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REVIEW OF PROPOSED NEVADA SCHOOL FUNDING REGIONAL COST ADJUSTMENT FORMULA

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EXECUTIVE SUMMARY

Ekay Economic Consultants, Inc. (EEC) was retained to review the Regional Cost Adjustment (RCA) proposed by Augenblick, Palaich and Associates (APA) Consulting that will allocate State funding to Nevada school districts. The RCA, titled the Nevada Cost of Education Index (NCEI), is proposed to include a wage-based component at 72% of total and a cost of living component at 28% of total. Key findings of our review are summarized below:

Comparable Wage Index

The wage-based component of the NCEI is based on the Comparable Wage Index (CWI) methodology. There are a number of significant concerns regarding this methodology, its applicability to Nevada school districts, and its use by APA.

1. The CWI model has a number of issues associated with limitations for the data used in the model (5-Year Public Use Microdata Sample (PUMS) database from US Census Bureau), as well as structural issues with model results.
 - 5-Year PUMS data incorporates significant lag-times between the date of the content and data release, with latest 2019 5-Year database not released until January 2021.
 - The five-year spread of the data collection further complicates the effort to provide real-time demographic characteristics and wage levels, and, therefore, does not reflect current economic dynamics.
 - For example, APA's use of the 2018 5-Year database includes data from 2014 to 2018, including periods of post-recession recovery in the State.
 - The model's timing constraints cannot account for industry changes in many rapidly changing labor markets.
 - Due to geographic and collection limitations within PUMS data, additional error is introduced through regional aggregations (5-Year Public Use Microdata Areas consist of areas with 100,000 persons or more) and very low sample rates (5%).
 - One of the four labor market regions used in the CWI model includes eleven of Nevada's 17 counties, stretching from the Arizona border to the Oregon border.

- Within this eleven-county labor market the diverse economies and economic anomalies are aggregated, and the CWI model arbitrarily assigns same values to all communities within this region in a one-size-fits-all approach.
 - As a result, the model assumes the access to the labor pool for Churchill County industries, located less than an hour's drive from Reno, is the same as access to labor for Lander County industries.
 - The model assumes the attractiveness and cost of living for Eureka County, where 88% of all employees are employed in the Mining industry, is the same as for Lincoln County where no single industry dominates.
 - Average weekly wages in Eureka County are also the highest of the 17 Nevada counties, whereas wages paid in Lincoln County are 2.5 times lower; the model makes no distinction of these differences.
 - The CWI and NCEI models not only do not include a consideration of housing costs, the CWI also assumes the same regional impact on wages in Lyon County (existing home price of \$310,000), Carson City (existing home price of \$380,000), and Douglas County (existing home price of \$549,000), which includes Lake Tahoe, one of the most expensive housing markets in the nation.
- 2. In addition to data limitations, the CWI model has a number of structural issues, including:
 - The model attempts to estimate the difference in “adjusted” rather than actual teachers’ wages across study regions. To do so, the model does not consider actual teacher wages, but rather creates a proxy of “comparable” wages for workers with similar industries, occupations, and education levels. To accomplish this, the model assumes these workers have the same interests and preferences as teachers.
 - The model assumes workers are mobile and there are no barriers to movement of workers across labor markets. This is inaccurate in fast growing counties which may lack housing or counties where insufficient labor supply exists.
 - The model is based on study regions, not actual school districts. Attractiveness or lack thereof of a school district within a large labor market/study region is not considered in the CWI methodology and all school districts within the same market

are treated the same, with the same wage estimates. As a result, the model does not capture differences in the school district characteristics which may impact teacher wages within any of the multi-county regions.

3. APA further enhances the shortcomings of the CWI methodology by making a number of adjustments to the original model.

- APA removed all occupation, industry, and education controls from the traditional CWI methodology. The adjustment allows unrelated industry anomalies to impact teacher wages comparisons
 - As an example, instead of comparing wages for accountants across different regions, as designed in the original CWI methodology to account for geographic differences in the wages of these professions. The APA analysis compares wages of miners to those of police officers, to hotel housekeepers across different regions. The APA model states that it estimates only the geographic differences in wages of these professions, but differences in wages due to the various occupational characteristics are also included in this estimate.
 - By doing this, regions with a high concentration of higher paid occupations will be assumed to have higher geographical costs and, therefore, would require higher teacher wages. Because it measures not only geographical, but also industry mix differences between regions, the resulting model will show significantly higher differences in costs between these regions. Not all of these differences are geographic, but they are assumed to be in APA's CWI model.
 - Industry mixes vary strongly from county to county in Nevada. Not all of the difference between an average wage in Eureka county of \$2,010 and Lincoln County of \$807 are due to geographical (cost of living or attractiveness) differences. Some of this is due to the fact that 88% of employees in Eureka County are mining employees with higher than average wages, while no significant industry exists in Lincoln County.
 - Not only is the resulting APA index not representative of geographic cost differences between study regions, the arbitrary decisions to implement these

model adjustments also shows the ease with which the model can be manipulated to arrive at desired outcomes.

- APA also erroneously allocated Storey County to Lyon, Carson, and Douglas counties region, rather than to Washoe County, since it is part of the Reno-Sparks MSA.

Cost of Living/RPP

Another shortcoming of the CWI model is that it is based on wages only and does not consider other costs of school operations. As a result, APA proposed the NCEI include a Goods component of the Regional Price Parities (RPP) Index, which represents the difference in the cost of living between various locations. There are also a number of issues associated with this component of the NCEI.

1. APA's recommended the RPP be limited to the Goods component of the index only, excluding Services-Rent, Services-Other, and All Items also offered by the index. By limiting the index to just the Goods component the analysis does not consider the differences in the cost of housing purchases or rents, energy, or health care across the regions.
 - As discussed above, housing differences between even adjacent counties can be significant and can impact both cost of living for existing residents and affordability issues and, therefore, shortages of labor from new residents.
2. The cost of living index also suffers from data availability lag times (2019 is currently most recent) and geographic flexibility. RPP data is only available for MSAs, metro areas, and non-metro areas. As a result, smaller counties in Nevada are again aggregated into a larger group, losing their individual cost-driving characteristics in the process.

Conclusion

The over-arching weakness in the CWI model is the use of dated data (error is introduced), the use of surveyed data (more error is introduced), and the lack of geographic flexibility due to source of data (more error is introduced). The APA's adjustment of the CWI model further complicates the objectives of the model by excluding controls for industry, occupation, and

education, resulting in a model that does not only capture differences in wages due to geographical factors, but also due to industry mix and other unrelated factors.

The cost of living adjustment also suffers from a number of issues, reducing the reliability and accuracy of its results. As a result, based on the discussion contained in our report, the NCEI's methodology and data, coupled with significant differences in Nevada's economic landscape and numerous highly heterogeneous rural counties, does not provide an accurate representation of the differences of teacher's wages across the 17 school districts in the state.

While some of these issues are complex and difficult to identify, many are obvious and can lead to mistrust from the public not only of this index, but the entire funding formula, of which this will be a component. Not only that, due to the inaccuracies outlined above, the index will provide a disservice to some counties while undeservedly enriching others, creating further inequities in operating costs, which it attempts to solve.

It is our opinion that given the methodology weaknesses, data constraints and special characteristics of the various school districts and labor markets within the State, that the proposed NCEI does not accurately represent geographic cost differences between Nevada school districts. As a result, the use of this index will lead to more financial inequity between Nevada school districts than it solves. It is our recommendation that the RCA is set to 1.0 for all districts until a more appropriate methodology for the State can be developed. Local resources, such as State economists at Nevada Department of Employment, Training, and Rehabilitation, should be consulted and their primary data utilized to arrive at a transparent and durable method using current data for individual labor markets and school districts that truly reflect geographic cost differences.

Until a better index is developed, there is strong precedent to not using an RCA across the United States. In fact, of the 50 states (plus Washington DC), there are currently 13 states (25% of all jurisdictions) utilizing one of the three commonly used regional cost methodologies: 1) cost of living, 2) hedonic index, and 3) comparative wage index. Of these, some version of the Comparable Wage Index (CWI) is used by seven states. Numerous states have considered using the CWI, but chose not to do so for various reasons.

I. OVERVIEW OF CWI METHODOLOGY

This section reviews the history of the development of the Comparable Wage Index (CWI), a major component of the Nevada Cost of Education Index (NCEI) developed and recommended by Augenblick, Palaich and Associates (APA) Consulting for use in the school funding process in Nevada. It is important to review the history and benefit and shortcomings of the CWI in order to understand the appropriateness of this use by the APA.

Measurements in variations in educational costs across regions are an important consideration across school districts, states, and nationally. These measures can be used to assign resources across districts, compare operating efficiency, and recommend policy changes. Numerous methodologies to measure these variations have been proposed and a few are implemented across the US. The CWI methodology, proposed by the APA, is a version of this measurement methodology. The CWI was developed to answer issues associated with the popular geographic cost-of-education index (GCEI), which measured how much more or less it costs to provide the same quantities and qualities of school resources and services in different locations (Chambers 1998).¹

The premise behind the GCEI is that educational expenditures are made up of two components:

“(a) variations in the levels of educational services reflected in the quantity and quality of the resources used to produce those services (for example, teachers, aides, administrators, and computers), and (b) variations in the prices paid for each unit of a given resource. To account for these variations, it is necessary to adjust the actual values of expenditures that are commonly reported by public school systems in order to determine the real differences in educational services and resources across geographic jurisdictions. This adjustment is accomplished with a price index that reflects only that portion of the variation in the prices of educational resources due to factors beyond the

¹ Chambers, Jay G. (1998) *Geographic Variations in Public Schools' Costs*. U. S. Department of Education, Office of Educational Research and Improvement. Working Paper No. 98-04. February 1998.

control of local school decisionmakers (for example, inflation or geographic differences in the cost-of-living, geographical amenities like climate or crime rates, or competitiveness of the local labor market for school personnel).” (Chambers 1998)

The methodology assumes actual (nominal) educational costs include components that can be controlled by the school district or other decision makers (such as purchasing supplies and materials from certain vendors, hiring personnel with certain educational or experience requirements, etc.) and these components must be excluded in order to arrive at “real” costs of school operations. When these costs are compared across regions, only the “regional” differences can be observed, controlling for other factors.

