3

Components of Complex and Composite Electoral Systems

In Chapter 2, we introduced several basic features of electoral systems, with a focus on those systems that we call "simple." In this chapter, we turn our attention to several more complex rules and systems that consist of composites of different rules. Many of the world's countries have complex electoral systems, and thus it is important to work through their details. However, the complications are not only about the systems themselves. The more complex the rules are, the more we risk finding ourselves in uncharted territory. When systems are more complex, we often have fewer past cases with similar rules from which to draw empirical lessons. Further, logical predictive models might elude us or have to be made overly complex themselves.

In this book we will show that one class of "complex" systems ("two-tier PR") can be covered under a simple logical model (Chapter 15). We will have less to say about other complex systems, although in Chapter 16 we will show that some of them behave a lot like simple systems after all! The implication is that perhaps some countries or other jurisdictions using (or considering using) complex systems could get by with simpler alternatives without changing outcomes all that much.[1]

This chapter will begin by delving further into single-seat district (M=1) systems, discussing how they can be made more complex than plurality/FPTP by the choice of electoral formula. Then we turn to multiseat districts where the rules are candidate-based, rather than list-based. These more complicated M=1 and M>1 systems retain the feature of those discussed in Chapter 2, which is to say that all seats are allocated in a single set of districts. That is, every voter votes in just one district for any given legislative chamber. Then we turn to multitier and composite systems, a common form of complexity in which one set of district overlays another, which means that every voter actually votes in two (or more) districts for the same legislative chamber. This chapter also discusses other complications to basic rules, such as legal thresholds.

[1] Exceptions would be cases where complex provisions are adopted to exclude some "undesired" party or to give an unusually large boost to the leading party. These sorts of complexities can have perverse results, and we will offer some examples in Chapter 15.

TABLE 3.1 *Possible seat allocation rules in a single-seat district*

	Categorical ballot (vote for one candidate)	**Ordinal ballot (rank two or more)**
Plurality	First-Past-The-Post	Borda Count
Majority	Two-Round	Alternative Vote

SINGLE-TIER COMPLEX SYSTEMS

If there is a single tier of districts, any complexity comes from the formula employed. We first discuss M=1 systems that have complex formulas, and then turn to M>1, candidate-based, systems. What leaves the formulas discussed here outside of the family of simple systems is the second criterion introduced in Chapter 2. That is, as single-tier systems, they conform to the first criterion (all seats allocated solely within districts); they do not necessarily conform to the second one (following votes distributions) because they make possible one party leading in the initial vote, but a different party winning the seat.

M=1, Complex Formulas

When the country is divided into single-seat districts, there are two basic choices. The candidate with the most votes (plurality or "relative majority") in each district could be declared the winner. If this is the case, we have the simple "first-past-the-post" (FPTP) formula discussed in Chapter 2. Alternatively, an absolute majority (more than 50 percent of the votes) could be required. In either case, the voter can be asked to cast either a categorical ballot for one candidate or to rank the candidates, as shown in **Table 3.1**.

In *First-Past-The-Post* systems, the candidate with the most votes wins, but in the other examples shown in Table 3.1, the process of determining the winner is more complex. In *Two-Round* (runoff) systems, the candidate with the plurality of the vote wins only if he or she has reached a stipulated threshold of the votes. If the required threshold is not reached in the initial voting, then there is a second round of voting on a later date.[2] Participation in the second round is almost always restricted to the top two vote-earners from the first round. Often the required threshold is a majority of the vote

[2] Rules for many elections in the US state of California now require a second round regardless of vote shares in the first round (the so-called "primary"). Thus it is possible that a candidate could have an outright majority in the first round but still be subjected to a second round, which the initial runner-up could win (given new information or different turnout of voters in the second round). Other states likewise use two-round majority in their general elections, while also having party primaries (which are also two-round), e.g., Georgia.

(half, plus one), in which case it may be called "Majority Runoff" or "Two-Round Majority."

Other thresholds are sometimes used in two-round systems. For instance, for presidential elections in Costa Rica, if the candidate with the most votes has at least 40 percent, the election is over in one round (Lehcouq 2004). Several other variations on two-round systems for presidential elections allow a winner with less than a majority in the first round under stipulated conditions but require a second round under other situations; Colomer (2004) aptly dubs this set of rules "qualified plurality."[3]

What all two-round rules have in common is that the eventual winner may not be the candidate with the most votes in the first round. That is why it fails our definition of "simple." In a context of political fragmentation, this feature may be an advantage, by preventing an extremist candidate form winning simply by having the largest block of passionate supporters but being less preferred by a majority of voters. Few stable democracies use a two-round majority system for assembly elections, but it is fairly widespread in Africa (see tables in Reynolds, Reilly, and Ellis 2005: 30–31).[4]

While two-round systems almost always restrict a second round to the top two candidates, there can be exceptions. French rules for National Assembly elections permit multicandidate runoffs.[5] If more than two candidates remain, the candidate with only a plurality of votes in the second round may be declared the winner ("Two-Round Majority-Plurality"). In most French runoffs only two candidates compete, as parties that finish lower than second in the first round tend to drop out and endorse one of the front-runners. However, occasionally more than two candidates remain in the second round. Majority-Plurality is unusual; the only other case to have used it recently over several elections is Hungary.[6]

In the *Alternative Vote*, voters have an ordinal ballot on which they can rank the candidates. When the votes are counted, the weakest candidate is eliminated and his voters' votes are transferred according to their second preferences. The process is repeated, if necessary, possibly involving some voters' third and lower preferences (if their higher preferences have already been eliminated). Australia has used the Alternative Vote, with some variations (Farrell and McAllister, 2006; McAllister and Makkai 2018), for about a century. Australia requires

[3] Sometimes the criteria for first-round victory are both a vote percentage and a margin over the runner-up – for instance, 45 percent or 40 percent with a ten-point lead over the runner-up. See Shugart (2007). A proposal for a variable threshold was presented as the "double complement rule" by Shugart and Taagepera (1994). See also Jones (2018).

[4] We are not aware of thresholds lower than a majority in two-round rules for assembly elections.

[5] Under current rules, a candidate qualifies for the runoff by earning votes equivalent to at least 12.5 percent of the registered voters in the district. In French presidential elections the runoff is restricted to the top two.

[6] Where there is also a list-PR component, making it a composite system (defined later in this chapter).

