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Collective Bargaining in Washington State Schools: Exploring the Landscape and Assessing Different Measures of Contract Restrictiveness

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I. A New Focus on Collective Bargaining

Collective bargaining agreements (CBAs) cover an array of school district regulations; they govern topics like hiring, compensation, transfers between schools, evaluation, professional development, the promotion processes, grievance and termination.[1]

Much of the literature on teacher collective bargaining describes the *potential* influence of CBAs have on school organization, finance, staffing and operations (Hannaway and Rotherham, 2006). But there has been limited empirical exploration of the influence these provisions have on important teacher governance outcomes. And existing studies rely on a range of measures of union strength, some no doubt more robust than others (Koski and Horng, 2007; Moe, 2005 and 2009; Strunk and Reardon, 2010).

In this policy brief we introduce a unique new dataset derived from *all* provisions included in *all* collective bargaining agreements in effect in Washington state in the 2010-11 school year. We use this dataset and a method called Partial Independence Item Response (PIIR)[2] modeling to calculate a restrictiveness measure for every CBA in Washington state. In addition to a measure of overall restrictiveness we calculate restrictiveness measures for a variety of data subsets: an objectively derived reduced subset of provisions (Strunk and Reardon, 2010), a subjectively derived subset of high-profile provisions, and subsets of data corresponding to eight key categories of provisions: accessibility, association, evaluation, grievance, layoffs, benefits and leave, hiring and transfers, and workload.[3]

The analysis reported here is important for several reasons. First, this is the first quantitative comparison of teacher CBAs in Washington state. The restrictiveness measures reported here will allow state policy makers to compare the degree that management has discretion over specific contract issues, district by district, across the state.

Second, while we focus on Washington state, we believe our research will be of interest to policymakers nationally as it is the first to apply the PIIR model to conceptually distinct sub-sections of CBAs and assess the degree that the overall measure of restrictiveness and the restrictiveness of sub-sections, as well as restrictiveness as measured by specific cherry-picked provisions, compare to one another.

Finally, our dataset is the first to include a state's full universe of CBAs. This allows us to explore the extent to which there is variation in CBA restrictiveness for the entire state of Washington. To our knowledge, this is the first study to assess this issue with a census of state data.

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[1] Recently, policymakers and pundits alike have pointed to CBAs, and particular CBA provisions (e.g. seniority-based job protections), as key inhibitors to effective school district operation and student achievement. For instance, in response to recent budget woes, the governors of Ohio and Wisconsin illegalized several public employee contract demands. Ohio voters later rejected these cutbacks via referendum (Maher & Nicas, 2011)

[2] For more information on the PIIR model and our methodology, see Appendix A online.

[3] We provide more detail about the kinds of provisions that fall under each of these headings in section IV.

In this policy brief we review existing literature on union strength, describe the data collection and coding process used to create a unique Washington state dataset, and present findings from the first of a series of CEDR working papers focusing on the issue of collective bargaining.[4]

II. Background

The few existing studies of bargaining in the education context focus on the provisions driving union strength or power and the influence of collective bargaining on outcomes like wages and student achievement.[5] Most of these studies rely on single indicators from one section of collective bargaining agreements to capture a union's strength in the bargaining process. For example, studies by Moe (2005) and Koski and Horng (2007) rely on measures of seniority-based transfer rights to assess the relationship between union strength and important teacher workforce outcomes.[6] And Moe's work on the relationship between union power and student achievement relies on a similar uni-faceted measure (Moe, 2009). Carefully chosen CBA provisions can inform our understanding of how these provisions influence specified outcomes. However, in highlighting particular cherry-picked provisions, this work may overlook important tradeoffs in the negotiation process, and in doing so, provide a misleading picture of union strength. Perhaps more importantly, it could lead to erroneous conclusions about the relationship between CBAs and important outcomes (e.g. teacher distribution or student achievement).[7]

Recent work by Strunk and Reardon (2010) seeks to quantify the underlying restrictiveness or strength of a teacher contract by addressing the *full-range of provisions* mentioned in contracts across the state. Strunk and Reardon rely on CBAs from a large, representative sample of California school districts and code provisions in each CBA as responses to a conditionally structured survey.[8] This approach allows them to include all provisions in a single PIIR model in which the probability that a provision appears in a CBA is a function of the restrictiveness of the CBA and the severity of the individual provision.