The presumption of the GCEI is that schools have sufficient control over some expenditures, so only those expenditures over which the districts do not have control, i.e., those driven by economic forces, rather than district’s decisions, must be compared to determine cost differences among the districts. This need to isolate uncontrolled expenditures results in a need for a model that makes numerous assumptions and requires large amounts of data to exclude controllable expenditures. If controllable expenditures are not a major portion of the budget, the cost (in terms of expenses, time, error, and effort) of creating a GCEI model, versus using actual educational expenditures, may exceed the benefit of such a model.

Table 1 provides a comparison of Chambers’ findings of actual and real (adjusted by GCEI) per pupil educational expenditures for Nevada, neighboring states, and other notable locations. The table shows Nevada and Arizona have the lowest difference in actual versus real costs of the select states, though Nevada difference did increase in 1993-94.

Chambers also found Nevada had the lowest variation of educational expenditures within the state at 2%, followed by West Virginia at 2.5% and Wyoming at 2.7%. Largest statewide variation in expenditures was in Missouri (10.2%), Minnesota (9.7%), and Illinois (9.5%). States with smaller variation tend to be the smallest states in terms of total enrollment and total number of school districts. Greater populations and larger numbers of districts suggest greater potential for diversity of circumstances and, hence, costs across local school districts.

Table 1. Comparison of Actual vs GCEI-Adjusted Real Expenditures for Nevada and Other States

State	Actual Expenditures/Pupil			Real Expenditures/Pupil		
	1987-88	1990-91	1993-94	1987-88	1990-91	1993-94
Nevada (Lowest Variation)	\$ 3,298	\$ 4,294	\$ 4,661	\$ 3,339	\$ 4,281	\$ 4,892
California (Largest-# of Students)	3,877	4,595	4,718	3,431	4,000	4,226
Idaho	2,505	3,206	3,628	2,713	3,497	3,943
Oregon	4,266	5,195	5,522	4,400	5,317	5,712
Arizona	3,498	3,860	4,104	3,463	3,865	4,135
Utah (#51-Per Student Spent)	2,302	2,767	3,206	2,390	2,883	3,358
DC (#1-Per Student Spent)	5,662	8,029	8,843	5,296	7,590	8,234
Wyoming (Smallest-# of Students)	4,742	5,310	5,534	5,016	5,670	6,042
Missouri (Highest Variation)	3,425	4,271	4,547	3,657	4,610	4,789
State	Difference (Real-Actual)			% Difference		
	1987-88	1990-91	1993-94	1987-88	1990-91	1993-94
Nevada (Lowest Variation)	41	(13)	231	1%	0%	5%
California (Largest)	(446)	(595)	(492)	-12%	-13%	-10%
Idaho	208	291	315	8%	9%	9%
Oregon	134	122	190	3%	2%	3%
Arizona	(35)	5	31	-1%	0%	1%
Utah (#51)	88	116	152	4%	4%	5%
DC (#1)	(366)	(439)	(609)	-6%	-5%	-7%
Wyoming (Smallest)	274	360	508	6%	7%	9%
Missouri (Highest Variation)	232	339	242	7%	8%	5%

Goldhaber (1999) used a version of Chambers Teacher's Cost Index (Chambers 1998) methodology in focusing on educational wage costs only, rather than the entire expenditure amount. Unsatisfied with the issues faced by modeling teacher's wages, such as potential lack of relationship between wages and productivity and lack of consistent teacher wage data, Goldhaber created a proxy for teacher wages. He assumed that school districts must pay wages that are competitive with the wages of college graduates in their area, if not, new teachers will be attracted to other occupations in which the economic rewards are greater. As a result, his analysis used wage information for persons of similar educational attainment to teachers.

The resulting General Wage Index (GWI) illustrates how wages for individuals with a given set of characteristics vary across states and over time. "In effect, we are predicting how much an individual in a given state would be expected to be paid relative to how much that same individual (or an individual with exactly the same observable characteristics) would make if

he or she lived in a different state (or in a different year) that had a different set of characteristics” (Goldhaber 1999).²

Given the limitations of Goldhaber’s GWI in being unable to identify intrastate variations in cost, Taylor (2006) extended the methodology to develop the Comparable Wage Index (CWI). Like the various geographic cost indices, CWI also recognizes expenditures (whether total or labor) vary from school district to school district for two basic reasons—differences in the uncontrollable cost of education, and differences in the choices that school districts make (e.g., having small class sizes or hiring teachers who are better educated and have more experience). However, as with Goldhaber’s GWI, Taylor excludes educator wages from the estimation of a CWI because these wages “reflect not only general economic conditions but also industry specific factors such as the degree of unionization or the amount of competition among school districts. By excluding educators from the calculations, researchers can ensure that the CWI reflects only variations in the general attractiveness of a locale.”

As a result, Taylor states:

“The basic premise of a CWI is that all types of workers—including teachers—demand higher wages in areas with a higher cost of living (e.g., San Diego) or a lack of amenities (e.g., Detroit, which has a particularly high crime rate) (Federal Bureau of Investigation 2003). The CWI reflects systemic, regional variations in the salaries of college graduates who are not educators. Provided that these noneducators are similar to educators in terms of age, educational background, and tastes for local amenities, a CWI can be used to measure the uncontrollable component of variations in the wages paid to educators. Intuitively, if accountants in the Atlanta metro area are paid 5 percent more than the national average accounting wage, Atlanta engineers are paid 5 percent more than the national average engineering wage, Atlanta nurses are paid 5 percent more than the

² Goldhaber, Dan. (1999) *An Alternative Measure of Inflation in Teacher Salaries*. Selected Papers in School Finance, 1997-99. U.S. Department of Education, National Center for Education Statistics.

national average nursing wage, and so on, then the CWI predicts that Atlanta teachers should also be paid 5 percent more than the national average teacher wage.”³

The CWI makes a number of critical assumptions. First, that controllable labor costs are significant enough that they have to be excluded through a model incorporating multiple assumptions regarding appropriate variables, sources of data, timing of data, representative population, and more. Each of these assumptions introduced error into the model. Second, as stated in the above quote regarding the model, noneducator proxy must be similar to educators in age, educational background, tastes for local amenities and more, which is very difficult to replicate without surveys and access to confidential personal information.

Third, each school district must be carefully matched with the corresponding labor market. “The CWI does not capture variations in cost across school districts within a labor market, as does a cost-of-education index. In particular, it does not capture any variations in cost attributable to working conditions in specific school districts. Therefore, despite the substantial differences between them, an advantaged school district has the same cost-of-living [CWI] index as its disadvantaged cross-town rival.” (Taylor 2006)

Matching district to labor market is relatively simple for urban school districts, where, by definition, the labor market is the surrounding metropolitan area. However, for rural districts, the analysis needs to be based on elusive data for the corresponding census place of work (small-area wage data suffers greatly from disclosure limitations).

Finally, as with other geographic cost indices, the CWI methodology does not specifically address nuances in the level of wages between employees in education and non-education sectors (Taylor 2006).

Taylor (2007) also states that the CWI is only a component of a larger methodology for estimating cost adjustments across regions, stating “the CWI is a labor cost index, and labor cost is only part of the total cost of education—albeit a very large part. Therefore, while it is

³ Taylor, L.L., and Fowler, W.J., Jr. (2006). *A Comparable Wage Approach to Geographic Cost Adjustment* (NCES 2006-321). U.S. Department of Education, National Center for Education Statistics. May 2006.

clearly appropriate to use the CWI to adjust for cost variations with respect to teacher salaries or current operating expenditures, it could be problematic to apply a labor cost index such as the CWI to school district expenditures that are largely unaffected by labor cost differentials, such as energy costs (Smith et al. 2003) or capital outlays.”

Taylor also mentions (2006) that the analysis focuses solely on wages, not benefits, which may differ significantly across districts. As a result, these costs must also be considered separately from the CWI.

The table below taken from the report, shows the comparison of actual and CWI-adjusted minimum teacher salaries, by state in 1999-2000. The table shows some states have significant differences between actual and CWI-adjusted costs. For example, Montana has the highest difference between adjusted and actual costs of all states, at \$7,058 or 33.7% higher than actual wages. South Dakota, North Dakota, and Wyoming are other states with high differences, ranging from \$5,899 (24.4%) to \$6,149 (28.1%). Nevada shows a \$136 difference, 0.5% higher than actual wages. This is the second lowest difference (in absolute terms) only to Delaware with a difference of \$71, or a reduction of 0.2% from actual levels (Taylor 2006).