TABLE 3.2 *Example of basic seat allocation options in a single-seat district*

	Left	Center-Left	Center-Right	Right	TOTAL
First or only preference	33	14	24	29	100
Second preference	14/2=7	33+24/2=45	14/2+29=36	24/2=12	100
Third preference	14/2=7	24/2+29=41	33+14/2=40	24/2=12	100
First-Past-The -Post	33 **wins**				
Two-Round, 2nd round	33+14=49	Eliminated	Eliminated	29+24=51 **wins**	
Alternative Vote, 2nd stage	33+14/2=40	Eliminated.	14/2+24=31	29	100
3rd stage	40	—	31+29=60 **wins**	Eliminated	100

Source: Modified from Taagepera (2007).

voters to rank all candidates, and thus the counting procedure ensures that one of them wins a majority; accordingly, it is called the "Majority-Preferential" system. In other jurisdictions voters have the option of ranking only as many as they wish, or are limited in how many they are allowed to rank.[7] In such cases, a majority of all votes cast may not be required to win in practice, because of voters not having ranked all candidates. As with two-round majority, sometimes the candidate who has the most first-preference votes is not the winner when later preferences of initially lower-placed candidates are transferred. Thus it is not a simple system. The Alternative Vote is used in some municipal elections in the United States, where it is often called "Instant Runoff."

In *Borda Count*, the ranked votes are weighted. When four candidates run, every 1st preference receives three points, every 2nd preference two points, and every 3rd preference one point. These weighted votes are added up, and the candidate with plurality wins. Borda Count is highly susceptible to strategic voting, and hence is a good system "only for honest men," as Jean-Charles de Borda himself put it 200 years ago (Colomer 2004: 30). Only one country country uses a variant of Borda Count for its full assembly: the small Pacific island state of Nauru (Reilly 2002). Slovenia uses Borda count for its single-seat districts that elect members of the Hungarian and Italian minorities (Lublin 2014:146). We will not discuss the Borda Count further, given its rarity.

[7] For instance, in Papua New Guinea, a valid vote requires ranking precisely three candidates. In municipal elections in San Francisco, California, voters may rank up to three candidates.

Table 3.2 illustrates the workings of the three most common systems for choosing a single winner. Here we compare outcomes under FPTP and more complex M=1 formulas for a hypothetical distribution of votes. Our scenario has one hundred voters and four candidates, assumed to line up on a simplistic left-right ideological scale. When voters are asked to rank candidates, we will assume that their second preference is the candidate closest to their first choice. In the case of equal closeness, they are assumed to split their second preferences evenly between the candidates to the left and to the right of their first preference. These assumptions are overly simplistic, but needed to make the example tractable.

Left has the most first preference votes and wins by the FPTP rule, despite only a third of the vote. By the two-round majority rule, the second round pits Left against Right, the centrist voters shift to their ideologically closest candidates, and Right wins. Finally, by the Alternative Vote rule, the process is more complex. Since no one clears fifty percent, the weakest candidate is eliminated – the Center-Left. His votes are reallocated according to the second preferences. Still, no one clears fifty percent. The weakest candidate now is Right, narrowly surpassed by Center-Right, thanks to the boost of second preferences from Center-Left. With Right eliminated, her votes are reallocated according to the second preferences, and Center-Right wins by a large margin of twenty percent.

Depending on the seat allocation formula chosen, almost any candidate could win *in this particular example*, chosen to illustrate the importance of the allocation formula. In many actual cases, however, many formulas yield the same result.

It may seem as if two-round rules permit voters to vote for their first choice in the initial round, given that they can always switch to their second-most preferred candidate of the expected runoff qualifiers. However, this can be dangerous, as voters on the French left discovered in 2002. In what would be one of the most fragmented presidential elections ever (see Chapter 11), the candidate with the most votes, Jacques Chirac (the incumbent rightist president), did not even reach 20 percent. A far-right "populist" candidate, Jean-Marie Le Pen of the National Front, came second with 16.7 percent. The main candidate of the left, then-premier Lionel Jospin, failed to crack the top two, with only 16.2 percent. Thirteen other candidates split the remaining vote. Several of these were from other left-wing parties, such as Worker's Struggle (5.7 percent), Greens (5.3 percent), and the Revolutionary Communist League (4.3 percent). It is unlikely that voters for these candidates thought they could win. It is more likely they wanted to make a statement, and that many planned to vote for Jospin in the runoff. Of course, they never got the chance. In the runoff, the combined forces of the left had little choice but to mobilize behind the right (Chirac) to stop the extreme right (Le Pen). Chirac won over 80 percent of the vote in

the second round.[8] The experience shows the importance, even in two-round systems, of being aware of how split the vote may be. It does no good to plan to vote for one's second favorite if only two worse choices get top-two vote totals.[9]

Similar cases of vote-splitting can also occur in "top two" rules used in some US states. These rules stipulate that the two top in the "primary" advance to a second round. However, these candidates might be from the same party – as happened in California's US Senate contest in 2016.[10] Republicans were split among several candidates, and the November general election was a contest between two Democrats.

It is most important to realize that the casting of votes, and even the entry of specific candidates, are not rule-blind. The seat allocation formula is known ahead of time, and parties and voters will adjust. If we return to our example in Table 3.2, we see that under FPTP, Center-Right is playing a "spoiler" role, enabling Left to win. Hence, if the opinion polls offer a realistic idea of the relative strengths of the candidates, Center-Right might drop out so as not to split the votes of the wider right. If Right and Center-Right fail to coordinate in such a way in the first election, the Left victory may teach them to present a joint candidate in the next election. In turn, this could encourage Left and Center-Left to choose between presenting a joint candidate or facing sure defeat. This is how FPTP may push the party system toward two dominant parties, as claimed by the so-called Duverger's law. However, it may take time, and exceptions outnumber the cases where a balanced nationwide two-party system develops, in part because the differences among candidates and parties are rarely all about a single ideological dimension as depicted in our example. Cox (1997) discusses extensively the conditions under which such coordination can be expected to occur. In Chapter 10 we will show that even at the district level, FPTP tends to be associated systematically with more than two parties if the national assembly size is large.

Other allocation formulas from our example in Table 3.2 exert less pressure toward concentration. In two-round majority, many candidates may continue to run in the first round, with the losers hoping to bargain with their support

[8] Despite Chirac's sub-twenty percent showing in the first round, parties supporting him went on to win the immediately ensuing assembly election in a striking case of the "honeymoon" election pattern first mentioned in Chapter 1 and explored in detail in Chapter 12.