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[4] Upcoming reports will focus on spatial dependence between CBAs and the impact of CBAs on the quality and distribution of the teacher workforce in Washington.

[5] The presumption in this work and ours is that management wants more flexibility. However, this is not a foregone conclusions as some research (Hess and Loup, 2008) suggests that management does not exercise flexibility even when there is a high degree of flexibility at their disposal.

[6] Moe relies on a transfer rights scale, developed based on factor analysis of several seniority rights CBA provisions. Koski and Horng rely on six transfer rights provisions.

[7] For example, it is conceivable that during negotiations districts trade stricter evaluation standards for seniority-based transfer rights . A focus on the relationship between evaluation standards and student achievement, would be influenced by the related seniority-based transfer rights provisions left unaccounted for in a narrowly-focused model.

[8] Only districts with at least 4 schools are included in Strunk and Reardon's analyses.

III. Data

Our data is coded from every active CBA in the state of Washington in the 2010-11 school year. Coding these agreements in a way that adequately captures the complexity of teacher contracts is a complex endeavor. Many important provisions in CBAs—such as the length of the school day, the negotiated class size in each grade, and number of leave days teachers receive—require a numerical response. Others —such as "Does this CBA include a no-strike clause?" and "Are tenured teachers evaluated differently than non-tenured teachers?— invite dichotomous categorization. And many responses in a CBA are conditional to responses earlier in the CBA—for example, the response to "is seniority the only factor in selecting a teacher to voluntarily transfer?" is conditional on the response to "does seniority play *any* role in selecting a teacher to voluntarily transfer?" Fortunately, the PIIR coding process[9] allows us to overcome these data challenges and consider each CBA a comprehensive document rather than subjectively pulling out specific CBA provisions that we (or others) may believe should have more or less influence on student and teacher outcomes. The resulting dataset contains binary data on 633 different provisions for each of the 270 CBAs in our sample.

We apply PIIR analysis to these data to produce the restrictiveness measures that we report here. These measures can be used to compare each CBA to every other CBA in the state, and by rubric design, the most restrictive district in the state should give management the least flexibility. However, two contracts by this measure may be considered equally restrictive if they have the same number of provisions even if they are restrictive in very different ways.[10] And it is quite likely that union and district representatives trade restrictiveness in one area of the contract for leniency in another. Therefore, in addition to obtaining an objective measure of CBA restrictiveness informed by all provisions in each CBA, we also perform similar analyses on different subsets and categories of provisions.[11]

IV: Subsets and Categories of Provisions

We use the PIIR model described above to obtain a measure of contract restrictiveness, using 633 identified and coded contract provisions for each of the 270 districts in Washington state that have collective bargaining agreements.[12]

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[9] We are extremely grateful to Katharine Strunk for sharing her coding rubric with us at the outset of this project.

[10] We cannot say whether this measure of contract restrictiveness is related to outcomes. We believe that a restrictive contract will restrict management practices in some sense. But a restrictive contract does not necessarily restrict management in ways that would be expected to lead to any particular outcome. To determine the relationship between a particular kind of restrictiveness and a particular outcome of interest we would still need to look at on-the-ground practices related to particular provisions. For example, a CBA may mandate that novice teachers are evaluated annually and the evaluation must consist of three classroom visits. This CBA would be seen as a more restrictive CBA than another district that did not mandate anything about the evaluation of novice teachers but we have no idea if what evaluation practices look like in either the district with "more restrictive" contract language or the district with no evaluation-related provisions.

[11] Restrictiveness should not be interpreted as necessarily being connected to student achievement. This connection is the subject of future work.

[12] An additional 25 districts in the state operated without collective bargaining contracts in the 2010-11 school year.

The objective and detailed measure of restrictiveness relying on all contract provisions is not portable or easily replicated in other contexts. Because we aim to use restrictiveness estimates to answer important questions about the relationship between union power and important education outcomes, like Strunk and Reardon, we assess the 633 contract items employed in our full model to ensure that they are all contributing to the measurement of the underlying restrictiveness trait. Identifying any misfitting items allows those items adding noise to our measure of restrictiveness to be removed from our scale. The resulting scale should be both more reliable and user-friendly (as it is composed of fewer items).[13] Like Strunk and Reardon (2010), we base our item reduction on the unbiased statistical methods used in test construction. After three rounds of an objective iterative item reduction process described in Strunk and Reardon (2010) we are left with an instrument of 218 items that spans the breadth of the contract. This estimates of restrictiveness based on this "restricted dataset" are also presented in all of the tables that follow.