CONSIDERATION OF CWI METHODOLOGY FOR NEVADA

In its November 2019 presentation, “Review of Final Recommendations from Nevada School Finance Study, Presentation to Nevada Commission on School Funding” by Justin Silverstein, APA, discussed various Regional Cost Adjustment methodologies, concluding the CWI approach was “the best metric to use in looking at the differential in costs facing school districts related to personnel, as long as other district characteristics, such as size, are being taken into account elsewhere.” Mr. Silverstein listed a number of benefits of the CWI as follows:

Table 3. Minimum (beginning) teacher salaries, cost-adjusted and actual, by state: 1999–2000

	<i>Minimum (beginning) teacher salaries</i>		<i>CWI</i>	<i>CWI standard error</i>
	<i>Cost-adjusted</i>	<i>Actual</i>		
United States	\$27,989	\$27,989	1.000	0.0039
Alaska	34,402	33,676	0.979	0.0119
Alabama	33,600	29,790	0.887	0.0042
Oregon	31,503	29,733	0.944	0.0070
Pennsylvania	31,125	30,185	0.970	0.0063
Vermont	30,999	25,791	0.832	0.0107
Delaware	30,874	30,945	1.002	0.0088
Georgia	30,644	30,402	0.992	0.0035
Hawaii	30,160	29,204	0.968	0.0080
Iowa	30,150	25,275	0.838	0.0052
Wyoming	30,067	24,168	0.804	0.0135
Indiana	29,671	26,553	0.895	0.0042
Kansas	29,528	25,252	0.855	0.0050
California	29,481	32,190	1.092	0.0018
Illinois	29,256	30,151	1.031	0.0034
North Carolina	29,240	27,968	0.956	0.0058
Tennessee	29,003	27,228	0.939	0.0072
Missouri	28,899	25,977	0.899	0.0047
Nevada	28,870	28,734	0.995	0.0083
Massachusetts	28,708	30,330	1.057	0.0047
Michigan	28,703	28,545	0.994	0.0047
Louisiana	28,614	25,738	0.900	0.0053
New Mexico	28,561	25,042	0.877	0.0077
New York	28,440	31,910	1.122	0.0060
Connecticut	28,207	30,466	1.080	0.0044
Oklahoma	28,073	24,025	0.856	0.0069
West Virginia	28,054	23,829	0.849	0.0096
South Dakota	28,038	21,889	0.781	0.0102
Montana	28,037	20,969	0.748	0.0081
Texas	27,964	28,400	1.016	0.0072
Maine	27,913	22,942	0.822	0.0074
Arizona	27,762	25,613	0.923	0.0037
Nebraska	27,641	22,923	0.829	0.0068
Rhode Island	27,606	27,286	0.988	0.0091
Florida	27,590	25,132	0.911	0.0026
Kentucky	27,558	24,753	0.898	0.0051
South Carolina	27,437	25,215	0.919	0.0072
Maryland	27,393	28,612	1.044	0.0049
New Hampshire	27,169	24,650	0.907	0.0078
Wisconsin	26,993	25,344	0.939	0.0082
Arkansas	26,961	22,599	0.838	0.0059
District of Columbia	26,722	30,850	1.155	0.0062
Colorado	26,610	24,875	0.935	0.0034
Minnesota	26,556	25,666	0.966	0.0051
Mississippi	26,538	23,040	0.868	0.0069
New Jersey	26,440	30,480	1.153	0.0063
Washington	26,140	26,514	1.014	0.0083
North Dakota	25,982	20,422	0.786	0.0102
Virginia	25,927	26,783	1.033	0.0067
Utah	24,976	23,273	0.932	0.0086
Idaho	24,893	20,915	0.840	0.0079
Ohio	24,524	23,597	0.962	0.0059

NOTE: CWI=Comparable Wage Index. States sorted by cost-adjusted minimum salary. Beginning teachers are those with 3 or fewer years of experience (U.S. Department of Education 2003, p. 59).

SOURCE: Snyder and Hoffman (2002), and U.S. Department of Education, National Center for Education Statistics, Comparable Wage Index data file, 2006.

- Uses Census Bureau data so easy to update.
- Calculated by measuring the variation in non-teacher wages across localities.
 - By examining the regional wage differentials of a large sample of workers who have characteristics similar to teachers, the CWI implicitly accounts for a wide range of factors that influence the salary levels necessary to attract teachers to live and work in particular districts or regions, such as cost of living and desirability of place, including climate, cultural amenities, safety, commute times, and recreational opportunities.
 - Independent of current district teacher salary decisions.

Our team has a number of comments regarding these claims, as well as the stated potential issues with the CWI from the academic literature, especially as applied to Nevada's labor regions.

a. Data Lags and Sample Size

According to Taylor (2006, 2007) and other CWI documents outlining CWI methodology, the analysis is based on the American Community Survey (ACS) Public Use Microdata Sample for areas with at least 100,000 residents (PUMAs or Public Use Microdata Areas). Information provided to our team indicates APA used the 2018 5-Year ACS data for its 2019 CWI analysis.

There are three issues with this data source. First, release of ACS data lags from one to two years, depending on the type of dataset. For example, 2019 5-Year ACS data files were not released until December 2020. PUMS files for 2019 5-Year ACS data were not released until mid-January 2021.⁴ As a result, by the time the PUMS files are released, the files are already one year old.

More importantly, 5-Year ACS data is composed of five years (60 months) of data. For example, 2018 5-Year ACS dataset (reportedly used by APA) includes data from surveys collected from January 1, 2014 to December 31, 2018. Of the two types of datasets (1-Year

⁴ "2019 Data Release Schedule." American Community Survey (ACS), US Census Bureau. Updated March 3, 2020. <https://www.census.gov/programs-surveys/acs/news/data-releases/2019/release-schedule.html>.

and 5-Year) offered through ACS, the 1-Year database provides the most current data, but is considered less reliable as it is based on a smaller sample size. Although the 5-Year database uses a larger sample size, it is also the least current by combining data over a five-year period.⁵

By using the 5-Year database, not only is the dataset over a year old at the time it is released, APA is also basing the CWI analysis on data from 2014 to 2018. Within that time frame Nevada counties were recovering from the impacts of the Great Recession at varying success levels while significant industry changes were impacting Washoe and Storey Counties.

The third issue with the Public Use Microdata Sample (PUMS) data is the methodology of partitioning each state into areas containing approximately 100,000 or more residents and surveying at a very low sample rate of 5% (5-Year data) of population. Within rural areas of Nevada, this means many small communities must be aggregated together before 5% of the population is randomly selected and surveyed. This method effectively blends and ignores unique characteristics of the small communities in Nevada. Moreover, given the very low sample rate, it is very possible that small communities are altogether not represented in the results. The application of this methodology results in high margins of error and is better suited for understanding areas with significant population.

Not only is the data on which the CWI analysis is based may not be accurate for a diverse, fast-changing state like Nevada, the CWI is complicated to create and update. The CWI is a regression analysis, which indicates the State will require not only access to the ACS data, but also economic analysis expertise and the use of complicated statistics software that immediately incorporates margins of error sourced in the data. This is supported by the fact that the State hired a consultant (APA) for this school funding analysis, including the RCA component. Furthermore, as discussed further in the report, it is open to methodology and assumption changes, that can add further error and result in dated and inaccurate findings.

⁵ "When to Use 1-year, 3-year, or 5-year Estimates." American Community Survey (ACS), US Census Bureau. <https://www.census.gov/programs-surveys/acs/guidance/estimates.html>

The ease with which the methodology can be adjusted can open it to manipulation for various purposes.

b. Focuses on Non-Controllable Teach Salary Impacts

As discussed above, the CWI attempts to predict teacher/educator salaries based on area characteristics and wages for comparable professions. As the analysis does not directly consider teacher wages, but rather uses a proxy of wages for representative occupation wages, it is important to ensure the proxy population is actually representative of the teacher population. This is supported by Cornman (2019), who lists a number of potential issues with the CWI, including “CWI is constructed assuming that educators and the non-educator population under analysis are comparable with respect to their tastes for amenities and the cost of living. If comparability breaks down, then a CWI becomes a poor proxy for the cost of educator labor.”⁶

The methodology leaves it up to the researcher to decide this “comparability.” Taylor (2006 and 2007) provided a robust list of education and occupation characteristics considered comparable for the analysis. This is supported by APA et al., in their 2018 report titled “Nevada School Finance Study,” stating:⁷

“...CWI assumes comparability of workers. The CWI captures average preferences for a location among all non-teacher workers, so using a CWI to adjust for district wage costs assumes teachers have similar preferences as other workers and therefore require similar wage adjustments. This assumption could be strengthened by estimating the CWI with a sample of workers more closely aligned with teachers (e.g. workers with college degrees or workers in industries that require education levels and/or job responsibilities similar to teaching). However, if teacher preferences are systematically different than other worker preferences—an unlikely possibility—then a CWI may not be appropriate.”

⁶ Cornman, S.Q., Nixon, L.C., Spence, M.J., and Taylor, L.L., Gevert, D.E. (2019). *Education Demographic and Geographic Estimates (EDGE) Program: American Community Survey Comparable Wage Index for Teachers (ACS-CWIFT)* (NCES 2018-130). U.S. Department of Education, National Center for Education Statistics.

⁷ “Nevada School Finance Study.” Augenblick, Palaich and Associates, Education Commission of the States, Picus Odden and Associates. Draft, August 1, 2018.

This model depends heavily on the accurate selection of data and use of appropriate variables and, as discussed below, can be significantly impacted if the methodology is changed.

c. Other Considerations

Cornman (2019)⁸ also lists a number of other potential issues with the CWI methodology.

1. The CWI is a labor cost index only, costs of other costs should also be considered. This is done by the APA by including the RPP cost of living index to the NCEI model.
2. The CWI assumes workers are mobile. However, “if moving costs or other barriers to moving slow worker migration, then ‘labor cost may temporarily diverge from what would be expected given local amenities and the local cost of living. Employers in fast-growing industries and school districts in fast-growing areas may need to pay a temporary premium to attract workers. [A] CWI cannot capture this effect.”

Some areas of the state, such as Washoe and Storey counties, are currently experiencing significant employment growth and resulting housing shortages and price increases. This creates significant affordability issues in the area, preventing some employees from moving to the region, impacting labor mobility. This also occurs in mining-intense counties, such as Elko and Eureka when new mining operations or increases in demand for mining products and mining employees collide with limiting housing availability and impacting area wages. The CWI model would not capture these impacts on teacher wages in the region or misrepresent impacts on teacher wages when they may not occur.

3. As discussed above, the CWI model uses proxy occupations to represent teacher/educator wages. As a result, it is important to ensure data on which the analysis is based are truly representative of teach preferences and economic conditions.