[9] Would Alternative Vote have prevented the French left's debacle? Perhaps. It is likely that as other left-wing candidates were eliminated, their transferred preferences would have flowed to Jospin. If so, Le Pen might have been eliminated before Jospin, despite the latter's third-place standing in initial preferences. It is impossible to say for certain that this would have been the case or, if it had been, which of the two major-party candidates would have won. However, even assuming the same distribution of first preferences, it is possible that AV could have resulted in a Jospin win (and perhaps then a Socialist win in the honeymoon assembly election).

[10] This is why the first round is not really a primary. Instead of selecting the general-election candidates of however many parties are registered to compete, it simply sends the top two, regardless of party.

prior to the second round; as cases like France in 2002 show, this can be risky. In the Alternative Vote, voters do not have to worry about playing a "spoiler" role. The voter may express support for her/his favorite, even if the latter has no chance to win, and then mark as second preference the preferred one among the top candidates.

Multi-Seat Districts with Party-Oriented Seat Allocation Formulas

In Chapter 2, we introduced the concept of *party lists*, in which parties present "teams" of candidates in a district, with $M>1$, and the allocation of seats is made first via the application of a formula to these lists. Most party-list formulas are proportional, and the broad category of list-PR makes up the most common type of electoral system worldwide.

However, there are some cases of plurality or even two-round majority list systems. In such a system, all the winners in a district come from one list. This formula is termed the *Party Block Vote* (PBV). We do not consider it a simple system, because it violates the criterion that seat allocation respects the votes of parties. By definition, PBV states that the largest list[11] gets *all* the seats, meaning that even when $M>1$, nothing matters other than which party (or alliance presenting a joint list) is the largest. Unique among electoral formulas, no second or lower-placed party can win, no matter the district magnitude or how close the parties' votes are.

Party Block Vote is used for statewide allocation in the US Electoral College.[12] In the larger states the formula greatly magnifies the advantage in electoral votes for the candidate who wins the state's voting plurality. It was this feature of the formula that was critical to the dispute over votes in the state of Florida in the US presidential election of 2000. With the electoral votes from the other forty-nine states and the District of Columbia known, Al Gore had 267 electoral votes – just three short of the number needed to win – and George W. Bush had 246. Florida's twenty-five electoral votes would go to the statewide plurality winner. When the US Supreme Court stopped a recount, Bush's declared lead in the state was 537 votes out of over 5.9 million, a margin of 0.009 percent, but sufficient to win the state's full slate of electors and clinch victory.

Stable democracies have largely abandoned this formula for electing legislative assemblies because it tends to boost the advantage of the largest party even more than FPTP, weakening the opposition to the point of making

[11] In the decisive round, if the rules allow for more than one. In regional and some local elections in France, the composition of lists can be changed between rounds – e.g., to include candidates from lists that did not advance to the runoff) (Hoyo 2018).

[12] Two states, Maine and Nebraska, award one elector to the plurality winner of each House district. They use party block vote for two statewide electors. Other states use statewide plurality for their full slate.

it ineffective. Such a case occurred in Mali (briefly democratic, before its breakdown in 2012); see Chapter 16.

In contrast to such a party-centered approach, one can formally ignore the existence of parties, focus on candidates, and give each voter as many votes as there are seats in the district. In such a case, we are in the realm of "nontransferable" votes, which places the system in our next category, candidate-centered formulas.

Multiseat Districts with Candidate-Based Formulas: Multiple Nontransferable Vote

There are also $M>1$ formulas that are strictly candidate-based (or *nominal*, as Shugart, 2005a, termed them). The number of votes per voter can range from one to M, or in principle higher. If the voter is permitted to vote for more than one candidate, we have a subfamily that we will call Multiple Nontransferable Vote (MNTV). These can be highly favorable to the plurality party, depending on voter behavior, with increasing odds for minority representation as the number of votes per voter is reduced, tending towards the single nontransferable vote (SNTV, discussed in the next subsection). These rules can be used with no parties at all, because votes are cast and counted solely for candidates. The rules, per se, are party blind.

If the voter may cast as many as M votes, we have the *Unlimited Vote*. This enables a voter to spread her votes among candidates without regard to the party (if any) that nominated them. However, if there is strong party loyalty, Unlimited Vote becomes akin to Party Block Vote, decimating all opposition to the dominating party.

Unlimited Vote is used in the US for some state legislatures (including New Hampshire and North Dakota) and many local jurisdictions (which are often formally nonpartisan). It was formerly used in Thailand, where it was associated with an extremely fragmented party system and weak partisan loyalties. When, on the other hand, there are parties with strong identity in the electorate, such a rule can greatly magnify the lead of the largest one. For instance, a political wing of the armed Hamas movement, running in the 2006 Palestinian election, won a large majority of seats despite a very narrow lead in votes. Hamas voters tended to vote for all or most of the Hamas candidates even though the electoral system allowed them to vote for individuals without regard to party, if they so chose; other parties' voters were less party loyal in filling out their ballots (Abdel-Ghaffar et al., n.d. 2016). The experiences in Thailand and the Palestinian Territories are discussed further in Chapter 16.[13]

[13] *Approval Voting* amounts to unlimited vote carried to the extreme: vote for as many candidates as you please, regardless of M, and the M candidates with the most votes win. No country has ever used approval vote, to our knowledge, though some academics have recommended it (Brams and Fishburn, 1983).

One can alleviate major party dominance by allowing *Cumulative Vote*. This formula typically gives each voter *M* votes, and a voter can cast more than one per candidate. As with other MNTV formulas, the winners are those with the top *M* vote totals. A minority in the electorate can load their votes heavily on a few candidates. The system is rare, but is found in some local elections in the US.

When the number of votes per voter is less than *M*, we have the Limited Vote. Under this formula, minorities may win seats even if the majority consists of voters who give all their available votes reliably in a block. The Limited Vote seems to achieve a reasonable degree of proportionality among parties when the number of votes per voter does not exceed the square root of district magnitude ($M^{0.5}$), although we are aware of no theoretical proof. Aside from some local elections, the main use of Limited Vote is in the Spanish Senate (Lijphart et al. 1986). The logically greatest limiting of the number of votes per voter is to allow just one, which brings us to SNTV.