CBAs often follow a similar layout or formula. Numerous CBAs contain headings to separate discussion of association rights (union structure and leadership), evaluation, grievance procedures, layoffs, hiring procedures and transfers, benefits and leaves, and workload. The Strunk coding rubric used to create the data used in these analyses also categorizes provisions in this manner. And previous work has focused on particular provisions that may fall under the umbrella of one of these subcategories (workload, layoffs, hiring and transfers) (Koski and Horng, 2007; Moe 2005, 2009; Moe and Anzia, 2010). Therefore, in addition to running PIIR analysis on our full and reduced datasets to obtain district restrictiveness estimates, we also run PIIR analyses of these categories and an accessibility category composed of questions designed to capture the ease of obtaining and digesting a copy of each district's CBA to determine whether or not districts that are highly restrictive in one category appear to be more or less restrictive in related categories. Table 1 below contains questions illustrative of each category.

Each of the data subsets analyzed may be useful in a particular context. Our final model specification relies on the high-profile provisions listed in Table 1, those talked about in the popular press and cited in prior subjectively focused academic research (Koski and Horng, 2007; Moe, 2005, 2009). The cherry-picked provisions from each contract category should adequately capture a district's visible restrictiveness.

Table 1: Cherry-picked Provisions
Accessibility
How many provisions does the CBA contain (at least 170, at least 202, at least 227)?
How many times is the district contacted to obtain the CBA (at least 2 times, at least 3 times)?
How long is the CBA (at least 47 pages, at least 63 pages, at least 86 pages)?
Association
Is there a no strike/lockout clause/concentrated activities/work stoppage?
Does the district pay for/cover any or all of the release time for negotiations for union members?
Hiring and Transfers

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[13] This does not mean the measure is more accurate. A measure that will yield the same response in repeated trials is reliable but may not be the best, or most complete, measure of a concept of interest.

Does CBA address seniority as a factor in deciding who is voluntarily transferred?

Does CBA address seniority as a factor in deciding who is involuntarily transferred?

Does CBA specify the order in which district can consider new employees for vacancies?
If position opened within the school year is filled with probationary/temporary teacher, will it be re-opened the following year to members seeking transfer/reassignment?
Does CBA require that district post all certificated vacancies/make them available to teachers in the district?

Workload

Does the CBA have a maximum class size for 4th grade? 8th grade? 9-12th grades?
Is collaboration time set aside in CBA (separately from prep time) for 4th grade? 8th grade? 9-12th grades (high school)?

Does the CBA specify a given length of the school day in instructional minutes?

Evaluations

Does CBA/Evaluation rubric define the final rating categories?
Does CBA specify that permanent teacher with 4 years or more experience, who meets or exceeds standards on previous evaluation, or who is NCLB highly qualified can be evaluated on a different schedule?

Are there consequences for receiving a negative/"unsatisfactory" performance evaluation?

Does the CBA allow for teachers to rebut or appeal a negative evaluation?

Grievance

May the teacher grieve disciplinary action?

Does the grievance go to the board?

Does the grievance go to mediation?

Does the grievance go to arbitration?

Layoffs

Within credentialing area, is seniority the only primary factor that determines the order of layoffs (i.e., not just a tie-breaker)?

Does the CBA specify primary factors other than seniority that determine the order of layoffs?

Does CBA provide for recall rights after layoffs?

Does CBA specify how reemployment offers are made after layoffs?

Does CBA specify that reemployment offers are made in reverse seniority order after layoffs?

Can members reject a reemployment offer after layoff?

Leaves

Do members receive LOA for family illness/ family care leave?

Do members receive parenting/ child rearing leave?

Do members get pregnancy/ maternity leave time over the 6 month period promised to them in ec/state laws?

Does CBA specify what members' rights of return are from this leave?

IV: Findings

The restrictiveness estimates informed by all contract provisions are presented in column 2 of online Appendix B.[14] All results have been standardized to have mean 0 and standard deviation 1 within each model.[15] Therefore, the magnitude of each coefficient should be interpreted in standard deviations of restrictiveness. For example, the overall CBA in Aberdeen School District is estimated to be 0.24 standard deviations less restrictive than the average CBA in the state when we use the full range of provisions in our dataset (column 2, Appendix B). A one standard deviation increase in restrictiveness equates to approximately 50 additional restrictive provisions. So Aberdeen has about 12 fewer restrictive provisions than the average CBA in the state.[16]

Column 3 of Appendix B displays each district's restrictiveness estimate based on the objectively-reduced dataset described above. Column 4 of Appendix B provides district restrictiveness estimates based on the high-profile cherry-picked set of provisions identified in Table 1. Columns 5–12 of Appendix B present results by subsection of the CBA.