⁸ Cornman, S.Q., Nixon, L.C., Spence, M.J., and Taylor, L.L., Gevert, D.E. (2019). *Education Demographic and Geographic Estimates (EDGE) Program: American Community Survey Comparable Wage Index for Teachers (ACS-CWIFT)* (NCES 2018-130). U.S. Department of Education, National Center for Education Statistics.

4. CWI is an estimate from a sample survey and is subject to the usual criticisms of sample-based research, including sampling error. As a result, data users will need to account for this variability when making claims about differences between estimated means.
5. CWI is based on local labor markets, not school districts. Attractiveness or lack thereof of a school district within a large labor market is not considered in the CWI methodology and all school districts within the same market are treated the same, with the same wage estimates. Cornman (2019) recommends, “when school districts operate in multiple labor markets (as may be the case when districts cross county lines), researchers must develop strategies for matching index values to school districts. Such strategies may introduce measurement error.”

Taylor’s (2007) CWI model divides the state into four regions: 1) Clark County; 2) Washoe and Storey counties; 3) Carson, Douglas, and Lyon counties; and 4) Remainder of State.⁹ The four regions are shown in Figure 1.

Figure 1 shows the Remainder of the State region spans across the entire state. Not only are these counties diverse geographically, their industry mixes, available occupations, amenities, access, population distributions, labor pools, proximity to out-of-county population centers, demographic characteristics, attractiveness, and other factors for these counties differ significantly.

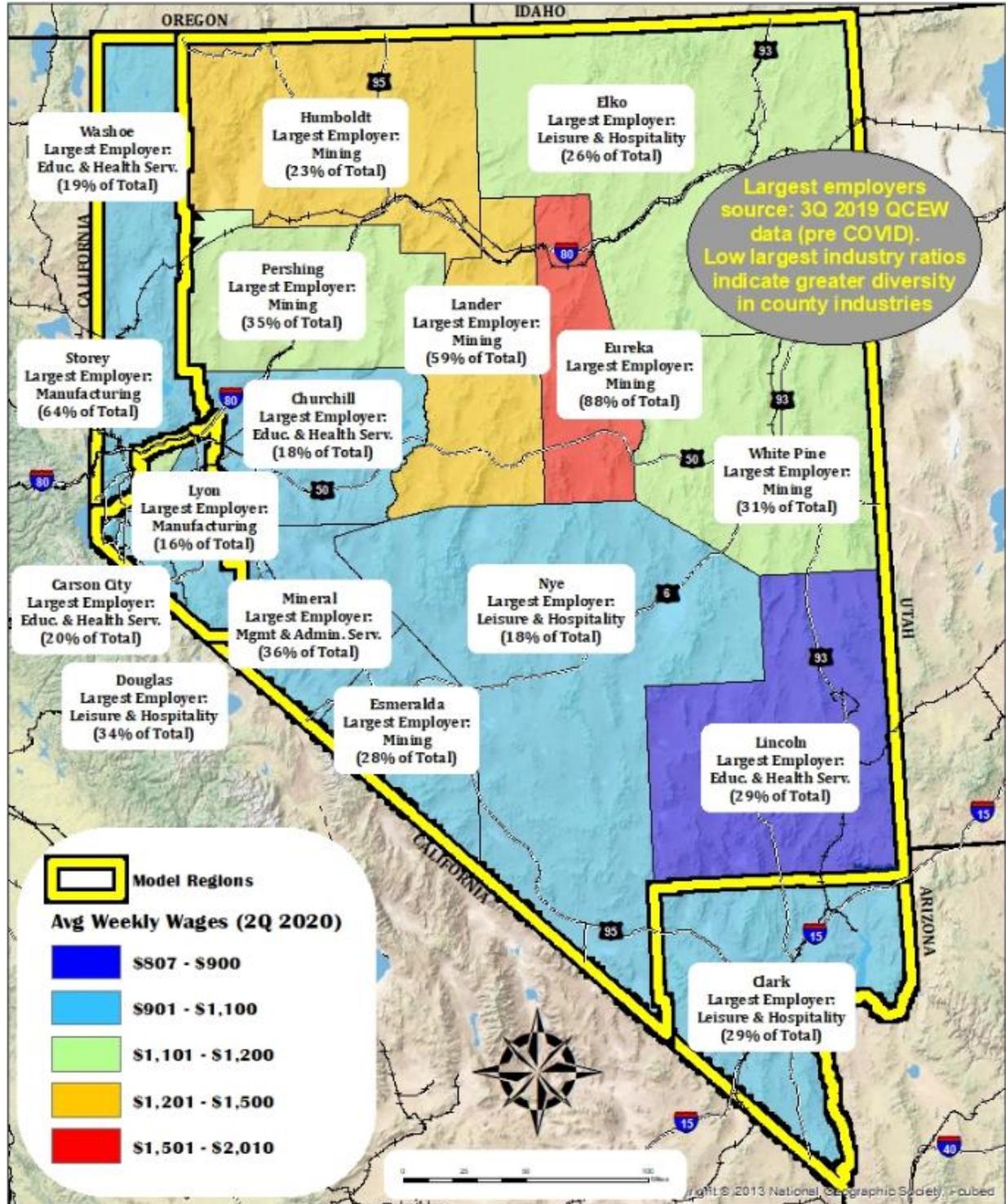
The figure shows wages and industry mix, as represented by major employers, differ significantly for these counties. Additionally, one cannot help but notice the 11-county mega-region, spanning the majority of the state’s land area and the industry and wage diversity within this region.

By combining these counties into a single region and considering only demographic factors as control variables, the analysis assumes cost of living and attractiveness of these counties (which the CWI attempts to measure as “measurement variables”) are the same

⁹ Includes Churchill, Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Mineral, Nye, Pershing, and White Pine.

across these counties, and erroneously assigns differences in all other attributes discussed above to measurement variables.

Figure 1. Map of Taylor CWI Regions-Nevada



As a result, the model assumes the access to the labor pool for Churchill County industries, located less than an hour's drive from Reno, is the same as access to labor for Lander County industries. The analysis also assumes the attractiveness and cost of living for Eureka County, where 88% of all employees are employed in the Mining industry, is the same for Lincoln County where no single industry dominates. Average weekly wages in Eureka County are also the highest of the 17 Nevada counties, whereas wages paid in Lincoln County are 2.5 times lower.

This methodology may be appropriate for a state with either equally divisible and populated regions or with areas where school districts and labor markets are closely located and aligned. This methodology matches school districts and labor markets for the two large population centers (Washoe/Storey and Clark), but is grossly inaccurate in assuming the same labor market for eleven small counties with diverse economic, labor, geographic, and other characteristics, considered Remainder of State.

6. The model attempts to quantify “attractiveness” and implies that wages in “attractive” locations should be lower because workers receive non-monetary benefits from living in the location. While this may be true in the short-term, long-term impacts are that demand for these “attractive” locations increase housing costs, which leads to only persons in high paying occupations being able to afford to move to the area. This creates shortages of lower paid, typically service occupations. While the model may capture some of these effects, the reasons for the effects are not defined in the model.

II. APA'S RCA MODEL AND METHODOLOGY

This section provides an overview APA's proposed Regional Cost Adjustment (RCA) methodology, including review of the model, sources of inputs, assumptions, and calculations.

According to the State of Nevada Department of Education (SNDE 2020)¹⁰ Senate Bill 543 (2019) created the 11-member Commission on School Funding to guide the work of the Department of Education to revamp Nevada's K-12 education funding formula for the first time in over a half-century. By request of the Commission, Augenblick, Palaich and Associates (APA) analyzed multiple components of Nevada's school funding, including a Regional Cost Adjustment (RCA) factor that would allow for the allocation of school funding among the seventeen county-wide school districts within the State.

A number of presentations by APA were provided to our team for review, along with some methodology notes by Dr. Christiana Stoddard, Montana State University,¹¹ who assisted APA in their analysis. The following discussion is based on these documents. It should be noted this report focuses only on the RCA analysis and documentations discussed by APA, it does not include a discussion of other components of school funding, including base per pupil amounts, special services, district size, or other adjustments.

In their presentation titled "Regional Cost Adjustment" (no date), APA representatives Amanda Brown and Justin Silverstein¹² discussed various available RCA approaches. Of the three proposed approaches, Cost-of-Living (COL), Hedonic Wage Index (HWI), and Comparable Wage Index (CWI), APA recommended the use of the CWI. For the Nevada CWI, APA created the index using the five-year American Community Survey (ACS) data ending

¹⁰ Commission on School Funding, State of Nevada Department of Education. Accessed January 27, 2020. https://doe.nv.gov/Commission_on_School_Funding/

¹¹ Stoddard, Christiana. "Memo on Wage Adjustments for Nevada CWI." April 23, 2020.

¹² "Regional Cost Adjustment." Presentation by Amanda Brown and Justin Silverstein, Augenblick, Palaich and Associates. No date provided. Our team was provided a number of these undated presentations with the same title. Most were similar with some small differing details.

2018 based on the methodology originated by Taylor et al. (2006, 2007).¹³ Though they calculated versions of CWI using data for employees with a bachelor's degree (BA) or higher, less than a BA, or a weighted combination of the two, ***APA recommended the CWI based on all workers, regardless of occupation and education should be used.***

Based on the multiple estimate alternatives analyzed by APA, the final recommendation was a hybrid RCA estimate called the Nevada Cost of Education Index (NCEI). This index is based on a weighted combination of two indices, the CWI discussed above at 72% and the "Goods" component of the COL index, represented by the Regional Price Parities (RPP) index utilized by the U.S. Bureau of Economic Analysis (BEA), at 28%. Presumably, this is based on the ratios of wages versus goods expenditures by Nevada's school districts. APA chose not to include the impact of housing expenses in the NCEI, expressing "some concern from economist that COL indexes may be overly influenced by housing costs."