Single-Vote Candidate-Based Systems: SNTV and STV

With the number of votes per voter limited to one, MNTV turns into the Single Nontransferable vote (SNTV), which can have effects similar to proportional representation formulas, notwithstanding that it is a purely candidate-based formula. If ranked-choice ballots are used instead of nontransferable ones, the system becomes the Single Transferable Vote (STV), which is a nonlist form of proportional representation.

SNTV may be the simplest method that could be applied in multi-seat districts. In a district with *M* seats, the *M* candidates with the most votes win. Simplicity is generally desirable, but SNTV has a unique drawback in how it affects parties. The earliest (to our knowledge) reference to this problem was that of Henry R. Droop (2012 [1869]: 3), who observed that a party,

> commanding a sufficient number of voters to return several representatives, would fail to obtain as many as it was entitled to, through too many of its votes being accumulated upon its most popular candidates.

Consider a five-seat district. Suppose we have parties whose votes (in percent) are A: 45; B: 13; C: 28; D: 14. Party *A*'s collective votes would be sufficient to win three seats.[14] Where it runs into trouble is if it has one candidate who is *too popular*. Suppose its first candidate, whom we will call *A*1, gets 23 percent of the district vote, while its other two get 11 percent each. It is now vulnerable to electing only *A*1, if four candidates from other parties each win more than 11 percent of the vote. Parties *B* and *D* can achieve this by nominating just one candidate apiece. Moreover, even Party *C*, with just

[14] For instance, it wins three under D'Hondt (see Chapter 2), because 45/3 is greater than the initial vote percentage of either *B* or *D*, and also bigger than *C*'s votes divided by two.

28 percent of the vote, could elect two candidates if they are fairly equal in votes – say, 16 and 12 percent. Party *A* can elect more than one candidate only by getting some of its voters who prefer candidate *A*1 to vote for *A*2 or *A*3. It is this need of parties to coordinate their votes across candidates that prevents SNTV from being a simple system: the rule does not respect the relative sizes of parties, because parties, per se, do not matter to the allocation. A party wins seats only in accordance to how many individual candidates it has among the district's top-*M* vote totals. We discuss this aspect of SNTV in detail in Chapters 13 and 14;

Because of such coordination problems, SNTV is rarely applied in districts of more than three to five seats, although a system that was SNTV in its main details was used for the Colombian Senate, with *M*=100, from 1991 to 2002 (Shugart, Moreno, and Fajardo 2003). Since 2005, Afghanistan also has used SNTV, and one district has *M*>30.

Partly because of its more common use in low-magnitude districts, SNTV is often called "semiproportional." The limited proportionality, however, is not a feature of the formula itself, which actually can overrepresent small parties because all they need is to have one candidate get a top-*M* vote total. Especially with low *M* this could be a much smaller total vote share than is needed under D'Hondt or some other proportional formulas applied to party lists. For these reasons, we have referred to SNTV as a "superproportional" formula (Taagepera and Shugart, 1989a: 170n; see also Cox 1996).

Instead of having nontransferable votes, voters may be able to rank their preferences, via an ordinal ballot. In these systems a vote is "transferred" to the voter's second choice when his or her first choice is unable to be elected due to low overall support. This reduces – but does not eliminate – coordination dilemmas. Called *Single Transferable Vote* (STV), this method is the multi-seat equivalent of the aforementioned Alternative Vote. Under STV, a candidate is elected when he or she obtains a stipulated quota, which is usually the Droop quota. We identified this earlier as q_{Droop}=100 percent/(*M*+1)+1; while that "+1" is usually superfluous, note that it is not when *M* = 1: then the Droop quota yields exactly the definition of majority: *half the votes, plus one vote*.[15] The use of the same formula for *M*>1 is simply a generalization of the Alternative Vote (AV) procedure to *M*>1 PR. Under both AV and STV, weaker candidates are eliminated, and their voters' second preferences taken into account. Under STV, in addition, there are transfers of "surplus votes" of the successful candidates; when a candidate is over the quota, additional votes for this candidate get reallocated to voters' second

[15] The phrasing is worth emphasizing. Sometimes we have had students understand "half plus one" to mean 51 percent. But this would be a *super*-majority requirement. For instance, half a million is 500,000, and half plus one would be 500,001, which is only 50.0001 percent, well short of 51 percent.

choices.[16] (This latter step is unnecessary when M=1; no one else can use the votes after a candidate obtains the quota and is elected. Under STV, surplus votes are transferred as long as other seats remain to be filled.)

Table 3.3 follows up on the previous example of an unlucky vote constellation, where SNTV might allocate the largest party only 1 seat out of 5. How would STV allocate these seats? For sake of keeping the exposition manageable, let's assume that the second preferences go to the candidates of the same party, or to the ideologically closest party. Droop quota for M=5 is 100 percent/6=16.7 percent. Any candidate who reaches this quota wins a seat. Her excess votes are allocated according to her voters' second preferences. If this helps further candidates to reach a full quota, the process is repeated. If not, then the weakest candidate is eliminated, and his votes are allocated according to his voters' second preferences. In later stages, third and fourth preferences may come into play. In this particular example, the largest party wins two seats, because the transfer of ranked preferences lets it consolidate the support that was initially spread among its three candidates.

Visibly, the STV procedure is more complex than those previously described – and we have omitted some details that can make it even messier. One is the sheer number of candidates the voter may be asked to rank. There is less penalty for fielding many candidates, compared to SNTV.[17] Thus, suppose M=5, and six parties run. There might be an average of around four candidates per party, for a total of twenty-four. It is hard to rank that many candidates in a meaningful way.[18] Hence STV is rarely used in districts with more than five seats. This low district magnitude impedes the achievement of high proportionality.

STV offers maximal freedom of choice to the voters, reducing fear that one's vote might be wasted. For instance, if a voter's main concern is to enhance

[16] If the second-choice candidate already has obtained a quota, or been eliminated from the count, the vote transfers to the voter's third choice, and so on.

[17] Why would there be any penalty? After all, votes can be transferred as soon as one of the party's candidates is eliminated. One reason is that if a party has too many of its candidates eliminated in early stages of the count, it won't have them left to collect transfers later. Another reason lies in what happens if we relax the unrealistic assumption we employed in our example – that voters prefer all candidates of their first-choice candidate's party over those of other parties. In reality, voters are free to rank candidates without regard to party, so a party may not retain its votes as the count moves to further stages. Parties may guard against these risks by trying to ensure that their candidates' first-preference votes are fairly equal. See Gallagher (2005).

