

Executive Summary

Colorado is one of 34 states that provide some form of funding for districts or schools that deal with diseconomies of scale—that are either small, sparse, or remote. The chief way in which Colorado provides this support is through the size factor, a sliding-scale weight that is applied to the base amount once it has already been adjusted for local cost of living but before other adjustments are applied. This weight is used to increase funding in smaller districts. Size factors in 2018–19 ranged from 1.0297 in the largest districts to 2.3958 in the smallest.

Colorado’s policy is largely successful at supporting districts that are especially disadvantaged by their geographies—those that enroll few students because they are rural or remote and therefore can do little to improve economies of scale. The highest size factors are all assigned to rural districts. It’s worth noting that some very sparse districts (low student densities) receive very little relative to the smallest communities, yet even the largest districts receive some support.

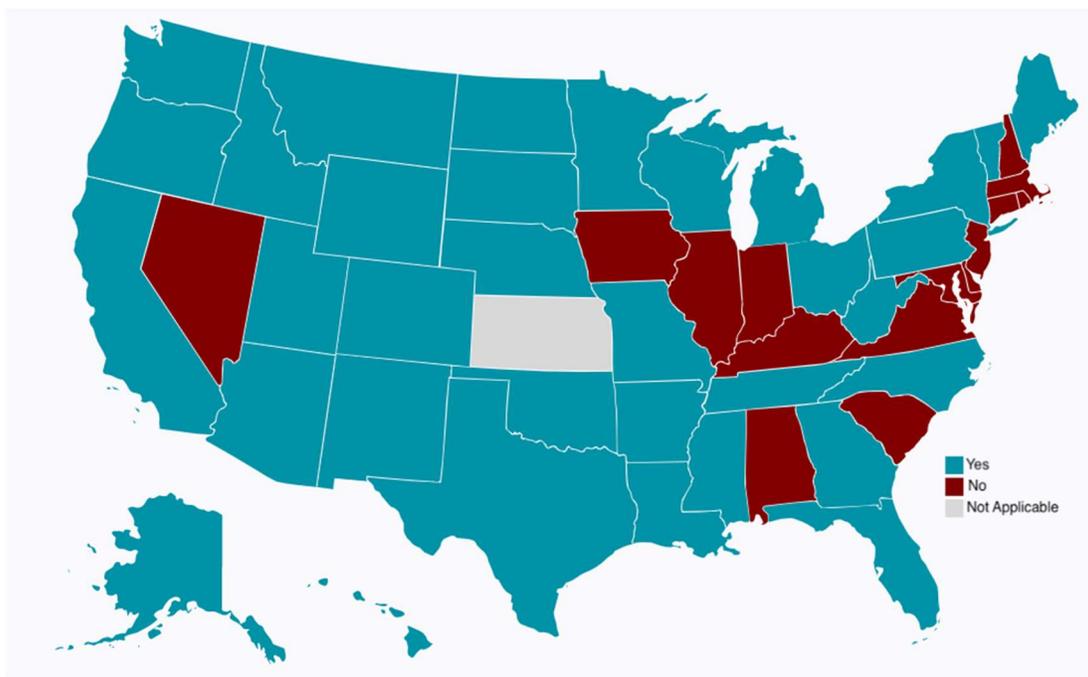
With this in mind, there are some aspects of the size factor which may merit a closer look. For instance, limiting the allotment’s beneficiaries to the very smallest districts could be worth considering, or modifying the measurement from strictly district size to one that includes district sparsity—measured by the number of students per square mile—may make sense depending on priorities.

Additionally, the State’s choice to place the size factor at the beginning of the formula calculation, as a multiplier applied to the base amount before further adjustments are made, assumes that district size has a multiplicative effect on all other aspects of spending. This may be a fair assumption, but it also leans more emphasis on district geography versus measures of specific student need. If the legislature were to decide on rebalancing these priorities, they could move the size factor to act as a simple weight on the base, similar to how the at-risk factor currently works.