In its final recommendations, APA acknowledged limitations of the NCEI, but concluded it was "consistent with research and practices of other states" and "reflective of competitiveness with other industries, split of expenses in state." APA also recommended on only applying the NCEI to districts with a base of 1.0 or above. Updating of the index each biennium and considering collecting district by district information to refine the index over time, was also recommended.

In reviewing this information, along with supporting documentation, our team has the following issues with the methodology and data utilized to arrive at the recommended NCEI. These are discussed in detail below.

1. WEAKNESSES OF APA'S USE OF CWI METHODOLOGY

Taylor (2006) listed a number of assumptions of the CWI model, including the ability of non-educator wages to predict educator wages, aligning non-education with education occupations, and matching districts to labor markets. However, the APA CWI model includes

¹³ Taylor, L. L., Glander, M., and Fowler, W. J. (2007). *Documentation for the NCES Comparable Wage Index Data File, 2005* (EFSC 2007-397). U.S. Department of Education, National Center for Education Statistics. August 2007.

a number of methodology assumptions that do not correspond to Taylor's methodology, further enhancing potential issues of the Taylor CWI methodology.

a. Educator vs. Non-Educator Characteristics

Taylor (2006) describes the CWI model as follows:

“The dependent variable is the log of annual wage and salary earnings for noneducators. The independent variables are age, gender, race, educational attainment, amount of time worked, occupation, and industry of each individual in the national sample. In addition, the estimation includes an indicator variable for each labor market area. The labor market indicators capture the effect on wages of all market-specific characteristics, including the price of housing, the crime rate, and the climate.” (Taylor 2006)

According to Taylor (2006), because the entire model is based on predicting educator wages, it is important that the non-educator proxies are representative of educators in the region. “Provided that these noneducators are similar to educators in terms of age, educational background, and tastes for local amenities, a CWI can be used to measure the uncontrollable component of variations in the wages paid to educators.”

In order to accomplish this, Taylor (2006) conducted significant analysis, excluding occupations and employment characteristics that may not be representative of educators.

“To ensure that the sample represents noneducators who are directly comparable to teachers, the estimation excludes a number of worker classifications. Because the sample is restricted to noneducators, anyone who has a teaching occupation or who is employed in the elementary and secondary education industry is excluded. Workers without a college degree are excluded because they are not directly comparable with teachers. Self employed workers are excluded because their reported earnings may not represent the market value of their time. Workers who work less than half-time or for less than \$5,000 per year are excluded because such part-time employees are not directly comparable to teachers. Finally, individuals employed outside the United States are excluded because their earnings may represent compensation for foreign travel or other working

conditions not faced by domestic workers. After these exclusions, the IPUMS 5-Percent retains 1,053,184 employed, college graduates drawn from 460 occupations and 256 industries.” (Taylor 2006)

Similarly, in the Appendix B, titled “Documentation for the American Community Survey Comparable Wage Index (ACS-CWI): 2013–15,” Snyder et al. (2018) also emphasized the importance of correctly matching the proxy population to educators, stating:

“The estimation sample has been constructed to ensure that the noneducator population is comparable to teachers with respect to their sensitivity to housing costs and local amenities.

The sample consists of people who

1. Are employed in private for-profit, private nonprofit, or government industries (excludes unemployed and self-employed or unpaid family workers).
2. Are between the ages of 18 and 80.
3. Work at least 20 but fewer than 90 hours per week.
4. Worked between 27 and 52 weeks in the past 12 months.
5. Have at least a bachelor’s degree.
6. Have annual wage and salary earnings above \$5,000.
7. Work in one of the 50 states or Washington, D.C.
8. Do not work in the elementary or secondary education industry and are not education administrators, teachers, librarians, teaching assistants, or miscellaneous other education workers (see Taylor and Fowler 2006).”¹⁴

Snyder et al. did include all occupations and industries in their analysis, controlling for industry differences over time with occupation and industry indicator variables for each year of their multi-year analysis.

¹⁴ Snyder, T., Dinkes, R., Sonnenberg, W., and Cornman, S. (2018). *Study of the Title I, Part A Grant Program Mathematical Formulas (2019-016)*. U.S. Department of Education, National Center for Education Statistics.

Taylor (2002) in reviewing options for updating the Cost of Education Index in Texas, discussed the importance of considering industries in these cost indices.

“However, some industries are observed in only a few Texas communities (for example, there are no drilling jobs where there is no oil.) Therefore, the state average wage for these industries would be a biased benchmark from which to compare local deviations. For example, if a particular high-wage industry is found only in Austin, the Austin’s deviation from the state average for that industry would be zero, and averaging in that zero would make the wage level in Austin appear artificially low. But restricting our analysis to those industries found in all parts of the state would also be inappropriate, because it would waste most of the available information on Texas wages.

Therefore, we used regression analysis to estimate the local wage level, with an indicator variable for each industry, each year, and each market. This strategy allowed us to isolate the independent impact of each industry on local market wages.” (Taylor 200)¹⁵

Though this description was not directly for a CWI analysis, it does stress the importance of the consideration of industry mix and industry wages in arriving at representative wages for teachers. In the CWI, Taylor (2006) included industry and occupation variables to attempt to control for the differences in this variable. This means that for each respondent used in the model, the industry in which this respondent was employed was also collected, to ensure wage differences across various industries were tracked and considered in the final results of the model. Additionally, by focusing only on educator-comparable professions, some of the differences in wages due to various occupations in Taylor’s model were considered.

Unlike the original CWI index, the index proposed by APA not only removed all consideration of education attainment (not focus only on employees with a bachelor’s degree or higher), it excluded control variables for industry and occupation, effectively ignoring industry and occupation differences on wages and how they relate to educational staff. As a result, the

¹⁵ Taylor, Lori L., Celeste D. Alexander, Timothy J. Gronberg, Dennis W. Jansen and Harrison Keller. (2002) *Updating the Texas Cost of Education Index*. Journal of Education Finance , Fall 2002, Vol. 28, No. 2 (Fall 2002), pp. 261-284.

APA model assumes that wages for all occupations, from surgeons, to miners, to police officers are representative of educator wages, regardless of economic forces, educational attainment, unions, or other characteristics. This is incorrect and misrepresents Taylor's CWI methodology.

This is a significant issue as it goes directly against the goal of attempting to understand the cost differentials among counties in the wages of certain occupations to be able to apply this to wages of teachers. The original CWI methodology included controls for industry and occupations to ensure the cost differences between study areas were measured for the same occupations. For example, in describing the CWI methodology Taylor (2006) states,

“Intuitively, if accountants in the Atlanta metro area are paid 5 percent more than the national average accounting wage, Atlanta engineers are paid 5 percent more than the national average engineering wage, Atlanta nurses are paid 5 percent more than the national average nursing wage, and so on, then the CWI predicts that Atlanta teachers should also be paid 5 percent more than the national average teacher wage.”

Using this example, the CWI in Nevada would measure how much more do accountants make in Washoe County versus Lyon County, versus other counties. Same is done for engineers, and other comparable occupations. Without these controls, the APA's CWI compares wages for all occupations in Washoe County to wages in all occupations in Lyon County, and other counties. Wages are not compared to the same occupation to determine only the difference in the wages for that occupation across the different counties, but to all wages. As a result, the model captures not only geographical differences in wages, but also differences in what different industries pay their employees based on skill requirements, hazardous or risky work, or a number of other characteristics that create differences in wages among occupations.

As a result, instead of comparing accountants across different regions, as designed in the original CWI methodology, the APA analysis compares wages of miners to those of police officers, to hotel housekeepers across different regions, with the assumption that the

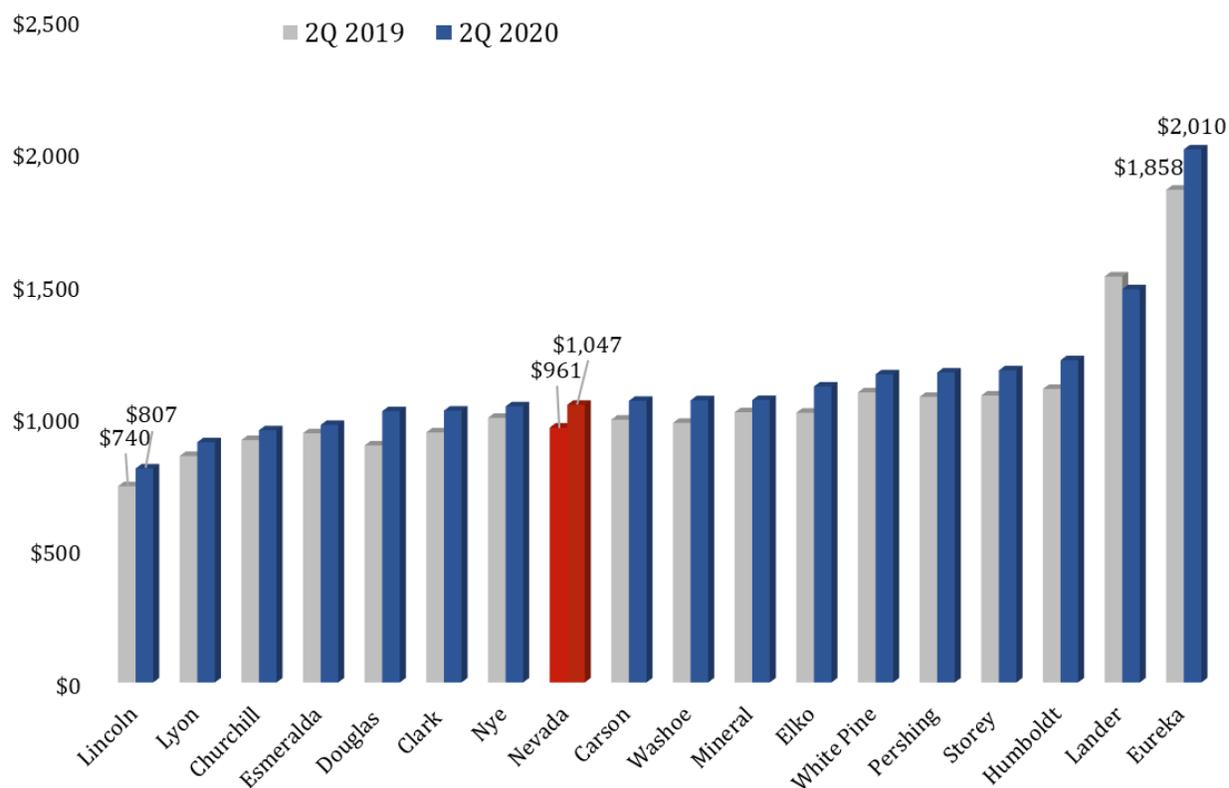
difference between these wages is due to geographical factors, rather than differences in occupations themselves.