We provide the estimates for the restrictiveness for all provisions in Washington online, see Appendix C online. The most restrictive district in each category is given a 1 (as before, each column represents a different data subset), the least restrictive district in each category is given a 0. In general, districts that are highly restrictive in one category are at least moderately restrictive in others, and CBAs in larger districts tend to be more restrictive than CBAs in smaller districts.[17]

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[14] Estimates are obtained via fixed-effects logit PIIR.

[15] The measure of contract restrictiveness obtained from a mixed effects model treating districts as fixed effects and provisions as random effects, yields highly correlated (r > .99) estimates, suggesting that the restrictiveness estiamates are robust to our specification of the provision effects. For simplicity, then, we only present results of the fixed-effects model.

[16] This calculation ignores the severity of individual provisions, so is only an approximation.

[17] The CBAs in the three largest districts in the state—Seattle, Tacoma, and Spokane—are among the most restrictive in the state, but interestingly, only Tacoma has one of the ten most restrictive CBAs in the state. The Tacoma CBA in our sample was the CBA that was active during the negotiations that ultimately led to a lengthy teacher's strike, and the restrictiveness of this CBA perhaps explains the district's willingness to toe a hard line during these negotiations.

Table 2, below, quantifies the relationship between the PIIR estimates calculated from each subset of data. The correlations are generally high, affirming that latent restrictiveness in one category is predictive of latent restrictiveness in another category or in the contract as a whole. For instance, the restrictiveness estimates using only hiring and transfer policies are strongly correlated (r = 0.59) with estimates based on the full sample of provisions.[18] This finding is, however, not universally true. The restrictiveness estimates relying on grievance provisions are moderately correlated with those relying on the full dataset while those relying on layoff policies are only weakly (and not significantly) correlated with other subsets. Researchers who rely on grievance and layoff policy as a proxy for union power should take note as these results suggest that provisions from these contract sub-sections may capture another dimension of bargaining and lead to misleading results.

Table 2. Measure Similarity: Pearson Correlations

	Full	Restricted	Cherry Picked	Accessibility	Association	Evaluation	Grievance	Layoffs	Benefits & Leaves	Hiring & Transfer	Workload
Full	1.0000										
Restricted	0.8758***	1.0000									
Cherry Picked	0.7498***	0.6456***	1.0000								
Accessibility	0.6495***	0.6161***	0.7244***	1.0000							
Association	0.6565***	0.5575***	0.5678***	0.5718***	1.0000						
Evaluation	0.6324***	0.3895***	0.3853***	0.2907***	0.2288***	1.0000					
Grievance	0.3391***	0.1621**	0.2895***	0.0573	0.1364*	0.2481***	1.0000				
Layoffs	0.0368	-0.0211	0.1434*	0.0586	-0.0282	0.0178	0.0219	1.0000			
Benefits/ Leaves	0.5787***	0.3577***	0.4334***	0.3642***	0.3394***	0.2988***	0.2298***	-0.0346	1.0000		
Hiring/ Transfers	0.5935***	0.5469***	0.5071***	0.5250***	0.4998***	0.2294***	0.1038+	-0.1197	0.3725***	1.0000	
Workload	0.7693***	0.8952***	0.4942***	0.4742***	0.4208***	0.3191***	0.0997+	-0.0040	0.2776***	0.311***	1.0000

Table 3, below, identifies the 10 districts estimated to be most and least restrictive in terms of the overall CBA and the various sub-categories of CBA provisionss. Given the generally positive correlations reported in Table 2, it is not surprising to see that several districts appear to be highly restrictive based on the full data and also appear in the top 10 in sub-categories. Tukwila, for instance, was estiamted to have the most restrictive CBA in the state when we consider the full range of provisions, and it also shows up in the top 10 most restrictive districts for several of the sub-categories. Entiat, meanwhile, appears to be the least restrictive category in the state based on the full dataset and the restricted subdomain and appears in the top 10 list of least restrictive districts based on cherry-picked, leave and workload provisions.