There is a broad range of approaches states use to fund districts facing diseconomies of scale. Many have size-based adjustments that offer no funding at all to the largest districts, and only support smaller districts. Over half of states increase funding for districts or schools that are sparse or geographically remote. And it is more common than not for states to handle these adjustments in a discrete stage of the formula rather than adjusting the base amount to which other weights are applied.

I. Colorado’s current system of funding for district diseconomies of scale

Colorado is one of 34 states that provide some form of funding for districts or schools that deal with diseconomies of scale—that are either small, sparse, or remote.¹ The chief way in which Colorado provides this support is through the size factor, a sliding-scale weight that is applied to the base amount once it has already been adjusted for local cost of living. This weight is used to increase funding in smaller districts.



Each district is assigned a size factor based on its enrollment size. The purpose of the size factor is to recognize purchasing-power differences between districts and acknowledge differences in economies of scale, so districts with smaller student populations have higher size factors. (Other factors, such as sparsity or other economy-of-scale challenges, are not considered in the assignment of the size factor, though the State provides separate funding for small and remote schools as a categorical grant outside the formula.) Size factors in 2018–19 ranged from 1.0297 (largest districts) to 2.3958 (smallest districts). The size factor can multiply the base amount by almost 240% for the smallest districts, all else held constant. The size factor is less determinative of Colorado’s overall education dollars than the other district-based adjustment, the cost of living factor—it accounts for approximately 4% of total program funding, compared to about 15% for the cost of living factor. For some small districts, though, it can have a greater impact than any other element of the State’s funding policy.

¹ Tally current as of the 2018 legislative session.