[18] In Ireland and some other STV jurisdictions, a ballot is valid even if a voter votes categorically for one candidate. In Australian Senate elections, voters were formerly required to rank all candidates on the ballot. Since 1983, they have been able to cast instead an "above-the-line" (or "ticket") vote for one party, which makes the system more like a closed-list system than like STV. In 2016, the rule was changed so that a ballot is valid if as few as six candidates are ranked, or a voter may rank parties above the line, rather than individual candidates. See McAllister and Makkai (2018).

TABLE 3.3 *Example of seat allocation by Single Transferable Vote (STV) in a five-seat district*

Candidates	A1	A2	A3	B	C1	C2	D
First preference votes (%)	23.0	11.0	11.0	13.0	16.0	12.0	14.0
Quota allocation	**–16.7**						
Remainder transfer (assumed)	6.3	–>+4.3	±2.0				
New totals		15.3	13.0				
Elimination of the weakest					±9.0<–	–12.0	–>3.0
New totals					26.0		17.0
Quota allocations					**–16.7**		**–16.7**
Remainder transfers				±8.6	<– 8.3		<–0.3
New totals				21.6			
Quota allocation				**–16.7**			
Remainder transfers			±4.9	<–4.9			
New totals			17.9				
Quota allocation			**–16.7**				
Residual remainders		15.3	1.2	[they add up to one Droop quota.]			
Seats for parties		**2 seats**		**1 seat**	**1 seat**		**1 seat**

Assume that candidates are listed in the order of placement on left-right scale
Source: First shown in Taagepera (2007).

women's representation, he could express high preference for all female candidates. Thus, STV has considerable philosophical appeal, and computer programs can handle the technical aspects easily. It remains a nonsimple system because whether parties win seats proportionate to their votes depends not on the formula, but on how voters deploy their rankings.

It bears emphasizing that each of the formulas for multiseat districts can be applied in single-seat districts, although then it normally goes by a different common name. As we noted in Chapter 2, all list-PR systems become FPTP when $M = 1$, provided that parties nominate a "list" containing just a single candidate. Open-list PR (mentioned already in Chapter 2 and considered in detail in Chapters 6, 13, and 14) with more than M candidates also can be applied with $M = 1$, but then it is not FPTP. In Uruguayan presidential elections, this was known as "Double Simultaneous Vote" in which the winner is the candidate with the most votes *within the party* that has the most votes.[19] Such rules also are used for the sole single-seat district in Finland and one in Peru.

[19] Uruguay later changed to two-round majority, each party settling on a single candidate via a primary.

We already noted that STV becomes the Alternative Vote. If we reduce SNTV to M=1 we again have FPTP.[20] In sum, the traditional distinction between single- and multiseat districts is not needed in the analysis of the impact of electoral systems on party systems. Actually, such distinction makes analysis harder. *Single-seat districts are merely the limiting cases of multiseat districts.*

BEYOND DISTRICT ALLOCATION: COMPLEX AND COMPOSITE ELECTORAL SYSTEMS

All electoral systems previously described offer only one district magnitude and one seat allocation formula, even while this formula might be quite intricate. The possibilities for electoral design multiply when district magnitude varies from district to district; however, if all seats are allocated in districts, the system may still be "simple." Chapter 6 offers detailed examples of such systems. Here we consider features that complicate electoral systems by introducing one of two features: (1) special rules that stipulate that a party may not win seats even if applying one of the proportional formulas would have let it win in the absence of the special rule; (2) features that allow a party to win seats in the assembly even if it won none in any of the districts. The first special rule refers to thresholds of minimal votes required to win seats. The second set of features refers to two-tier or composite systems.

Legal Thresholds

While proportional representation for parties may be considered desirable in general, a profusion of tiny parties is not. Therefore, limits on minimal representation are imposed in many countries that use PR, especially those that use large-magnitude districts. Typically, parties below a given threshold of votes are not entitled to participate in seat allocation. The legal threshold used may be a low as 0.67 percent (The Netherlands, where this is the Hare quota, 1/M, given M=150), but it is usually higher, for instance 5 percent (Germany). This is the sense in which legal thresholds potentially violate our second simplicity criterion: a party may have enough votes to have won a seat given the district magnitude and allocation formula, but it is denied because of the threshold. We discuss some examples from Israel in Chapter 5. Some countries apply even higher thresholds to alliance lists of several parties. For example, in Poland (as discussed in Chapter 1) a single party faces a 5 percent threshold, but an alliance list must win at least 8 percent.

[20] Of course, generally parties nominate only one candidate each; however, if a party had two or more candidates under M=1 SNTV, it is still a FPTP election but one in which the party with the most votes might fail to win the seat due to its internal split. In the Philippines it occasionally happens that a party faces a nomination battle and so declares a district a "free zone"; it then must coordinate on one of its several candidates or risk defeat (Kasuya 2009: 100–102).

It matters whether the threshold applies nationwide or in individual districts. Suppose a party has 4.9 percent of the nationwide votes. A nationwide threshold of 5 percent would bar it from obtaining seats. Something like this actually happened to two parties in the German election of 2013: there were parties with 4.76 percent and 4.70 percent of the nationwide votes,[21] but the nationwide 5 percent requirement meant no seats for either. However, the same threshold applied in individual districts almost surely would allow it to win some seats, provided districts have sufficiently high magnitude, because in some districts the party would be over 5 percent. A case in point is Spain, where there is a 3 percent threshold applied at the district level; numerous parties have won representation in Spain with less than 3 percent of the nationwide vote, because they obtain more than 3 percent in one or a few specific districts.

Rules of this sort can be highly consequential, especially if seats are allocated in districts, but the threshold is nationwide. For instance, in Turkey, district magnitude ranges from two to thirty-one (mean around 6.5), which should allow many small parties to win seats, especially given that Turkey has significant regional differences in its politics. Yet there is a threshold that must be cleared at the national level to win any seats in any district. Moreover, this threshold is the highest among arguably democratic countries, at 10 percent. Thus in several elections parties have won sizeable pluralities of the votes in some districts and yet no seats there (or anywhere). In Chapter 16 we will see that sometimes the largest party in a Turkish district has failed to win a seat, and sometimes parties present independent candidates to circumvent the threshold. When they do, they behave as though the system is SNTV, rather than list PR. The Polish system, referred to previously in this chapter as well as in Chapter 1, is another example of all seats being allocated in districts, yet thresholds based on nationwide votes. Similar rules are found also in Czechia and Peru.