In doing this, regions with a higher number of higher paid occupations will be assumed to have higher geographical costs and, therefore, would require higher teacher wages, whether this is actually accurate or not. Because it measures not only geographical, but also industry mix differences between regions, the resulting model will show significantly higher differences in costs between these regions. Not all of these differences are geographic, but they are assumed to be in APA's CWI model.

While this may be less important in smaller or states with homogeneous economies, this is important in Nevada, which like Texas, differs in industry mix across counties. Figure 2 shows the differences in average weekly wages for the seventeen counties in Nevada, compared to the overall state wage from the Nevada Department of Employment, Training, and Rehabilitation (QCEW 2020).¹⁶ Data is provided for second quarter 2019 and second quarter 2020 (latest data available). The table shows 2Q 2020 wages range from \$807 for Lincoln County to \$2,010 for Eureka County.

The difference in these wages is due to the various industry mixes within these counties. In Eureka, Mining, Quarrying, and Oil and Gas Extraction industry made up 88% of all county employees, with an average wage for the industry of \$1,982. In Lincoln County, where no significant industry exists, Public Administration industry made up 19.5% of all county employment with an average wage of \$737, followed by Health Care and Social Assistance (16.1%) at \$851, and Retail Trade (12.9%) at \$369.

¹⁶ Employment and Wages by Industry – QCEW, Nevada Department of Employment, Training, and Rehabilitation. Accessed January 27, 2021. <http://nevadaworkforce.com/Home/DS-Results-QCEW2>

Figure 2. Comparison of Average Weekly Wages-State and Counties

Given the significant differences in wages among industries and the differences in the industry make-up of individual counties, the APA's version of CWI, which does not control for industry differences but rather includes all wages for all industries and occupations in the model, provides an inaccurate view of geographic differences in wages in study regions. This conflicts with the CWI's objective to determine wages that should be paid to teachers based on regional, rather than industry, differences in the area only.

The original CWI methodology modeled these wages for persons who would compete with teachers in terms of education and similar occupations. By including all occupations and education levels, the APA analysis assumes teachers in a mining-heavy county should be paid as much as mining professions, even though the two industries are not impacted by the same labor forces and presumably, mining employees are not representative of teachers and will likely not compete for the same jobs.

Overall, APA recommended the NCEI estimates and methodology, stating “For wage adjustments, research in this area is consistent that the wages of comparable workers are the best way to reflect the mix of cost of living and attractiveness of location.” However, APA’s use of all occupations and education levels in its CWI model does not represent “wages of comparable workers,” but rather all workers, even those impacted by labor market forces different from those impacting the education industry.

The APA presentation also states, “CWI using all professions and all education levels is appropriate in the absence of specific data on occupational patterns in Nevada.” No additional information is provided as to why this assumption is appropriate, when the original CWI methodology (Taylor 2006, 2007) uses specific education levels and occupations comparable to teachers only. Additionally, it is unclear why specific data on occupational patterns in Nevada is unavailable, as Taylor and other researchers conducted multiple CWI studies across the US, including Nevada.

Baker (2008) discussed the issue of not controlling for industry mix in regard to Missouri’s Dollar Value Modifier (DVM), which is a CWI-based regional cost adjustment index. According to Baker, Missouri’s DVM did not consider workforce age or education, nor did it include a consideration of the industry factors for each region. As a result, Baker stated,

“An area of the state with more doctors and lawyers will get a bigger school funding adjustment than an area with a meatpacking or chicken-processing plant, even though teachers are unlikely to make a career change in either of those directions. Quite likely, it will be more difficult to recruit and retain teachers in that area with the meatpacking or chicken-processing plant, or with no viable industry at all.

A legitimate comparable wage index estimates how physicians’ wages might vary from one labor market to the next, how lawyers’ wages vary from one labor market to the next, and how laborers’ wages vary from one labor market to the next, avoiding the potential problem of paying teachers like doctors in a county with more doctors and paying teachers like laborers in a county with more laborers. Similar problems may exist even

in a well-estimated comparable wage model because varied local economies support varied wages across professions.

As discussed previously, a comparable wage index approach is best applied to geographic areas defined as labor markets, or areas within which teachers are likely to sort. Identifying labor markets is inherently problematic because lines must necessarily be drawn between geographically contiguous areas. Where big cost differentials are applied across contiguous districts, significant inappropriate labor-market distortions may be created. This is especially true where higher- poverty and higher- need districts are the ones that lie just outside of the labor market that receives higher wage adjustments.”¹⁷

b. School District and Labor Market Match

Taylor (2006) emphasized the importance of matching each school district with the appropriate labor market, as the CWI cannot determine individual characteristics of districts within a multiple-district region and the same labor market impacts will be assigned to all districts in the region.

“By matching each school district with the corresponding labor market, the research methodology can support CWI estimates for each school district in the United States. For urban school districts, this would be the CWI for the corresponding metropolitan area. For rural districts, this would be the CWI for the corresponding census “place of work”. A census place of work is a cluster of counties or census-defined places that contains at least 100,000 persons. All counties—and therefore all districts—in a census place of work area have the same CWI.”

Similar to the APA CWI, Taylor (2007) created four regions for the State of Nevada. However, APA erroneously assigned Storey County to the wrong region, as shown in the table below. Storey County is part of the Reno-Sparks Metropolitan Statistical Area (MSA), along with Washoe County. The two counties share close commuting relationships, and a common labor

¹⁷ Baker, Bruce D. “Doing More Harm Than Good? A Commentary on the Politics of Cost Adjustments for Wage Variation in State School Finance Formulas.” *Journal of Education Finance*, Spring 2008, Vol. 33, No. 4, pp. 406-440.

market. Despite its relatively small size, Storey County is home to the Tahoe Reno Industrial Center, a major employment center in the area and wages in the county are the fourth highest of all counties in the state (Figure 1). Modeling Storey County in the wrong region misrepresents CWI results for Washoe County (Reno-Sparks MSA) and what our team is calling the West Rural region (Lyon County, Carson City, and Douglas County), where Storey County is erroneously included by the APA.

Table 2. Comparison of Taylor and APA Geographic Regions for CWI Model

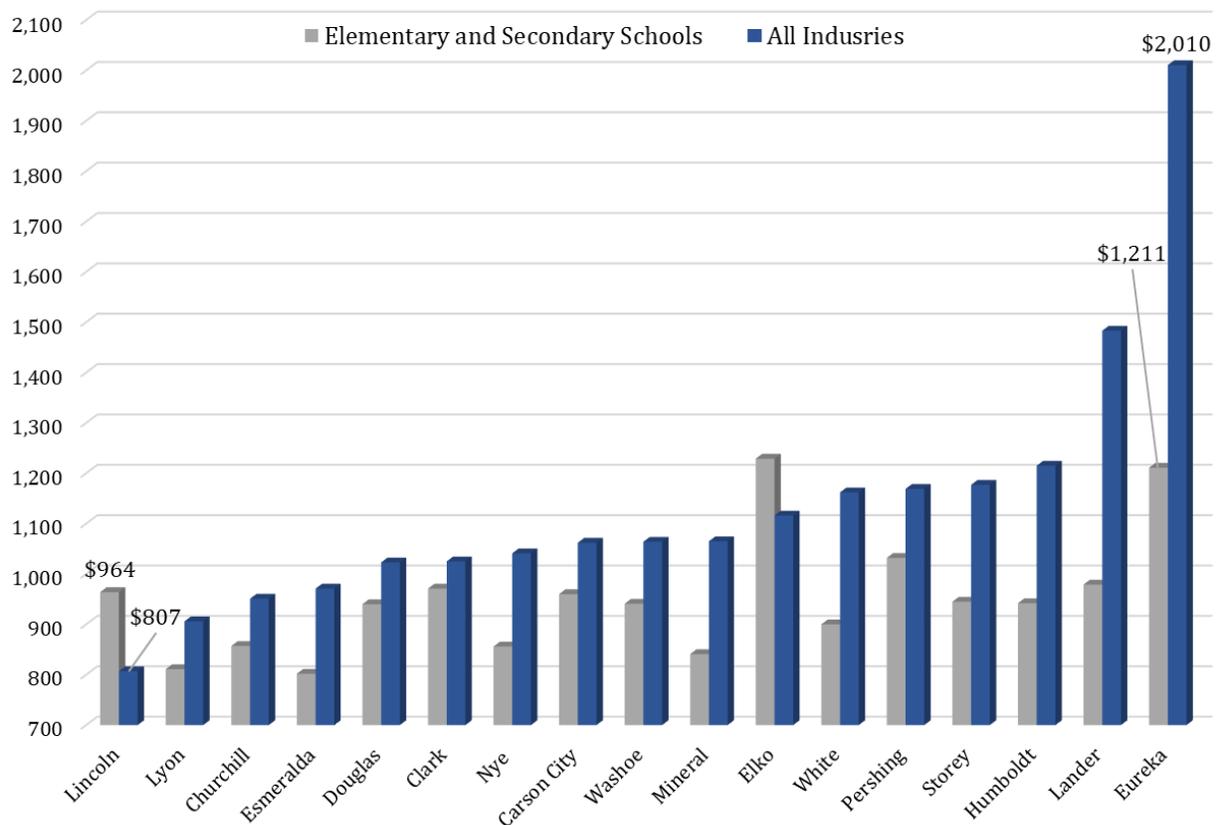
Region	Taylor 2007	APA 2020
Las Vegas MSA	Clark	Clark
Reno-Sparks MSA	Washoe	Washoe
	Storey	
West Rural	Carson	Carson
	Douglas	Douglas
	Lyon	Lyon
		Storey
Remainder of State	Churchill	Churchill
	Elko	Elko
	Esmeralda	Esmeralda
	Eureka	Eureka
	Humboldt	Humboldt
	Lander	Lander
	Lincoln	Lincoln
	Mineral	Mineral
	Nye	Nye
	Pershing	Pershing
	White Pine	White Pine

Additionally, by combining the eleven counties into one model (Remainder of State), the CWI estimate assumes the same labor conditions in Lincoln County and Eureka County, and the remaining nine counties stretching from Arizona to Oregon.