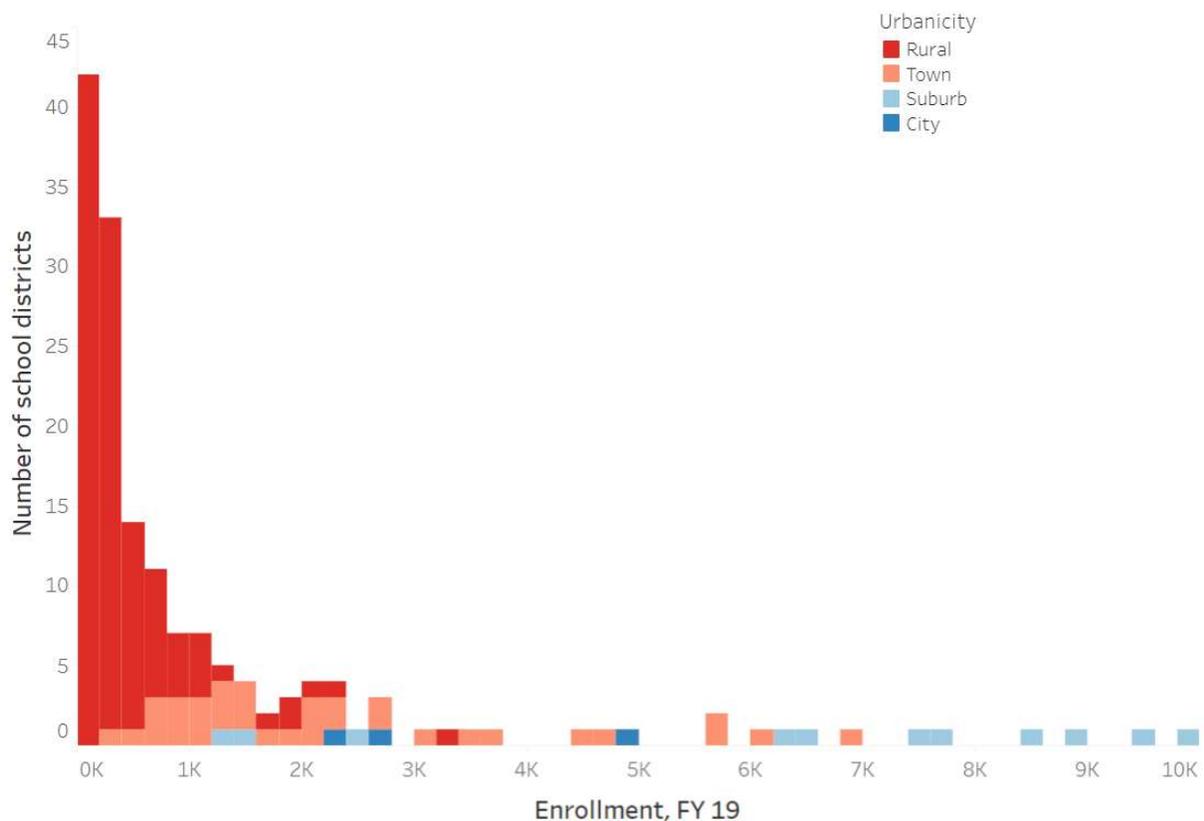
II. Assessing Colorado’s current policy

Responsiveness to diseconomies of scale

In any funding policy of this type, the primary goal is to support districts that are especially disadvantaged by their geographies. When a district has a small enrollment size because it is in a remote or sparsely populated area, or because natural features like mountains or rivers make student transportation difficult, there is little that can be done to improve economies of scale. There is a difference, however, between districts that are small because of geographies and those where communities have made the active decision to remain small due to preference. The State may want to consider how to address this difference in size due to geography vs. preference in the funding formula.

To assess this distribution in Colorado, it is helpful to see how the U.S. Census classifies the State’s school districts of various size. (These designations are based primarily on distance from an urban area.) As we can see in Figure 1, the State’s smaller school districts are rural areas or remote towns, as we would expect. However, there appear to be a handful of suburbs and communities close to urban areas—blue boxes, suggesting choice rather than geography—that fall on the smaller end of the enrollment spectrum.

Fig. 1: Student Enrollment by District’s Census Urbanicity Classification
(Districts with Enrollment < 10,000)



But when making the same comparison directly against the size factor, the distribution falls out as one would hope. In Figure 2 cities and suburbs are all pushed to the left of the graph (meaning their size factor is minimal), with a few towns pushing only slightly to the right. In fact, rather than districts receiving an *outsized* sum of revenue, the larger concern may in fact be a handful of rural districts that could benefit from more.

