

Online Appendix to “After the Punctuation: Competition, Uncertainty, and Convergent State Policy Change”

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This appendix is largely an update to the online appendix supporting our first article in this project, “Policy Dynamics and the Evolution of State Charter School Laws” by Thomas T. Holyoke, Jeffrey R. Henig, Heath Brown, and Natalie Lacireno-Paquet published in *Policy Sciences*, 42: 33 – 55, 2009. Most of the material here refers to this article where we first presented our alternative CER index, the same index used in the current paper. We have indicated which material is from the first article and which is new for the article in *State Politics & Policy Quarterly*.

Appendix Detailing the Creation of the State Charter School Law Scores

This appendix was written at two different points in time. The bulk of it was written in 2008 as a supplement to another article we published using these scores. In order to maintain the integrity of the double-blind peer review process, we cannot refer reviewers to that original article. Instead, we offer this appendix laying out how we developed the charter school policy change index used in the first article and in the current paper. The second part of this appendix is an update written in 2018 because the Center for Education Reform (CER), the organization developing the original scores, made some changes in 2009 regarding the way they coded aspects of state laws. Consequently, we had to make some adjustments to the way we use their scores, which we explain here at the heading “Coding Update.”

About the CER Index

Although developed by the Center for Education Reform, an advocacy organization, to rate the progress of state governments towards creating strong charter schooling systems, the 10-item CER scale has seen significant use in academic research (e.g., Kirst 2006; Wong and Shen 2002; Stoddard and Corcoran 2007). Some of this has been as a base-line against which alternative measures of various state law characteristics regarding charter schooling and school choice have been evaluated (e.g., Scott and Barber 2002). Witte et al. (2003), however, point out that the CER index is flawed in that it mixes measures of a state law’s flexibility and its accountability. Some sub-measures may change in one direction while others change in the opposite direction over time. Essentially they wash each other out, suggesting a lack of change when significant change along possibly multiple dimensions is in fact taking place. Furthermore, Wong and Shen (2006) argue that the ten-item aggregated CER index misses crucial within-state variation, suggesting that

several sub-measures in the aggregate scale are essentially measuring the same thing. These are concerns we must address in order to use the CER scores at all.

Criticisms of the CER Index and Alternative Measures

Two other teams of scholars have tried to create alternative state charter school policy measures. We argue, however, that these alternative measures have two drawbacks. First, they do not appear to be all that different from the original CER measure. Second, they only cover one or two years whereas the CER scores cover many years. What these alternative measures *do* make possible is an opportunity to get a sense of the validity of the CER measure by comparing them all. Witte et al. (2003) identified and coded 17 variables capturing different characteristics of state charter school laws which they then condensed into five composite measures. Four of these composite measures were closely related and collectively form a measure of a state law's flexibility. The fifth composite measure captures accountability, and combined with the four flexibility measures yields Witte et al's final index. To demonstrate their index's validity they regressed it on the aggregate CER measure for a bi-variate correlation of $r = 0.82$ ($p < 0.01$). This strongly suggests that their new measure is very similar to the original CER index, effectively providing some validation of both measures.

Similarly, Wong and Shen (2006) also developed a new index of state charter school laws, which they compared to the old by regressing on both a series of independent variables that logically ought to explain the structure of any state's law. It turned out that the independent variables did a somewhat better job explaining variation in the CER measure than the Wong and Shen index (see their Tables 5 and 7), though it did not explain either measure particularly well. Taken together, rather than improve on the performance of the CER index, analyses of the

alternative measures of Witte et al. and Wong and Shen suggest that the original CER measure is just as valid. The CER measure also has the benefit of being measured for every state with a charter school law for almost every year beginning in 1996.

Flexibility, Accountability, and Within-State Variation

Although the aggregate CER measure has been used to good effect in charter school research (e.g., Kirst 2006; Stoddard and Corcoran 2007), crucial problems identified by Witte et al. and Wong and Shen must still be addressed. Witte et al. argue that the Center for Education Reform is really capturing two fundamentally different ideas, but they are lost when the Center goes on to combine all of their ten individuals measures together for a single, aggregate index. Specifically, Witte et al. argue that some sub-measures are capturing state law “flexibility” while others are measuring “accountability.” The first refers to the degree to which states exempt their charter schools from state and local school district laws, providing them with greater freedom to recruit students from target populations, implement original new curricula, and operate in accordance with a variety of tailored business models. The other concept, accountability, regards the level of reporting requirements imposed on schools by various public entities in return for public funding and the right to be exempt from other state and local laws. As Witte et al. argue, not only are these two conceptual dimensions distinctly separate and mutually exclusive, they also tend to vary inversely to each other so that a composite measure like CER is unlikely to accurately reflect either.