District magnitude as such imposes an effective threshold. For example, when $M=5$, it is nearly impossible for a party to win a seat with less than 10 percent of the votes. For calculation of effective thresholds, see Taagepera (2007: 241–253). The key point is that a district-level legal threshold may block small parties in large districts while having no impact whatsoever in small districts. Again consider the case of Spain, with many five-seat districts but also districts for Barcelona and Madrid with $M>30$. Only the latter are affected by Spain's district-level legal threshold of 3 percent, because the effective thresholds inherent in small district magnitudes are larger than that.

A few legal thresholds contain an "or" clause. For instance, in Germany a party participates in nationwide proportional allocation if it obtains

[21] Respectively, the Free Democratic Party (which had been in every assembly elected since 1949) and the Alternative for Germany (a party contesting its first national election).

5 percent of the votes *or* has three of its candidates win in single-seat districts.[22] In New Zealand, a party needs 5 percent of the nationwide votes for party lists *or* just one district plurality to qualify for proportional allocation. Sweden has a provision that a party needs 4 percent of nationwide votes *or* 12 percent in any given district.[23]

Two-Tier and Composite Systems

An electoral system may consist of two (or more) components (or levels), meaning overlapping sets of districts. When these components are linked through an allocation rule that takes account of the outcome in one component when allocating seats in the other, we can speak of a two-tier or multitier system (Gallagher and Mitchell 2005b).

In such a system, there are districts as in any "simple" system but there is also another bloc of seats allocated either nationwide or in regional clusters of districts. Sets of such super-districts are commonly referred to as "upper tiers," as distinct from the "basic tier" of local districts. These systems allow parties to win seats in the assembly even if they have support that is too geographically dispersed to win in any district. In an upper tier, votes are aggregated across the districts and used for the allocation of seats in order to smooth out disproportionalities that arise from the districts. We follow the terminology of Elklit and Roberts (1996), and call these systems "two-tier compensatory."[24]

One type of two-tier compensatory system is the *mixed-member proportional* (MMP) model found in Germany and New Zealand. In these two cases, the basic tier consists of single-seat districts (using plurality) while the upper tier is nationwide[25] and uses PR rules. What makes the system "two tier" is that, on the interparty dimension where the total number of seats per party is determined, all the seats (with minor exceptions) are allocated as if it were one nationwide district. So if a party wins many single-seat districts, it will win few (or potentially no) list-PR seats, but if it wins no district seats it will still get its proportional share, all taken in the upper tier.

The way this type of system works is best illustrated with an actual example from New Zealand.[26] The MMP system was adopted in 1996, following many

[22] If a party wins only one or two single-seat districts, it keeps those seats. It just does not qualify for any seats from the proportional allocation if its nationwide party-list votes were under 5 percent.

[23] Unlike in New Zealand, however, qualifying for seats in one district does not also qualify the party for any national seats.

[24] A few actually have more than one layer of compensation seats, a detail we leave aside.

[25] In Germany, each state (*Land*) is its own upper-tier district, but the allocation ensures it functions as if it were one nationwide district, through a further complication that we will not elaborate on here (Zittel 2018).

[26] For more detailed treatment, see Shugart and Tan (2016) or Vowles (2018).

TABLE 3.4 *Example of an election under MMP: New Zealand, 2008*

Party	Votes (%)	Constituency seats	List seats	Total seats (%)
National Party	44.7	41	17	58 (47.5)
Labour Party	33.8	21	22	43 (35.2)
Green Party	6.7	0	9	9 (7.4)
New Zealand First Party	4.0	0	0	0
ACT New Zealand	3.6	1	4	5 (4.1)
Maori Party	2.4	5	0	5 (4.1)
Jim Anderton's Progressive	0.9	1	0	1 (0.8)
United Future New Zealand	0.9	1	0	1 (0.8)
Others	3.0	0	0	0
Total	100.0	70	52	122

decades under a FPTP system (which produced the two unusual results described at the beginning of Chapter 1). **Table 3.4** shows the 2008 election; all parties that won at least 4 percent of the vote or one seat are shown. The system consists of two tiers, one of which has seventy single-seat local constituencies. The remainder are elected from nationwide party lists. The system is a two-tier compensatory system because it is designed to ensure that the final seat allocation – taking into account both constituency and list seats – approximately matches the percentage of votes per party. It achieves this by taking the number of constituency-level plurality seats each party won and then, if necessary, allocating it further seats from the list to compensate it according to its nationwide list vote percentage.

If we take the case of National, the largest party, we see it had 44.7 percent of the votes. This entitles it to fifty-eight of the 122 seats by the application of a nationwide proportional formula (Ste.-Laguë, as defined in Chapter 2.) It won forty-one constituency seats. Thus it needs seventeen seats off its nationwide (closed) list in order to reach its proportional entitlement. Labour, which did poorly relative to its vote percentage in the constituencies (winning just twenty-one), needs twenty-two list seats to compensate it and bring it up to its proportional entitlement of forty-three out of the 122 seats.

As noted earlier, New Zealand has an "alternative" threshold – a party qualifies to participate in the allocation of compensatory list seats if it wins either 5 percent of the party-list votes or one constituency. Thus some very small parties have seats despite having less than 5 percent of the votes. Two parties (Jim Anderton's Progressive and United Future New Zealand) won one seat apiece simply because the party leader was capable of winning his own local constituency contest. ACT New Zealand likewise won in one

constituency; in addition to this seat, it also has four more, because its vote share is sufficient for five seats. Had it not won the constituency seat, however, it would have had no seats, given that its list vote fell below 5 percent. This was the fate that befell the New Zealand First Party, which was actually the fourth largest party in terms of votes, but it failed to clear either alternative threshold, and hence was shut out, while parties with lower vote totals but success in at least one constituency have representation. This result demonstrates the two-tier composite nature of the system: there are two paths into parliament, a FPTP path and a list-PR path.[27]

What happens if a party wins more constituencies than its proportional share? We see this with the case of the Maori Party, which has five constituency seats despite only 2.4 percent of the party vote. This number of seats won in the FPTP tier is two more than its proportional entitlement would have been, and thus the assembly was expanded from its usual fixed 120 to 122 to accommodate what is termed an "overhang" by the Maori Party.