Fig.2: Size Factor by District’s Census Urbanicity Classification

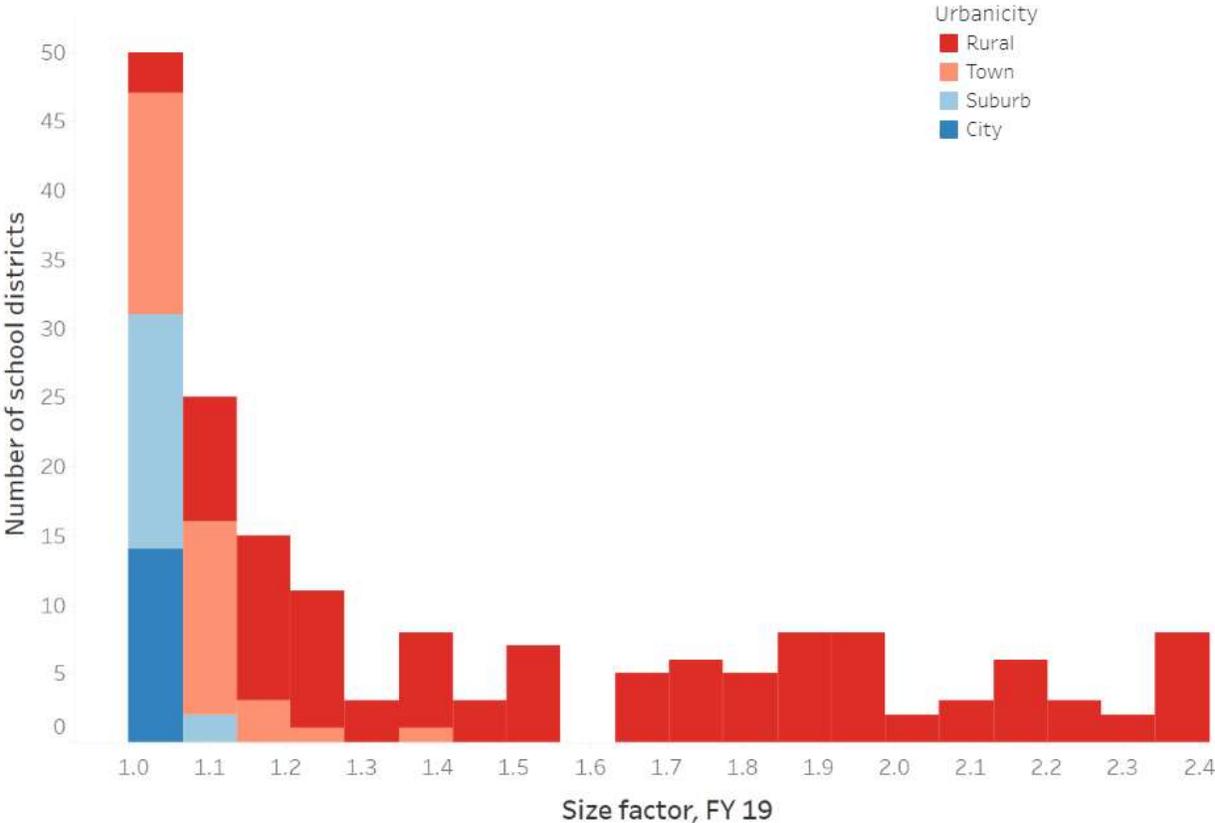
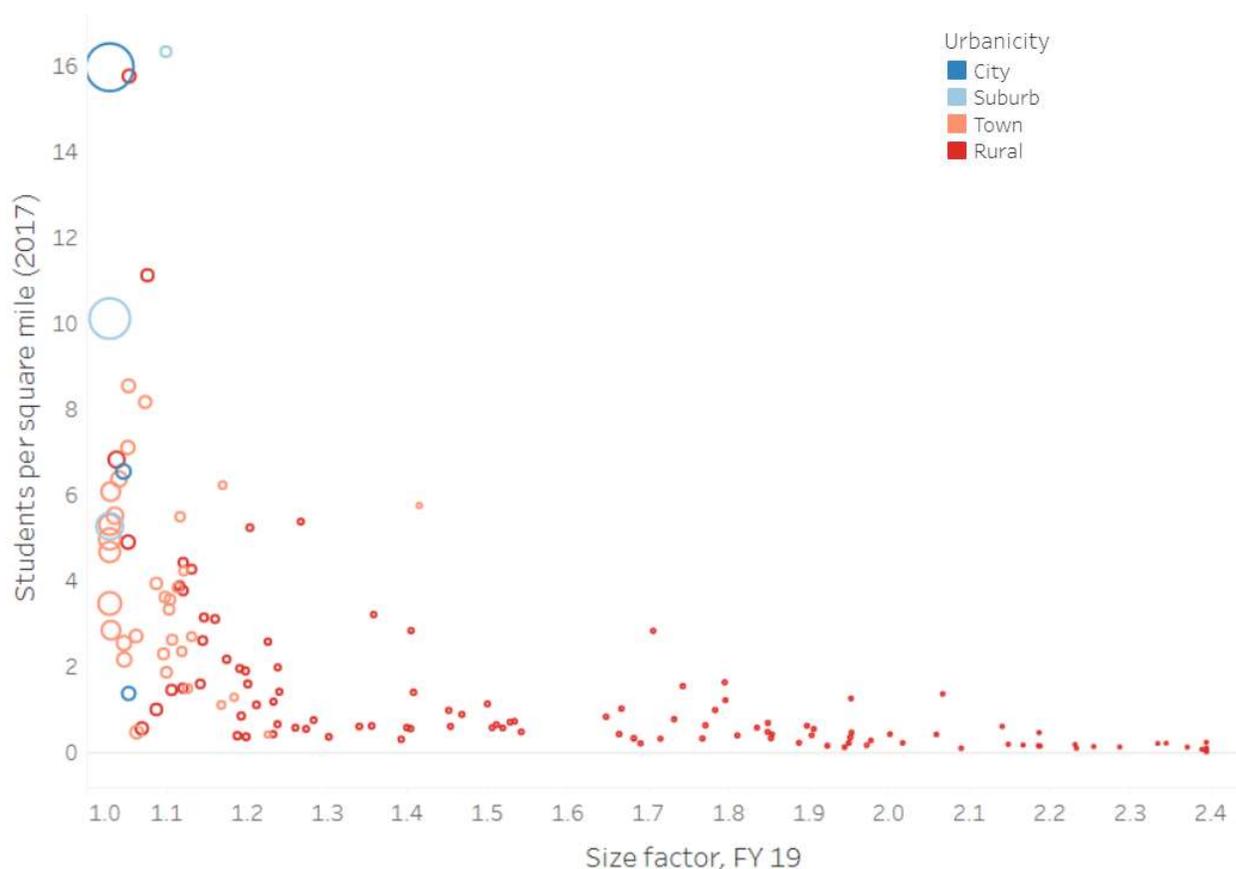