Figure 3 shows a comparison of wages for the detailed Elementary and Secondary Schools industry (education industry) to average countywide wages for all industries shown in Figure 2. The figure shows little relationship between education industry wages and total industry wages. In Lincoln County, where average countywide wages are lowest of all counties, education industry wages are not only higher than many other counties, but 20%

higher than countywide wages. In Eureka, education wages are the second highest of all other Nevada counties, but make up only 65% of the average wage paid by all countywide industries.

Figure 3. Comparison of Average Weekly Wages-Nevada Counties-Elementary and Secondary Schools vs. All Industries, 2Q2020



The difference between the highest and lowest average weekly wages at the county level in Nevada is \$1,203, whereas the difference for education industry wages is only \$415, indicating much less of a variance in educational wages than in countywide wages. This is because countywide wages are impacted not only by labor market drivers, but also the industry make-up, while educational wages include a single industry with more pronounced wage controls.

Furthermore, the figure shows that the county with the lowest wages in the state, Lincoln, and the county with the highest wages, Eureka, are both located in the same study region, along with nine other highly diverse counties with difference population, labor markets, key

industries, and other factors. The individual characteristics of these counties are lost in the Remainder of State region and all, including Lincoln and Eureka counties, would receive the same RCA adjustment ratio, based on the APA methodology.

2. COST OF LIVING ADJUSTMENT LIMITATIONS

According one of its presentations (“Regional Cost Adjustment” presentation by Brown and Silverstein, no date provided), APA solicited stakeholder inputs for its Regional Cost Adjustment (RCA) methodology. Stakeholder responses and potential issues associated with these responses are summarized below.

The slide titled “RCA Factors that Should be Considered” provides stakeholder answers to the question: “What cost drivers should be considered to create a regional cost adjustment in the new formula?” This includes: Wages -not limited to professional salaries; Energy; Health care; Cost of goods and shipping (including foodservice); Cost of living, including housing; and Internet.

The proposed NCEI includes wages for all occupations and education levels, rather than the non-teacher occupations with a BA or higher typically considered by the CWI. To answer the call for a cost of living adjustment, APA recommends including the Goods component of the Regional Price Parities (RPP) index (BEA 2020), to represent non-wage cost of living differences among the four regions. APA recommends this Goods RPP amount be included at 28% of the final NCEI index calculation.

As this PUMS data, this federal dataset is also limited in geographic availability (non-MSAs are combined into one “Nonmetropolitan” areas) and limited by lag time, with the 2019 RPP indices being the most recent.

Moreover, by including only the Goods portion of RPP (other cost of living categories include All Items, Rents, and Services),¹⁸ the NCEI does not consider housing purchase or rental costs and only portions of transportation (shipping), energy, health care, and other costs, as shown

¹⁸ BEA (2020) “Real Personal Income and Regional Price Parities.” Bureau of Economic Analysis (BEA). May 2020. <https://www.bea.gov/resources/methodologies/rpp>

in Table 3 below. The table shows by including only the Goods portion of RPP, the analysis considers 62.5% of all transportation costs included in the RPP estimates, 38% of housing costs (this component includes only housing operating costs, such as utilities and maintenance, housing rental costs are considered separately and housing purchase costs are not included in the RPP), and 23% of medical costs (only medical goods, but not services are considered). As a result, the NCEI, as recommended by APA, fails to consider many of the cost components identified as important by stakeholders.

Table 3. Distribution of RPP-Included Costs into Goods and Services

Component	Goods	Services
Rents	0.00%	100.00%
Food	55.72%	44.28%
Transportation	62.54%	37.46%
Housing	37.96%	62.04%
Recreation	44.68%	55.32%
Education	17.69%	82.31%
Other	51.61%	48.39%
Apparel	100.00%	0.00%
Medical	23.02%	76.98%

Not only are housing purchase and rental costs major expenditure items for many families (typically estimated at approximately a third of a family's income), housing costs differ significantly across the state.

By not including housing costs in the NCEI, the index assumes the same regional impact on school costs in Lyon County (existing home price of \$310,000), Carson City (existing home price of \$380,000), and Douglas County (existing home price of \$549,000), which includes Lake Tahoe, one of the most expensive housing markets in the nation.

The rising housing prices and increasing affordability issues are creating labor shortages in these fast growing regions, requiring wage increases in order to attract employees, especially in the lower paying professions, such as janitors, bus drivers, and other service providers for school districts. These significant impacts and differences across regions are not captured in the APA RCA model.

3. OTHER STAKEHOLDER FEEDBACK

a. Regional Cost Adjustment

The slide titled “Feedback on RCA,” from the same APA presentation provides stakeholder answers to the question “What other concerns, if any, do you have with including a regional cost adjustment in the funding formula?” This includes:

- RCAs do not adequately address recruitment and retention issues
- An adjustment that only benefits one or two districts is not equitable
- An average of two approaches (“Best Of”) doesn’t make sense
- Specific comments about CWI:
 - All professions/industries/education levels should be considered
 - Unsure whether higher wages in rural counties reflect a need or just their ability to offer
 - Wages can take many years to adjust to cost of living changes in a market, so a CWI method would be very slow to adjust to the realities of area affordability
- About CWI alternatives:
 - A cost of living adjustment makes the most sense in that it is relatively easy to understand, update and better reflects current conditions
 - A dynamic hedonic model that is updated periodically would be more accurate

Many of these comments are an appropriate criticism of the proposed NCEI. The CWI is a prescriptive methodology in that it estimates how much teachers should be paid based on qualitative and quantitative factors included in the model, rather than a descriptive model that describes what teachers are actually paid. In this, the model does not address recruitment and retention issues, as well as other impacts on teach salaries including unions, lack of available employees, or unique labor markets of individual districts, many of which are analyzed as one. Nor, due to its reliance of dated data, does the model consider changing realities of area affordability or current labor market conditions. Again, the NCEI fails to meet many of the issues raised by stakeholders.

b. Salary Competitiveness

Similarly, in the same presentation, the slide titled “Salary Competitiveness” includes stakeholder answers to the question “Do you have any specific concerns about wage competitiveness in your area?”

- Districts face challenges to compete with mining, gaming and construction industries
 - In rural areas, challenges to compete with urban districts
- Salaries are not sufficient to address high health care or housing costs

By considering all occupations in the district or region in the CWI, the model assumes wages paid to all occupations are representative of the wages that should be paid to teachers. This is an inaccurate assumption, and, as discussed later in the report, goes against the original CWI methodology. Some Nevada counties have significantly differing industry concentrations and, therefore, County wages may be biased towards industries with highest employment. Some of these industries would not compete with the educational industry for labor. As a result, considering total wages for a manufacturing or mining-heavy district to represent “recommended” wages for teachers is inaccurate.

III. RCA IN OTHER JURISDICTIONS

This section provides a discussion of the use of APA's or similar RCA formulas in other jurisdictions across the US.

Of the 50 states (plus Washington DC), there are currently 13 states (25% of all jurisdictions) utilizing one of the three commonly used regional cost methodologies: 1) cost of living, 2) hedonic index, and 3) comparative wage index. These are shown in Table 4.

Table 4. List of States Using Regional Cost Adjustments¹⁹

Comparable Wage	
Index-7	Hedonic Index-5
Florida	Texas
Illinois	Alaska
Missouri	Maryland
New Jersey	Wyoming
New York	Maine
Massachusetts	
Virginia	Cost of Living-2
	Colorado
	Wyoming

Of these, the Comparable Wage Index (CWI) is used by seven states, though differences in methodology occur, as discussed above. The remaining six states use either the hedonic index or cost of living methodology, or both. Some additional considerations of the use of regional cost methodologies across the US, include:

1. CWI Removed in Tennessee

It should be noted Tennessee also utilized the CWI in its Cost Differential Factor (CDF). However, in 2016, the Tennessee General Assembly passed a new school funding plan, eliminating the from its school funding formula in a phased manner, with schools currently

¹⁹ Online search of various state school departments and similar entities.

receiving 20% of the total calculated CDF and the intention of phasing the adjustment out completely in the future.²⁰

2. CWI Considered, but not Used in Some States

According to reports prepared for them by APA and other organizations, a number of states have also considered the CWI, but ultimately chose not to utilize either preferring an alternative regional cost methodology (Maryland and Wyoming) or no regional cost adjustment at all (Oregon, Arkansas, Minnesota, Michigan, and others).