The set of features just described for the New Zealand system typify MMP systems, such as the one in Germany. Slightly different variations of MMP are also found for the Scottish Parliament and the Welsh Assembly (Lundberg 2018), as well as for the national assembly in Bolivia (Centellas 2015).[28]

In each of these MMP systems, the voter is given two votes, one for a candidate in their local constituency and one for a party list. Because the voter need not give both to the same party, it is an example of what Gallagher and Mitchell (2005b, 2018) call a *dividual* ballot. It is possible, however, for MMP to allow the voter only one vote, with the same vote counting for both their own constituency contest and for the party list. Germany had a one-vote MMP system in the 1949 election (Zittel 2018).

The MMP composite consists of FPTP in one tier and PR in another, with compensation to make the overall outcome close to nationwide proportional representation while retaining a local-district component. It is similarly possible for PR to be used in both tiers. For instance, in Denmark, each county serves as a multiseat district. Magnitude of these districts ranges from two to twenty, for 135 in total. There is then a forty-seat nationwide compensatory tier. Representation by party is determined as if there were one

[27] Because 7 percent of the votes remained unrepresented (New Zealand First and various others), all parties that received list seats were somewhat overrepresented.

[28] In Scotland and Bolivia, the key variation is that there is no nationwide compensation. Rather, compensation occurs over regional clusters of single-seat districts. Such procedure can generate substantial deviation from proportionality. However, we would still call these systems MMP because the mechanism for distributing list seats is compensatory. The factor limiting proportionality is thus the magnitude of the compensation regions, not the allocation formula. An analogy can be drawn to Spain, which all sources we know of classify as "proportional"; yet disproportionality can be relatively high in Spain, due to the use of many low-magnitude districts.

district of 175 seats (not counting an additional four from overseas territories[29]), provided that a party clears the 2 percent threshold.[30] In this way, many districts have a rather modest district magnitude, similar to some cases of districted single-tier PR, allowing for local representation. Yet parties nationally are represented in almost perfect proportion to their overall votes.

The system of South Africa likewise has a fixed compensatory tier on top of a multiseat district proportional tier (Ferree 2018). Each tier has 200 seats, with very high magnitude in most districts (averaging twenty-two, with each of the nine provinces being a district). This tier alone already would guarantee a high degree of proportionality; yet South Africa then tacks on 200 nationwide seats and allocates the entire 400-seat parliament as if it were one nationwide district. Moreover, there is no legal threshold, and thus parties with as little as 0.2 percent of the nationwide votes, and insufficient votes to win even one seat in any of the large provincial districts, have gained a seat. In all two-tier compensatory systems in which PR is used in the basic districts, the voter is allowed only one categoric vote,[31] although in principle a two-vote design could be implemented.

Another type of composite system can be thought of as part of the same "two-tier" family even though there is no set-aside block of seats for nationwide allocation. This subfamily is known as "remainder-pooling." For instance, a quota (i.e., one of those introduced in Chapter 2) is applied in districts, but the remainder seats might not be determined at the district level. Rather, the rules might say that a party wins a seat only if it gets one or more full quotas. The remainder votes and seats are then pooled at national (or regional) level, to minimize wasted votes in the districts.[32] Thus whereas some two-tier systems have a fixed number of seats in an upper tier – as with Denmark and South Africa, for example – in a remainder-pooling system it may not be possible to answer the question, "how big is the upper tier?," except to say, "as big as necessary." However, many seats are not won by quotas become upper-tier seats, and the number of seats allocated in this tier could be different from election to election (even for a constant overall assembly size).

[29] The Faeroe Islands and Greenland.

[30] There are further complex features affecting small parties' qualification for nationwide seats. See Taagepera and Shugart (1989a: 128) and Elklit (2005: 459–460).

[31] In Denmark, open lists can be used in the basic districts (Elklit 2005), whereas in South Africa the lists are closed (Ferree 2018).

[32] In the upper tier, the allocation formula may change from what it is in the districts. Some countries even have three tiers, with complex limitations. When too many seats are deemed to go to the second tier, one may alleviate the full quota rule in the districts and allocate seats by largest remainders, as long as these remainders surpass 0.9 or 0.75 of the full quota. Estonia introduced such a relaxation around 2000.

TABLE 3.5 *Example of an election under MMP: Japan, 2012*

Party	Pct. votes (party list)	Districts won	List seats	Total seats	Pct. seats
Liberal Democratic (LDP)	27.8	237	57	294	61.3
New Komeito	11.9	9	22	31	6.5
Democratic (DPJ)	15.5	27	30	57	11.9
Restoration Party	20.5	14	40	54	11.3
Your Party	8.8	4	14	18	3.8
Tomorrow Party	5.7	2	7	9	1.9
Communist	6.2	0	8	8	1.7
Social Democrat	2.4	1	1	2	0.4
People's New Party	0.12	1	0	1	0.2
Others	1.2	0	1	1	0.2
Total		300	180	480	

The LDP and Komeito contested the single-seat districts in alliance.

Composite Systems That Are Not Compensatory: Parallel Allocation and Bonus Adjustment

Instead of a compensatory composite of basic and upper tiers, it is possible to have the two components of the system operate in "parallel." If it is a *mixed-member majoritarian* (MMM) system, then seats are allocated in two independent components, one consisting of nominal (candidate-based) contests in districts[33] and the other of PR (which may be nationwide or regional). The key distinction is that the PR seats do not compensate parties in the way we saw for MMP (Table 3.4). Instead, a party's total is just the number of district seats it won, plus the number of seats it won from the PR component of the system. This combination of rules is much more favorable to large parties or those with regional concentration than is MMP. In fact, it really is more of a "softened" form of majoritarian rules, in which small nonregional parties are given a chance to win a few seats, rather than a type of PR system. Strictly speaking, the parallel components of MMM systems should not be called "tiers" because the allocation of the list seats is not linked to the outcomes in the nominal contests (see Gallagher and Mitchell 2005b).

Table 3.5 shows as an example of MMM the actual election result in Japan in 2012. We see that the largest party, the Liberal Democratic Party (LDP) won 27.8 percent of the party list votes. Despite this relatively low popularity of the party nationwide, it did exceptionally well in the single-seat districts, where it

[33] The districts are usually $M=1$ and the allocation rule is usually plurality. However, districts can be multiseat and can use any of the candidate-based rules discussed earlier in this chapter.

picked up 237 of the 300 seats.[34] Despite this performance making it already substantially overrepresented, it still was entitled to add a roughly proportional share of the list seats (57/180) on top of its single-seat district wins. This is a major distinction from MMP, as shown in Table 3.4, under which a party tends to have a share of the *total* assembly seats that is close to its share of list votes. By adding a party's district wins and its list wins, the MMM system preserves a substantial portion of any bonus a large party might have obtained from winning many of the single-seat districts. We see that the smaller parties were significantly underrepresented overall, because while the list tier enables them to win a block of seats, it does not compensate them in the manner of MMP.