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[18] While one should be cautious about drawing strong conclusions that the relationship between contract provisions in Washington state apply to other states, this is at least suggestive evidence that prior work focusing only on these provisions (Koski and Horng, 2007) may be capturing a measure of restrictiveness similar to a measure relying on the full range of provisions in CBAs.

Table 3. Most and least restrictive distircts by category

	Full	Restricted	Cherry Picked	Access	Association	Evaluation	Grievance	Layoffs	Leaves	Transfer	Workload
Most Restrictive Districts by Category											
1	TUKWILA	CHENEY	HIGHLINE	PASCO	TUKWILA	LOON LAKE	EDMONDS	LOPEZ	HIGHLINE	TOUTLE LAKE	VASHON ISLAND
2	HIGHLINE	MEAD	EVERGREEN (CLARK)	NOOKSACK VALLEY	TACOMA	SOUTHSIDE	NORTHPORT	RAYMOND	EDMONDS	COLUMBIA (STEV)	TOUTLE LAKE
3	LAKE STEVENS	TUKWILA	TUKWILA	KALAMA	SPOKANE	ENTIAT	MANSON	GRIFFIN	LAKE STEVENS	COLTON	CRESCENT
4	RENTON	FEDERAL WAY	RENTON	CRESTON	UNIVERSITY PLACE	MARY WALKER	COLLEGE PLACE	SOUTH BEND	EPHRATA	BREWSTER	CHENEY
5	SEDRO-WOOLLEY	CRESCENT	CASCADE	KLICKITAT	LAKE WASHING-TON	CENTERVILLE	PROSSER	EATONVILLE	MANSON	NORTH RIVER	ORTING
6	LAKE WASHING-TON	LAKE WASHINGTON	DIERINGER	BREMERTON	MUKILTEO	WARDEN	TONASKET	LA CENTER	MOSES LAKE	CENTERVILLE	METHOW VALLEY
7	WARDEN	ORTING	GRANITE FALLS	KAHLOTUS	NORTHSHORE	CASCADE	CLE ELUM-ROSLYN	SAN JUAN ISLAND	SEDRO-WOOLLEY	COSMOPOLIS	MEAD
8	TACOMA	LAKE STEVENS	RIVERVIEW	MOSSYROCK	SHELTON	MONTESANO	SOUTH WHIDBEY	BREWSTER	SEQUIM	WAITSBURG	FEDERAL WAY
9	NORTHSHORE	ISSAQUAH	SEQUIM	TOUCHET	SHORELINE	MANSON	WINLOCK	KENNEWICK	CHEWELAH	PRESCOTT	LA CONNER
10	ORCAS ISLAND	SEDRO-WOOLLEY	LAKE STEVENS	RENTON	FRANKLIN PIERCE	WILLAPA VALLEY	HIGHLINE	CASTLE ROCK	CLOVER PARK	MARY WALKER	ORCAS ISLAND
Least Restrictive Districts by Category											
1	ENTIAT	ENTIAT	TOUCHET	COLFAX	CRESTON	BREMERTON	MOUNT VERNON	LAKE CHELAN	LOON LAKE	LAMONT	KITTITAS
2	QUEETS	CENTERVILLE	GRAPEVIEW	TENINO	QUEETS	STEVENSON-CARSON	KLICKITAT	SOUTHSIDE	WILBUR	SPRAGUE	LIBERTY
3	MARY WALKER	LIBERTY	MARY WALKER	OTHELLO	WAHKIAKUM	LIBERTY	ABERDEEN	OKANOGAN	CHIMACUM	SOUTH BEND	MOSSYROCK
4	GREAT NORTHERN	ORCHARD PRAIRIE	COLFAX	ORONDO	GLENWOOD	QUEETS	TOUCHET	BOISTFORT	GREAT NORTHERN	GREEN MOUNTAIN	ORCHARD PRAIRIE
5	LIBERTY	QUEETS	ENTIAT	SELKIRK	MILL A	NOOKSACK VALLEY	BETHEL	WARDEN	ORCHARD PRAIRIE	LACROSSE	ENTIAT
6	CENTERVILLE	KITTITAS	WASHTUCNA	GRAPEVIEW	WAITSBURG	ALMIRA	OTHELLO	SPOKANE	DAVENPORT	GREAT NORTHERN	ORONDO
7	LOON LAKE	WASHTUCNA	OAKVILLE	CAPE FLATTERY	GRAPEVIEW	TOLEDO	BELLEVUE	MUKILTEO	TOUCHET	TOUCHET	BREMER-TON
8	WASHTUCNA	BREMERTON	ROCHESTER	OCOSTA	KLICKITAT	GREAT NORTHERN	RIDGEFIELD	OAK HARBOR	ENTIAT	ST. JOHN	QUEETS
9	ORCHARD PRAIRIE	MILL A	PE ELL	HOOD CANAL	COLUMBIA (WALLA)	TEKOA	MONROE	MANSFIELD	WASHTUCNA	BRIDGEPORT	COLUMBIA (STEV)
10	TOUCHET	LACROSSE	CENTERVILLE	ADNA	CENTERVILLE	WISHKAH	CENTERVILLE	MOUNT VERNON	LYLE	POMEROY	BOISTFORT