Figure 3 plots student density against the district size factor (districts with more than 20 students per mile are removed). For the most part, the smallest, sparsest districts receive the highest adjustment. However there are some districts—primarily red circles in the lower-left corner—that appear to be fairly small, with very-low numbers of students per square mile, while receiving relatively little from the size factor adjustment. It may be worth considering whether districts of this type would be appropriately included in an adjustment focused on economies of scale.²

² More information can be found online using the interactive tool, but a random sample of these districts might include West Grand, Plateau Valley, Crowley County, Del Norte, etc.

Fig.3: Student Density by District Size Factor



Role of the size factor in the total program funding calculation

The size factor and cost of living factor are both applied to the base amount before further adjustments are made, and therefore, they play a very significant role in the computation of total program funding. This is especially clear in the effect that they have on the at-risk weight. Because the base amount is adjusted for size and cost of living before the at-risk weight is applied, the amount of funding generated by each at-risk student is influenced by these factors as well. Given the 2018–19 base amount of \$6,769, the at-risk factor value of 0.12, and the range of size factors possible, the value of the at-risk supplement could vary by over a thousand dollars per eligible pupil. In a district with the lowest size factor of 1.0297, setting aside the effect of the cost of living factor, the at-risk supplement would be worth \$836 per at-risk pupil. In a district with the highest size factor, 2.3958, that calculation would yield an at-risk supplement of \$1,946 per student. As a consequence, at-risk students in large districts receive substantially less support from the State than they would if they lived in smaller districts. This adjustment may make sense given the additional costs associated with providing education in small communities, but is necessary to be aware of.

III. Policy options for small-district funding in Colorado

Responsiveness to diseconomies of scale

The State could take one of a few different approaches when it comes to ensuring that its funding formula is responsive to districts' economy-of-scale challenges.

- 1) The size factor could be kept as it is. As the analysis above shows, the current size factor system does provide the most support to rural and remote districts, supporting districts whose diseconomies of scale are largely greatest—and most unavoidable.

This approach has the clear benefit of avoiding the need for any legislative changes or adjustments in district budgets. Because the size factor currently drives such a large portion of formula funding, those districts with higher size factors rely a great deal on this funding; changing the system could be challenging for those districts, and would require a carefully planned transition. Additionally, the present policy is, by and large, achieving its goals. However, the current system does have downsides. Because every district, no matter how large, does receive *some* increased funding through the size factor, the State is spending a fair amount of its size factor dollars supporting districts that do not face diseconomies of scale. Additionally, by focusing on size to the exclusion of geographic factors, there may be some districts receiving more or less than would be optimal given their circumstances.

- 2) One modest policy change that Colorado could pursue would be to set the lowest size factor at 1.0 rather than 1.0297, and set a maximum size for districts to be eligible for size factor funding. If the State's goal is to support districts that face diseconomies of scale due to their size, then it may make sense to limit the distribution of this funding to districts that are genuinely judged to be small by Colorado standards.

In order to bring about this change, the legislature would need to change the size factor calculation described in Colo. Rev. Stat. § 22-54-104.