Wong and Shen identify another problem with the CER scores. Correctly acknowledging the well-established concern that different political institutions may interpret the same law differently, especially when one is creating policy and another is implementing it (Meier 1993;

Nie 2008), they argue that treating changes in the aggregate CER measure as definitive signs of policy change is problematic. Amending the enacting statute may create change in one direction on one sub-measure while a change in the implementing regulation may create change in a different direction of another of the ten sub-measures. These changes might then wash each other out when aggregated, thus masking important, if contradictory, changes in each state's policy, losing crucial within-state variation over time.

These problems are linked. If the aggregate CER measure is indeed made up of sub-measures capturing different conceptual policy dimensions, as Witte et al. argue, then it should come as no surprise that one set of sub-measures, say those capturing flexibility, change in one direction while another set, perhaps measuring accountability, change in a different direction, all of which is masked by aggregation, as Wong and Shen argue. This means that to use the CER scores we must reconsider whether all ten sub-measures ought to be used. If not, then we need to decide which ones to use.

Minimizing State Standard Deviations to Measure Policy Change

We address these concerns sequentially because those by Witte et al. are conceptual while Wong and Shen's are empirical. Our task is to develop an acceptable measure of state policy change using some subset of the 10 CER sub-measures. We proceed in the following stages. First, before any empirical work is done, we need a theoretical definition of the policy dimension we are trying to capture that can be used to guide our research. For this we rely on Witte et al. for guidance. Second, we need to identify those sub-measures developed by CER that, based on the descriptions the advocacy organization provides, appear to conform to our theoretical definition. Third, we need to find a means of selecting measures that empirically minimizes the within-state

variation problem identified by Wong and Shen. Finally, we need to combine our measures into a single, aggregate measure that conforms to both our theoretical definition as well as the empirical bar we will set.

Theoretical Definition

Our question is how state policy changes over time, but this is too vague an idea to start with. We therefore provide the following refinement: we are searching for change in the level of flexibility provided to charter schools by state law. We define “flexibility” to mean exemption from state and local school district laws and regulations, as well as other factors restricting the freedom of charter schools to target student populations, develop innovative curricula, and control their own internal operations, including the hiring and firing of employees. We do *not* include the ease of the chartering process itself (approving new charter schools) in terms of how many different chartering authorities there are, or whether there is an appeals process. Although the Center for Education Reform considers these to be important, we do not believe they clearly fit either with notions of flexibility or accountability. A state may make it “easy” to open a school, and yet still strictly regulate its structure and operation, indeed an easy “cookie-cutter” approach may make opening new schools especially easy. High values of our measure will thus, hopefully, reflect the kind of flexible policy pro-charter school advocates, like the Center for Education Reform, desire and for which they lobby.

CER Sub-Dimensions Capturing Policy “Flexibility”

In Table 1 we lay out the ten sub-dimensions of charter laws developed by the Center for Education Reform and used until undergoing a modification in 2009 (see below). We also provide

the Center's description as to what aspect of state law each sub-dimension is supposed to capture. Finally, we offer a short explanation as to why we believe each sub-dimension definition should, or should not, be included in our measure of policy flexibility. Six of these measures appear to fit. This alone, however, is not the sole reason to include them in our final index. Several empirical concerns could push us to change the sub-dimensions included.