3. Other Regional Factor Considerations

Other states, such as Kansas, Washington, South Carolina, Rhode Island, and a number of other states, take into consideration housing costs, housing assessed valuation, or income (typically median family or household income) as a cost of living adjustment or to help equalize districts with lower or higher than average property tax and other revenue contribution.

For example, in Washington, “to compensate for differences in the cost of living, the Legislature added regionalization factors on top of the state’s base salary allocations to districts in which median home values are higher than the statewide median. For the top third of these districts (ranked by median home price) the regionalization factor is 18 percent; for the middle third, the regionalization factor is 12 percent; for the remaining third, the regionalization factor is 6 percent. Additionally, a 6 percent adjustment is provided for six districts that border districts with regionalization factors more than 6 percent higher.”²¹

4. Differences in CWI Methodologies

Even those states utilizing the CWI approach may differ in their methodology. For example, Florida’s Price Level Index (FPLI) is based on wages by occupation from the Occupational

²⁰ “Tennessee Basic Education Program Handbook For Computation. Tennessee Department of Education, Office of Local Finance. September 2018.

²¹ “School Funding, Accounting for the Billions Spent in Response to McCleary.” Special Report, Washington Research Council. SR 20-02, October 5, 2020.

Employment Statistics (OES) survey, rather than the American Community Survey (ACS) used by most CWI analyses. “The first step in calculating the FPLI is to make an initial estimate of relative wage differences between counties, holding occupation constant. This means that a county’s index is not impacted by having more or less workers in high wage occupations, but rather by having higher or lower wages within given occupations compared to the same occupations in other counties.”²²

The Cost of Competing Adjustment (COCA) index in Virginia is not a statewide based index designed to distribute state funding across districts based on their relative costs of operations, as is the typical goal of CWI adjustments. In Virginia, COCA is applied to only a few districts in Northern Virginia, nearest to adjacent Washington DC and in the Western portion of the State adjacent to Maryland. This is done in an effort to attract and retain teachers given competition from neighbors with higher teacher salaries.²³

The Wage Adjustment Factor (WAF) in Massachusetts is based on the average annual wage data for each labor market provided by the Massachusetts Executive Office of Labor and Workforce Development. The WAF is based on all wages, including teachers, in the area, but is not a regression model, like the CWI. “The factor reflects a town’s own average, but is more weighted to the average of the labor market area (LMA) where the town is located. There are real differences in these averages, which represent the combined total for all industries both private and public. A district’s wage factor is a percentage that is applied to the eight salary-related functional categories in the foundation budget. The LMA for a district is compared to the state average and weighted at 80 percent. The town’s own factor is weighted at 20 percent. The distance above or below the state average is then divided by three to determine the WAF.”²⁴

²² Dewey, Jim. “The 2019 Florida Price Level Index.” Economic Analysis, Florida Polytechnic University. January 20, 2020.

²³ “Technical Report: Cost of Competing Adjustment for School Divisions in Northern Virginia.” Joint Legislative Audit and Review Commission. Report Document No. 82, 2013. December 2012.

²⁴ “School Finance: Chapter 70 Program FY19 Chapter 70 Aid and Required Contribution Calculations.” Massachusetts Department of Elementary and Secondary Education. September 2018.

Missouri's CWI-based Dollar Value Modifier has faced some criticism over its methodology. According to Baker (2008), this index did not follow the typical CWI methodology in including data for teachers along with data for other professionals, and not adjusting for education level, age or types of industries in each region. "As a result, the DVM may have the effect of 1. allocating higher adjustment to those areas where workers are simply older; 2. allocating lower adjustment to areas where low-paid teachers make up a disproportionate share of the labor market; or 3. allocating higher adjustment to areas where better, non-comparable jobs, requiring non-comparable education, may exist and lower adjustment to impoverished areas with only low-paying occupations and industries that may in no way be comparable to teaching."²⁵

New Jersey's Geographic Cost Adjustment (GCA) differs from the typical CWI methodology in that its analysis is based on county-wide data, not labor market data.²⁶ As discussed above, it is an important component of the CWI to match the district with the labor market in order to ensure labor market characteristics are being captured in the model.

Of the 51 states and districts across the United States, only 13 or 25% use a regional cost adjustment (RCA) factor. Of these, more than half use the CWI-type methodology, though actual uses vary, including Massachusetts which uses actual wage data, rather than a regression model and a number of states have face criticism in their deviation from the CWI methodology.

A number of states have considered the CWI methodology, but chose an alternative regional cost method or chose not to use the RCA at all. As discussed above, Tennessee chose to remove its CWI-based RCA from its funding formula.

²⁵ Baker, Bruce D. "Doing More Harm Than Good? A Commentary on the Politics of Cost Adjustments for Wage Variation in State School Finance Formulas." *Journal of Education Finance*, Spring 2008, Vol. 33, No. 4. pp. 406-440.

²⁶ "Geographic Cost Adjustment (GCA) Update FY2014." State of New Jersey, Department of Education. No date provided.

IV. RCA RECOMMENDATIONS AND CONCLUSIONS

This section includes recommendations for a Nevada-specific RCA model to ensure the resulting formula is accurate, equitable, transparent, and easy to reproduce.

The CWI was initially created to model the portion of teacher wages based on wages of similar regional professionals. The model attempts to focus only on economic factors impacting differences in these wages across geographic areas, rather than impacts of school district choices regarding teacher wages (controllable costs). The model assumes that teacher wages are impacted by both regional economic forces (non-controllable costs) and controllable decisions by school districts, such as paying higher wages to attract more experienced teachers.

No discussion was provided in the documents we reviewed from academic sources or from APA as to the magnitude of controllable costs in teacher's wages, especially in Nevada, where the NCEI is being proposed. If these costs are not significant, the cost of the creation and implementation of the CWI for Nevada, a major component of the proposed NCEI, may more than outweigh the benefit of the model.

The benefit of the model is as stated, "it allows to compare teacher's wages across regions without the impact of controllable costs". As mentioned above, the magnitude of this benefit is unknown as it is unclear what portion of teacher's wages is impacted by controllable costs. However, as represented by past CWI studies of statewide adjustments (discussed earlier in this report), the difference between adjusted and actual teacher's wages in Nevada were not significantly different, indicating little controllable cost differences. If this pattern continues across the regions, little benefit will, theoretically, be obtained from the model.

However, the costs of the model are significant, measured not only financially, but also in administrative oversight, loss of control ("black box" of inputs and outputs), and person-hours. In addition to the need of hiring consultants to create the original and each subsequent updated model, the shortcomings of the original CWI model, plus the issues associated with APA's use of the model must be considered. In addition, the difficulty in

carefully aligning labor markets to school districts will ensure that resulting modeled wages are not representatives of teacher salaries in the modeled regions, especially smaller regions. The lack of control variables for industry anomalies and occupation alignments with education will ensure the model includes these industry anomalies and competitive forces for all occupations in the region. The arbitrary decisions to implement these model “switches” also shows the ease with which the model can be manipulated to arrive at desired outcomes. The dated data on which the model is based creates output which may not be representative of current wages and economic conditions, especially in rapidly growing and changing counties.

These, and other issues outlined in this report, add error to the model at each step, reducing the reliability of the model estimates and resulting wage findings. The more error, the less the model’s results represent the differences in teacher’s wages across the various regions in Nevada. This lack of accuracy and reliability is the heaviest cost of the model.

Therefore, is the attempt to arrive at “adjusted” teacher’s wages worth the error and loss of reliability that occurs during this adjustment. As discussed earlier in the report, other states have considered some type of a regional adjustment, including the CWI, and very few are actually use this adjustment today.

That said, there is full agreement from the authors of this report that economic differences, and resulting wage differences, including operating and salary costs, exist among the various counties in Nevada and should be considered in the apportionment of State school funding. A regional cost adjustment for the State should be based on a methodology that is accurate, equitable, transparent, easy to update, and refine.

The overarching weakness in the CWI model’s accuracy is the use of dated data (error is introduced), the use of surveyed data (more error is introduced), and the lack of geographic flexibility due to source of data (more error is introduced). The APA’s adjustment of the CWI model overlooks the availability of Quarterly Census of Employment & Wages (QCEW) that is sourced from employer filings (all employers are mandated to report), represents place-of-work metrics at the address level, is available by industry down to the six-digit industry

NAICS code (North American Industry Classification System), and has a lag-time of four to five months between end of each quarter and data availability. Instead, the CWI model used by APA applied sources and inputs that force the creation of “mega-regions” that ultimately mask the wage nuances between communities.

The defining of industries comparable to educational institutions is further clouded by applying national-level methods within the CWI model. Each state and their regions contain unique industry mixes and anomalies. Therefore, the determination of comparable industries could benefit from using State economists, such as those at the Department of Employment, Training, and Rehabilitation who “live and breathe” the data on a daily basis.

Defining labor markets that synchronize with Nevada school districts is too complicated to be assigned to distant consultants with little understanding of local economies. By choosing data sources with geographic limitations, the APA’s CWI model is limited to dividing the state into four regions, with one eleven-county region and weak labor market linkages.

As proposed, the RCA methodology will invite ongoing scrutiny and the need for continuous consultation to update the complicated matrix of data inputs. Moreover, if the RCA is employed, the index will provide a disservice to some counties while undeservedly enriching others, creating further inequities in operating costs it attempts to solve.

It is our opinion that given the methodology weaknesses, data limitations, and special characteristics of the various school districts and labor markets within the State, that the proposed NCEI does not accurately represent geographic cost differences between Nevada school districts. As a result, the use of this index will lead to more financial inequity for Nevada school districts than it solves. It is our recommendation that the RCA is set to 1.0 for all districts until a more appropriate methodology for the State can be developed. Local resources, such as State economists at Nevada Department of Employment, Training, and Rehabilitation, should be consulted and their primary data utilized to arrive at a transparent and durable method using current data for individual labor markets and school districts that truly reflects geographic cost differences.

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