County and Taitung districts in 2008, and the Taoyuan 6, Jinmen,

[^14]:    and Lianjiang districts in 2012. The latter two constituencies (both offshore islands) saw candidates from within the pan-blue camp competing against each other.

[^15]:    ${ }^{36}$ R. H. Brookes, "Electoral Distortion in New Zealand," Australian Journal of Politics and History 5 (November 1959): 218-23; R. H. Brookes, "The Analysis of Distorted Representation in Two-Party Single-Member Elections," Political Science 12, no. 2 (September 1960): 158-67.
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    ${ }^{39}$ See Rein Taagepera, "Seats and Votes: A Generalization of the Cube Law of Elections," Social Science Research 2, no. 3 (September 1973): 257-75.

[^17]:    ${ }^{40}$ For examples of partisan bias in the electoral system in the UK, see Adrian Blau, "Partisan Bias in British General Elections," British Elections \& Parties Review 11 (2001): 46-65. For examples in Australia, see Jackman, "Measuring Electoral Bias: Australia, 1949-93."
    ${ }^{41}$ In Japan this is more than offset by an electorate size bias that favors parties with rural strongholds.
    ${ }^{42}$ Mikael Mattlin, "Nested Pyramid Structures: Political Parties in Taiwanese Elections," China Quarterly 180 (December 2004): 1031-49.

[^18]:    ${ }^{43}$ In both 2008 and 2012, the KMT won two seats in both three-seat aboriginal constituencies, with the remaining seats secured by the PFP (lowland district) and NPSU (highland district).
    ${ }^{44}$ Galina Borisyuk et al., "A Method for Measuring and Decomposing Electoral Bias for the Three-Party Case, Illustrated by the British Case," Electoral Studies 29, no. 4 (December 2010): 733-45; Michael Thrasher et al., "Electoral Bias at the 2010 General Election: Evaluating Its Extent in a Three-Party System," Journal of Elections, Public Opinion \& Parties 21, no. 2 (2011): 279-94.
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