---- Insert Table 1A about here ----

Minimizing Within State Variation

Acknowledging Wong and Shen's concern regarding inconsistent changes in the sub-dimension measures getting masked by aggregation, we perform an empirical test to find those sub-measures that consistently change in the same direction over time. Having said that, we suspect that we are not likely to find any sub-set where all of the measures move in the same direction in every year for every state. Indeed, if they did it would suggest that all of the measures are merely capturing the same underlying phenomenon so that only one of them is necessary. Still, we need to find a combination of sub-dimensions that minimizes this problem. Rather than analyze all scores for all years, we find it sufficient to use the scores from years fairly far apart, 1998 and 2006. While CER scores first appeared in 1996 (but not in 1997), a few minor changes to the coding were made to them as the 1998 scores were developed. So 1998 is the earliest year that the scores exist in exactly the same format as the 2006 scores (which were the latest scores when this analysis was originally done).

We examine the change in different combinations of the 10 sub-dimensions for each state from one year to the other. WE assume that if one measure changes in a positive direction and another in a negative direction, then this will produce a larger standard deviation for that state from

1998 to 2006. A change in the same direction should produce a smaller standard deviation. For example, suppose that six CER sub-dimensions measuring aspects of a state's charter law changed positively as follows: +1, +0.5, +1.5, +0.5, +0.5, +1; also suppose that the other four changed in a negative direction: -1.5, -0.5, -0.5, - 2. The standard deviation of these changes is 1.14 and reflects the fact that there is internal inconsistency in the directions of the measures of policy change, just as Wong and Shen warn about. If the four negative measures were all positive, say +1.5, +0.5, +0.5, +2, then the standard deviation shrinks to 0.55. Returning to our data, if we only used the six measures identified in Table 1A for inclusion, those whose positive change contributes to a more flexible, less regulated state policy, and average the standard deviations for the 38 states examined, we end up with a standard deviation of 0.79. But is there a combination out of the ten that produces an even smaller standard deviation?

After significant analysis of different combinations, we found three that produced an average standard deviation of 0.77. Their difference from 0.79, however, is so small that we reject these alternatives because these three combinations contain sub-dimensions that are too inconsistent with our definition of policy flexibility to be included. In other words, we stay with our six CER sub-dimensions: "multiple chartering authorities," "exemption from collective bargaining," "automatic waiver from state and district laws," "Legal / operational autonomy," "guaranteed full per-pupil funding," and "fiscal autonomy."

---- Insert Table 2A about here ----

To improve our sense as to whether our six selected sub-measures are capturing aspects of the same underlying dimension, we ran pair-wise correlations of the measures for 1998 and 2006 to see how well they correlate each year. As Table 2A shows, all of the measures correlate with each other, some at very high levels, none less than 0.37 and half over 0.60. In other words, they

correlate enough to suggest connections, but none correlate so high that one might suspect that two (or more) are measuring the same thing. We also assess the similarity of these sub-dimensions with a factor analysis for 1998 and 2006. As the eigenvalues displayed in Table 3A reveal, the sub-dimensions load on the first factor only and it accounts for virtually all of the covariation in the sub-measures. For 1998 the dimension constructed correlates with our six combined measures at $r = 0.96$, and $r = 0.94$ for 2006.

---- Insert Table 3A about here ----

Coding Update for 2018

An update is in order. In 2009 the Center for Education Reform made a few changes to its sub-measures, which meant we had to make some adjustments in the way we used them. Specifically, the sub-dimension “multiple chartering authorities” was renamed “multiple chartering authorizers.” The new definition appears to have the same meaning as the old so the name change is cosmetic, yet the Center also decided to place more weight on this measure in the aggregation by changing its individual scale from 0 to 5 to 0 to 15. We re-adjust by simply taking the new score and dividing it by 3 so that it again scales from 0 to 5. Similarly, “guaranteed full per-pupil funding” undergoes a cosmetic, rather than substantive, name change to “100% funding” and its scale increases from 0 to 5 over to 0 to 10, but we compensate by dividing its score by 2. “Exemption from collective bargaining” remains the same.

Our other three sub-measures, “automatic waiver,” “legal and operational autonomy,” and “fiscal autonomy” were combined by CER into two categories, “state autonomy” and “district autonomy” which refer to charter school freedom from state and local laws regarding operations and fiscal control. Since these two new categories combined just the three sub-measures of

flexibility we had been using, we do not see any problem using these two sub-measures instead. However, the two new sub-measures remained scaled from 0 to 5, which means the overall number of points entering into our aggregated scale after 2009 is 5 points less than before. To compensate for this, and so that the two new categories have the same impact on the overall scale as the three older sub-measures, we multiple both of the measures for state and district autonomy by 1.5. Now our point totals, and the relative contributions of each sub-measure are consistent with earlier years. Any change in our overall CER measure from this change should appear after 2008. Examining our data we find no dramatic change, and this can be seen in Figure 2 in the main paper where the larger changes that lead us to speculate about policy convergence start happening years before, in 2006.