There are, however, exceptions. For example, Warden School District appears to have a relatively restrictive CBA based on the analysis of the entire contract, but the Warden CBA is estimated to be less restrictive in some of the sub-categories, layoffs for instance. And half of the districts that appear in the least restrictive list, based on analysis of the full CBA (Entiat, Mary Walker, Centerville, Loon Lake, and Touchett) appear to be in one of the top 10 sub-domaine most restrictive lists.

Table 4, below, displays the average district characteristics for the districts with the top ten most and least restrictive CBAs in the state. Of the statistically significant differences between the districts with the most and least restrictive contracts, we see that highly restrictive districts tend to be much larger (12,113 vs. 230 students) and more diverse than the least restrictive districts in the state. Highly restrictive districts also receive a greater percentage of their funding from local sources (33.3% vs. 17.8%) and less state funding (59.5% vs. 70.8%) than less restrictive districts. These striking differences illustrate that districts with highly restrictive contracts tend to serve very different students and receive funding from very different sources than districts with very unrestrictive contracts.

Table 4. Mean Characteristics of Top 10 Most and Least Restrictive Districts

District Characteristics	High Restrictive	Low Restrictive	p-value of difference
Average enrollment	12113	230	**.0051
Percent American Indian students	1.4%	11.8%	.2654
Percent Asian/Pacific Islander students	12.5%	2.0%	**.0075
Percent black students	8.5%	0.4%	*.0254
Percent Hispanic students	20.6%	8.8%	.1472
Percent Migrant students	2.7%	0.3%	.3563
Percent bilingual students	13.0%	1.2%	*.0136
Percent Special Education students	12.8%	11.4%	.2381
Percent of students received free/reduced priced meals	44.3%	44.8%	.9694
Percent of local funding	33.3%	17.8%	***.0004
Percent of state funding	59.5%	70.8%	**.0062
Average teacher experience	11.8	13.1	.1471
Percent of teachers with a master's degree	62.9%	60.7%	.7300
Percent of students passing the reading WASL	66.7%	67.0%	.9370
Percent of students passing the math WASL	51.4%	41.8%	.1146
Average per pupil spending on instruction	$5,480	$8,759	.0800

p-values based on Wald test: *p<.05, **p<.01, ***p<.001

It is computationally costly to utilize the PIIR method to obtain CBA restrictiveness measures so it is of interest to assess whether high-profile cherry-picked provisions tend to provide a good measure of the overall restrictiveness of CBAs. As it turns out, the correlation between the PIIR measure calculated only from cherry-picked provisions and the PIIR measure that utilizes the entire contract is about 0.75. This suggests that—although our item reduction demonstrates that a large number of provisions are necessary to make conclusive inferences about contract restrictiveness—it is still possible to infer a great deal about the restrictiveness of a contract from a small subset of subjectively-chosen provisions. The table below lends further support to this assertion. Each row of the table considers a cherry-picked provisions from the hiring and transfer category (See Table 1 for a description of each provision). The columns explore the differences in average enrollment, free or reduced price lunch participation, and math achievement between districts with (1) and without (0) each provision. Note that these results mirror our findings from the PIIR measures calculated using all provisions in a contract: districts with more restrictive transfer provisions have higher enrollments, serve fewer free and reduced priced lunch students and have higher math achievement scores than districts with less restrictive transfer provisions.