In MMM systems, the voter may have separate votes in each component of the system, as in Japan, or just a single vote that is counted both for a candidate and the list of the party that nominated the candidate. South Korea allowed the voter only one vote from 1987 till 2004, when it was switched to two votes. When there is only one vote, it puts a voter who prefers a small party in a bind. If she votes for the small party, she is voting for a party with little chance in the single-seat district. If she votes for a large party, she is unable to boost her preferred small party's chances in the PR component.

In addition to MMP (compensatory) and MMM (parallel) systems, there are also systems that combine a component elected by plurality or majority with another using PR in ways that are "partially compensatory." Mixed-member systems with only partial compensatory rules in Hungary, Mexico, and formerly Italy (1996–2001) are often erroneously classified as MMP, but their design and outcomes substantially favor parties that win many seats in the individual districts. The details can be complex; see Shugart and Wattenberg (2001) for explanation.

A further example of a composite system that is not compensatory is *bonus-adjusted PR*. These systems typically award an initial block of seats to the party or alliance with a plurality of the vote, and then use proportional representation for the rest of the seats. For instance, a system used in Greece over several elections automatically awards fifty of the 300 parliamentary seats to the party with the most votes nationwide, and then allocates the other 250 proportionally to all parties, including the bonus recipient.[35] From 2005 through 2013, Italy's system for the Chamber of Deputies awarded a guaranteed minimum of 55 percent of seats to the alliance of parties with the most votes. It then allocated these seats proportionally among parties in the alliance, and the rest of the seats proportionally to other parties (Passarelli 2018). These systems thus

[34] Partly this was due to the New Komeito, which ran separately on the party lists, but did not compete against the LDP in districts. Rather, the two parties formed an alliance for these seats.

[35] Provided a party clears a 3 percent threshold. In addition, the proportional component of this system is itself two-tier compensatory, and most of the seats at the district level are allocated using open lists. Complexity can come in many layers!

contain a strong majoritarian element – there is a premium on being the largest political force – alongside a significant proportional one.

PATHOLOGIES OF ELECTORAL SYSTEMS

Pathologies of electoral systems are a source of increased noise. While building logical models of manageable simplicity, one has to overlook many such complications. At the same time, we must be aware of the simplifications made, so as not to mistake the models for the real world. Only then can we use these models for prediction – and know the limits on these predictions.

One common pathology is malapportionment, in which the ratio of elected representatives to voters is substantially different across districts. It may be a central design element – the US Senate has two senators per state regardless of the massive population disparity across states. The districts of single-tier PR systems typically have magnitudes that vary with population, but in some cases – such as Argentina, Brazil, and Spain– the largest population districts are significantly underrepresented (Samuels and Snyder 2001; Calvo and Murillo 2012; Hopkin 2005). [36]

Another pathology is *gerrymandering*, meaning the politically motivated drawing of district boundaries. Unlike malapportionment, gerrymandering is difficult with PR systems; it is mainly a feature of single-seat districts. With PR, the added value to a would-be boundary manipulator is small and hard to forecast accurately. When M=1, on the other hand, moving geographic blocks of voters from one district to another by shifting a boundary can make a difference between a safe seat for one party (or social group) and a competitive district. Most countries that use M=1 districts have independent actors draw boundaries and thus they do not have gerrymandering. The US, however, allows states to determine the mechanism for drawing boundaries, even for federal House elections. Many states continue to allow elected legislators to determine boundaries. In this book we leave the considerations of boundary delimitation and electoral geography to one side, not because it is unimportant, but because such topics deserve their own books (see Handley and Grofman, 2008; McGann et al. 2016).

These two pathologies should be kept conceptually distinct. Gerrymandering can exist even in the absence of malapportionment: all districts could have the same population, yet the precise location of the boundaries could be determined

[36] For instance, in Brazil, where the states serve as electoral districts, there are large discrepancies in population. While the districts' magnitudes cover a wide range, even the smallest states are guaranteed a minimum M=8. The 44 million residents of São Paulo (M=70) have approximately one representative for every 630,000 residents, while the 500,000 residents of Roraima (M=8) have approximately one representative per 60,000!

for political advantage.[37] Or, all district boundaries could be immutable, but malapportionment is entrenched through political compromise or simple inaction (failure to adjust magnitudes to keep up with population movements). The two pathologies can, of course, be combined: district boundaries could be politically manipulated (gerrymandered) to ensure unequal ratios of representatives to voters across districts (malapportionment).

CONCLUSIONS

In this chapter, we have reviewed several features of electoral rules that make them more complex than the simple types reviewed in Chapter 2. These include runoff and ordinal-ballot rules that are more complex for single-seat districts than is the plurality rule. They also include the single transferable vote (STV, which also uses an ordinal ballot), a more complex form of proportional representation than the list-PR systems discussed in Chapter 2. We further reviewed legal thresholds and two-tier or composite systems, including the mixed-member family (MMP and MMM) and bonus-adjusted PR.

Each of these more complex rules has its advantages, and some electoral systems scholars and reform advocates consider some of them, especially STV and MMP, preferable on normative grounds to simpler systems (Bowler et al. 2005). Nonetheless, these systems entail some risk if adopted in places not already accustomed to them. They may not work the same as they do in their current jurisdictions, because voters and party politicians may adapt differently. Moreover, because we have few real-world cases for many of these systems, especially those that combine several features, it is difficult for us to generalize from experience. In Chapter 15, we show that we can extend a logical model to include two-tier compensatory systems. In Chapter 16 we assess the performance of several complex systems, and note that while some of them appear to work out as if they were simple, others are so complex that they mostly exceed our modelling ability. Most of this book, however, will concern itself with simple systems, because they lend themselves to logical modelling and thus to drawing general inferences. In Chapter 4, we introduce some key tools for assessing the performance of electoral systems.

[37] This is basically the case in the US, within states. There is some malapportionment in the US House across states. For instance, some states with a single Representative have smaller population than the average district in the country.