Table 1A: CER Sub-Dimensions and Our Choices

Number	CER sub-dimension name	CER description of sub-dimension (from the Center for Education Reform)	Our justification for inclusion (or reason for exclusion) in baseline
1	Number of Schools	States that permit an unlimited or substantial number of autonomous charter schools encourage more state activity than states that limit the number of autonomous schools	Not included. This is about numbers only, not operational flexibility
2	Multiple chartering authorities / binding appeals process	States that permit a number of entities in addition to or instead of local school boards to authorize charter schools, or that provide applicants with a binding appeals process, encourage more activity	Included. More choices make it more likely potential charters can gravitate towards permissive regulators
3	Variety of applicants	States that permit a variety of individuals and groups both inside and outside the existing public school system to start charter schools encourage more activity than states that limit eligible applicants to public schools or public school personnel.	Not included. This makes it easier for more people to open schools, but says nothing about regulatory flexibility in operation and reporting requirements
4	New starts	States that permit new schools to start up encourage more activity than those that permit only public school conversions	Not included. Again, this only deals with numbers, not flexibility
5	Schools may start without third party consent	States that permit charter schools to form without needing consent from competing districts or the general public encourage more activity than those that do not	Not included. Making it easier to create a school says nothing about operational flexibility
6	Automatic waiver from laws and regulations	States that provide automatic blanket waivers from most or all state and district education laws, regulations, and policies encourage more activity than states that provide no waiver or require charter schools to negotiate waivers on an issue-by-issue basis	Included. This is the very heart of the notion of flexibility
7	Legal / operational autonomy	States that allow charter schools to be independent legal entities that can own property, sue and be sued, incur debt, control budget and personnel, and contract for services, encourage more activity than states in which charter schools remain under district jurisdiction. In addition, legal autonomy refers to the ability of charter schools to control their own enrollment numbers	Included. Ability to manage their property and their budgets is a major factor in the concept of flexibility. The alternative is having these set for them by regulators
8	Guaranteed full funding	States where 100 percent of per-pupil funding automatically follows students enrolled in charter schools encourage more activity than states where the amount is automatically lower or negotiated with the district	Included. This gives schools greater autonomy from public oversight and greater budget control
9	Fiscal autonomy	States that give charter schools full control over their own budgets, without the district holding the funds, encourages more activity than states that do not	Included. Same as the above measure
10	Exemption from collective bargaining agreements / district work rules	States that give charter schools complete control over personnel decisions encourage more activity than states where charter school teachers must remain subject to the terms of district collective bargaining agreements or work rules	Included. Personnel planning is important for designing varied curricula and not needing to submit themselves to public requirements

Table 2A: Pairwise correlation of selected CER measures in 1998 to 2006

CER sub-measure	Multiple chartering authorities	Collective bargaining exemption	Automatic waiver from state and district laws	Legal and operational autonomy	Guaranteed per-pupil funding
1998					
Multiple chartering authorities	1.00				
Collective bargaining exemption	0.67***	1.00			
Automatic waiver from state and district laws	0.50***	0.61***	1.00		
Legal and operational autonomy	0.72***	0.72***	0.53***	1.00	
Guaranteed per-pupil funding	0.51***	0.37*	0.44**	0.45**	1.00
Fiscal autonomy	0.63***	0.64***	0.39*	0.78***	0.63***
2006					
Multiple chartering authorities	1.00				
Collective bargaining exemption	0.50***	1.00			
Automatic waiver from state and district laws	0.44***	0.39*	1.00		
Legal and operational autonomy	0.77***	0.64***	0.66***	1.00	
Guaranteed per-pupil funding	0.54***	0.44***	0.41**	0.63***	1.00
Fiscal autonomy	0.74***	0.57***	0.58***	0.84***	0.73***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.005$