This approach has the advantage of preserving the overall structure of the formula while still sharpening the policy's focus on the intended recipients of the funding. Additionally, by limiting the applicability of the size factor to smaller districts, the State can either increase the size factor funding for those districts, or recoup funding for other important priorities. The downsides of this approach are that budget and planning shifts would be required for larger districts, and that some remote areas with small, but not tiny, student populations may be left out.

- 3) A more significant change would be for the State to move away from funding districts based purely on their enrollment size and begin to consider other diseconomies of scale—namely, to transform the size factor into a weight for sparsity or rurality. There are a number of models in place for this in other states. One version of such a policy would be to replace the

current size factor with a sliding-scale weight that increases the base amount in districts with fewer students per square mile than the state average. Another option would also be for the legislature to take the funding currently allocated to the size factor and distribute half of it based on size, with the other half distributed based on sparsity.

In order to implement this change, the legislature would need to change the size factor calculation described in Colo. Rev. Stat. § 22-54-104 to reflect the new calculation.

The benefits of this approach are that it may do a better job calibrating funding policy to address true diseconomies of scale—those that are due to geographies. While the vast majority of very sparse districts in Colorado benefit from the current size factor, there are some that may be slightly larger in terms of enrollment, but have very low student density. The reform would give the State the opportunity to increase distributions to those districts, if desired. The chief downside of this approach is that, given the size of the fund and the level of change, it would require more transition time and/or funding, and some districts that do not require the additional help may receive additional aid due to a larger net.

Role of the size factor in the total program funding calculation

The size factor currently inflates the base amount before other adjustments are made. As a result, those other adjustments—most notably, the at-risk weight—reflect and amplify the size factor. The two clearest options for this aspect of the policy are:

1) The State could maintain its current formula structure. Having the size factor increase the base to which other adjustments are applied is unusual, but it is a policy choice with a reasonable theoretical underpinning. If the legislature believes that small districts need more funding to educate low-income students and English-language learners than large districts do, because diseconomies of scale have a multiplicative effect across all factors, then this policy should be retained.

This approach has the advantage of avoiding any statutory adjustments or changes to district budgets. It also may serve the State's goals, if indeed the intention is to provide more funding for low-income students and English-language learners in small districts than those in large ones. However, if that is not the purpose of the policy, then retaining it has the clear downside of shifting additional dollars to a priority that is not directly tied to student need.

2) Another policy option would be to change the placement of the adjustment. Rather than use size (along with cost of living) to increase the base amount before applying further weights, which magnifies the effect of the size factor through the rest of the formula, the State could handle the adjustment in the same stage as other weights, such that the same base amount is used for size, at-risk students, and any other student-based weights that might be in the formula.

In order to implement this change, the legislature would need to change the size factor calculation described in Colo. Rev. Stat. § 22-54-104.

This approach has the benefit of making the formula calculation simpler and more transparent, since it is clearer what the base is. The main downsides are that it would change the funding levels in a fair number of districts and would require careful transition planning. In addition, if the legislature does believe that the challenges of being a small district extend to the support that is offered to at-risk students, then this would be a movement in the opposite direction.

IV. Funding for diseconomies of scale in other states

General structure

Thirty-four states, including Colorado, currently address diseconomies of scale in their education funding policies. Twenty-six provide support for sparse districts or remote schools, while twenty-eight provide funding for small schools or districts. (Twenty of these provide support for both sparsity and small size.)³

The mechanisms vary broadly, and a number of states employ more than one approach. In seventeen states, including Colorado, a weight is applied to the base amount in qualifying sparse or small schools or districts (or the state takes the mathematically equivalent approach of weighting the student count in low-enrollment schools or districts and funding accordingly). An additional ten states take the similar approach of providing a supplemental dollar amount for each student in a qualifying school or district. In eleven states, funding adjustments for sparsity size are made as part of the transportation funding system in recognition of the additional costs involved in transporting students in remote or sparse areas.

Responsiveness to diseconomies of scale

States take a variety of structural approaches to their diseconomy-of-scale funding. While some, like Colorado, focus only on district size in their allocations, others consider geographic factors such as sparsity, remoteness, and inaccessibility, all intended to target funding towards districts that are necessarily small, or face unavoidable diseconomies of scale.