Table 3A: Factor analysis of selected CER sub-dimensions

Factor	Eigenvalue	Difference	Proportion
1998			
Factor one	3.53	3.22	0.95
Factor two	0.31	0.12	0.08
Factor three	0.19	0.21	0.05
Factor four	-0.02	0.05	-0.01
Factor five	-0.07	0.14	-0.02
Factor six	-0.21	-	-0.06
2006			
Factor one	3.66	3.51	1.00
Factor two	0.15	0.06	0.04
Factor three	0.08	0.07	0.02
Factor four	0.01	0.11	0.00
Factor five	-0.10	0.04	-0.03
Factor six	-0.14	-	-0.04

Additional figures for 2018 update

The first of the following four figures, A1, shows the cumulative enactment trend for state charter school laws, which clearly follow an *S*-pattern. The second and third figures, A2 and A3, are alternatives to Figure 2 in the paper, all states with a charter school law between 1996 and 2014 and all states adopting a charter school law 1997 or before. Finally, Figure A4 is a reproduction of Figure 2 in the paper but with the states labeled.

Figure A1: Cumulative rate of state charter school law adoptions (first adoption in 1991)

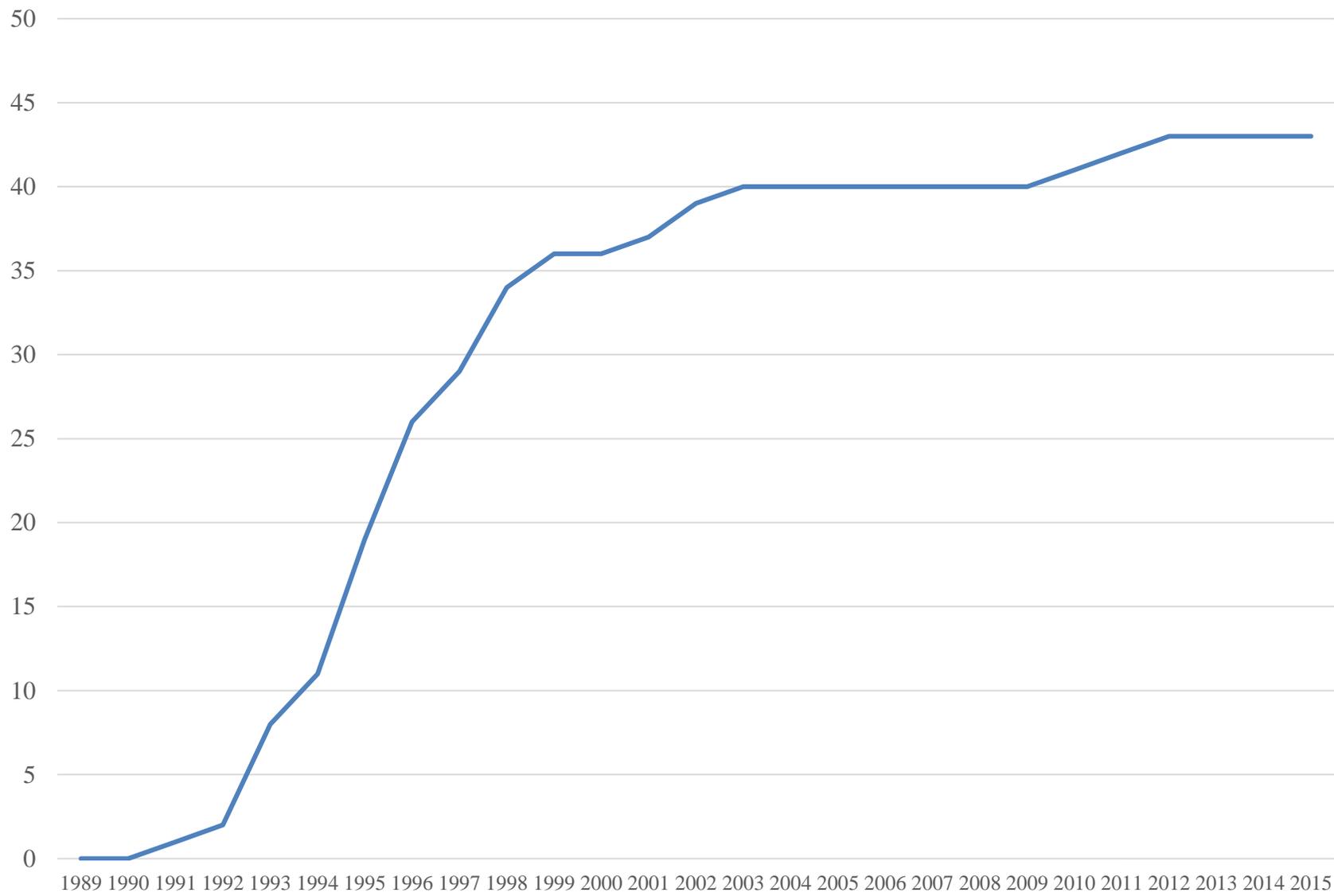


Figure A2: Change in all state CER scores from 1996 to 2014