Examples of states that use size as the basis for their funding include:

- Missouri, where all districts enrolling fewer than 350 students receive a proportional share of the state's appropriation for this purpose.
- Louisiana, where all districts with fewer than 7,500 students receive weighted funding on a sliding scale from 0% to 20% of the base amount.

³ Tally current as of the 2018 legislative session.

Examples of states that use sparsity as the basis for their funding include:

- South Dakota, where districts with fewer than 0.5 students per square mile receive additional funding on a sliding scale.
- Ohio, where the transportation funding formula provides more money to districts with fewer than 50 student riders per square mile.

Arkansas is an example of a state whose funding focuses on isolation and inaccessibility.

Supplemental funding is provided on a sliding scale to districts that meet four of five criteria:

- There is a distance of at least 12 miles from the district's high school to the nearest high school in a neighboring district, by hard-surfaced highway.
- The district has a density of transported students <3 per square mile.
- The district has an area of at least 95 square miles.
- The district's bus route miles are mostly on non-hard-surfaced roads.
- Geographic barriers impede transportation to schools that would otherwise be consolidated or would share programs and services.

Role in the total formula calculation of the adjustment for diseconomies of scale adjustment

Only a few states make diseconomy-of-scale adjustments in the manner that Colorado does, as a first stage that produces a new base amount for the district to which other weights are then applied. These states include:

- Alaska, where the student count is multiplied by a factor ranging from 1.0 to 2.116 depending on the sparsity of the district before other adjustments are applied. Funding is allocated in accordance with the inflated student count.
- Arizona, where the base amount is increased in small and isolated districts by a factor that can range from 1.158 to 1.669. Further student-need weights are applied to the adjusted base amount, and funding is calculated accordingly.
- Texas, where the base amount is increased separately based on both the district's enrollment size and its degree of sparsity before other student-need weights are applied. However, in the 2019 legislative session, the state passed a change to its formula that will move the size-based adjustment to a later stage of the formula, leaving only the sparsity adjustment (which is relevant for a fairly small number of districts) to change the base amount before other weights are applied.

A more common approach is to make all adjustments to the same basic allotment, in a single stage. In these states, the values of student-need weights are not affected by the adjustments for district size or sparsity. Examples include:

- Arkansas, which applies a sliding-scale weight to the base amount for students in districts facing diseconomies of scale, separate from and unrelated to the funding that is distributed for English-language learners and students from low-income households.

The weight ranges from 1.05 for small school districts that are not isolated, to 1.2 for the most sparsely populated, isolated areas.

- Louisiana, which applies a sliding-scale weight to the base amount for students in small districts, ranging from 1.0 for districts over 7,500 students to 1.2 for the smallest districts. This weight does not affect the value of other student-based weights in the calculation.
- North Dakota, which applies a weight of 1.1 to the base amount for students in sparse districts, and a sliding-scale weight that increases the base by up to 36% for small districts. This weight does not affect the value of other student-based weights in the calculation.

V. Conclusion

Colorado's size factor provides additional funding for all districts, with increasing support for districts of smaller enrollment sizes. On the whole, this policy does a good job of providing funds to rural and remote districts.

There are two areas in which Colorado might consider alternative policy approaches: The criteria used to qualify districts for this funding, and the way in which this adjustment affects the total formula calculation.

With regard to the qualifying criteria, it is currently the case that all districts, even the State's largest, receive some funding from the size factor. Additionally, the use of simple enrollment size as the basis for the calculation may mean that the funding is not necessarily directed toward districts that face the greatest barriers to achieving better economies of scale. Other policy options including setting a maximum size threshold for districts to qualify for size funding, and to change the basis of the calculation to include sparsity or another criterion that reflects districts' geographic conditions.

When it comes to the role played by the size factor in the total formula calculation, the placement of this factor at the beginning of the formula calculation means that it is magnified in importance and has ramifications for the value of other, student-based adjustments. The State may decide to maintain this structure. If there is interest in changing it, however, an alternative is to re-order the formula so that the size factor is treated as a weight alongside other student-based weights, and applied to the same base amount as those weights.