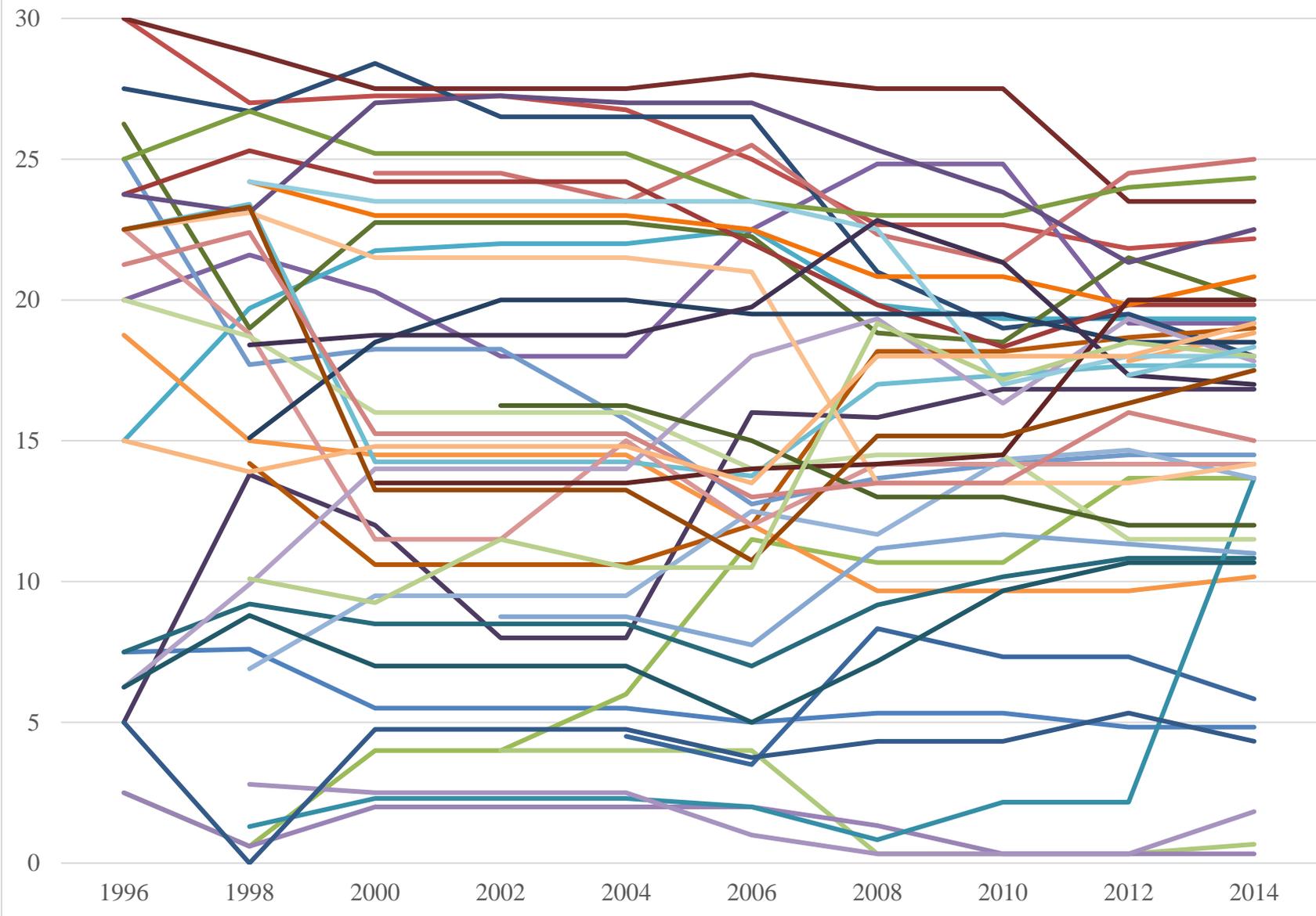


Figure A3: Change in state CER scores for all states adopting laws prior to 1997

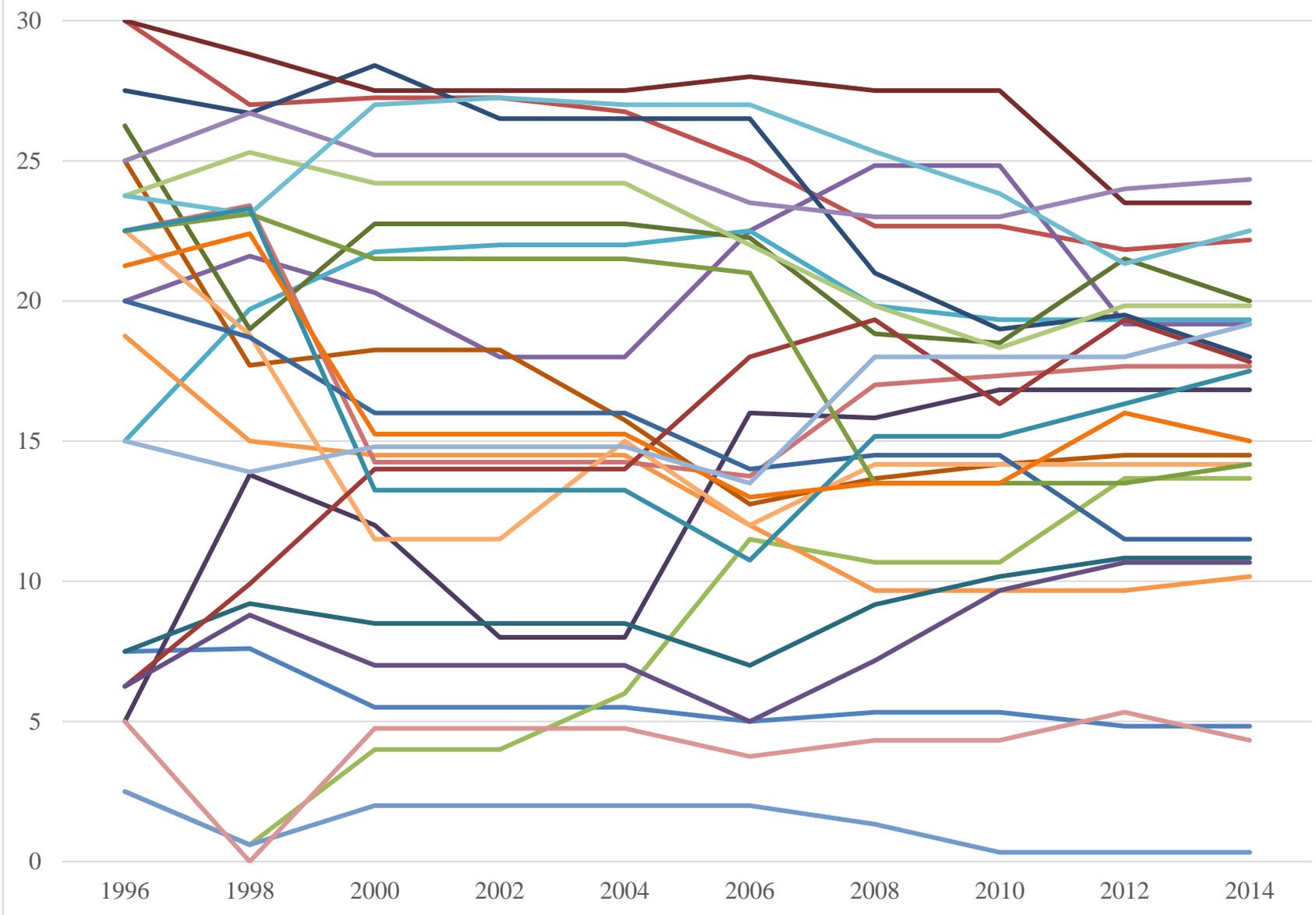
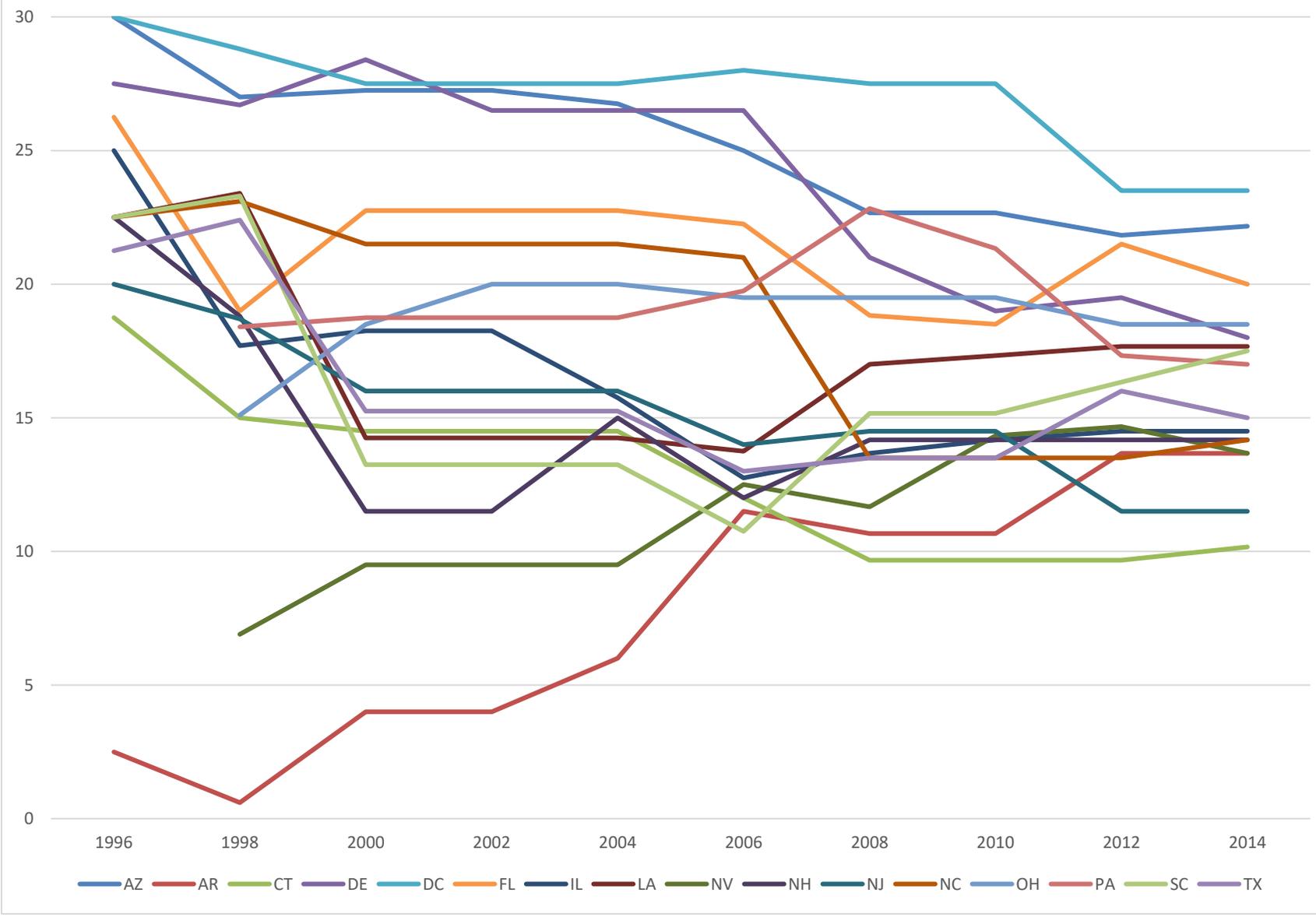


Figure 4A: Change in state charter school laws with more than five points of change from 1994 to 1997



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