	Average Enrollment (1)	Average Enrollment (0)	% Free or Reduced Price Lunch (1)	%Free or Reduced Price Lunch (0)	% Passed Math Test (1)	% Passed Math Test (0)
Transfers 1	5609	2122	48.2%	48.5%	47.5%	46.9%
Transfers 2	5692	1934	45.6%	51.1%	49.6%	44.8%
Transfers 3	4397	2371	46.9%	52.0%	47.9%	45.5%
Transfers 4	6381	3729	37.2%	48.8%	57.2%	46.8%
Transfers 5	4195	2420	47.6%	51.2%	48.1%	43.6%

This comparison indicates that future research relying on highly contested provisions across contract subsections may yield results similar to research relying on exhaustive, detailed coding of a near-complete universe of provisions.

VI. Conclusions

We report several restrictiveness estimates for each collective bargaining agreement in Washington state. Our overall restrictiveness measure is informed by all provisions in all contracts in the state. We also focus on the restrictiveness of certain contract subsections and high-profile provisions. Policy makers interested in the specific aspects of each CBA that contribute to its restrictiveness should focus on the restrictiveness estimates by category, since CBAs that are restrictive along one dimension are not necessarily restrictive along others. Cross category comparisons illustrate the tradeoffs that may take place throughout the bargaining process and may suggest to policymakers where leeway is more and less acceptable to negotiating parties.

Our correlation analysis suggests that while the PIIR method is an important development in the analysis of collective bargaining outcomes, researchers do not necessarily need to code *every* provision in CBAs to utilize this methodology and draw meaningful conclusions from these agreements. Specifically, analyses that calculate PIIR estimates using a subset of high profile provisions across the contract or a category of provisions that appears to contribute to the latent restrictiveness of the contract—such as association rights, evaluation procedures, teacher benefit and leave policies, hiring and transfer provisions, and teacher workload agreements— may capture a measure of latent restrictiveness similar to one that utilizes the full range of provisions. This is promising news for policymakers and practitioners who want to explore the relationship between collective bargaining and other important school outcomes but do not have access to exhaustive datasets of CBA provisions.

The restrictiveness estimates reported and analyzed here allow us to pursue further research to quantify the determinants and implications of teacher contracts. Specifically, in a related paper (Goldhaber et al., 2012), we investigate determinants of contract provisions, providing evidence that the appearance of a provision in one district increases the likelihood of that provision appearing in nearby districts. In future work we plan to assess the impact of teacher CBAs on student achievement and the quality and distribution of the teacher workforce. Our findings thus far demonstrate that there is variation in the restrictiveness of teacher CBAs in Washington and

future work will quantify the importance of this variation for Washington's students and teachers.

References

Goldhaber, D., Lavery, L., Theobald, R., D'Entremont, D., and Fang, Y. (2012). Teacher Collective Bargaining in Washington State: Assessing the Internal Validity of Partial Independence Item Response Measures of Contract Restrictiveness. CEDR Working paper no. 2012-3. Center for Education Data & Research (CEDR), University of Washington, Seattle, WA.

Goldhaber, D., Lavery, L. & Theobald, R. (2012). My End of the Bargain: Exploring the Influence of Spatial Relationships on the Provisions in Collective Bargaining Agreements. CEDR Working Paper 2012-2. University of Washington, Seattle, WA

Hannaway, Jane and Rotherham, Andrew J. (2006). *Collective Bargaining in Education: Negotiating Change in Today's Schools*. Cambridge, MA: Harvard Education Press.

Hess, Frederick M. and Loup, Cody (2008). "The Leadership Limbo: Teacher Labor Agreements in America's Fifty Largest School Districts." Thomas B. Fordham Institute, Washington, D.C.

Koski, W. S. & Horng, E.L. (2007). Curbing or Facilitating Inequality? Law, Collective Bargaining, and Teacher Assignment Among Schools in California. *Education Finance and Policy, 2(3),* 262-300.
Moe, Terry M. (2005). Bottom-Up Structure: Collective Bargaining, Transfer Rights, and the Plight of Disadvantaged Schools. Department of Political Science, Stanford University. (A revised version, with different coding for the dependent variable, can be found at in the Education Working Paper Archive, Department of Education Reform, University of Arkansas: http://www.uark.edu/ua/der/EWPA/Research/Teacher_Quality/1786.html.)

Maher, K. & Nicas, J. (2011, November 9). Ohio Voters Reject Public-Union Limits. The Wall Street Journal. Retrieved from http://online.wsj.com/article/SB10001424052970204190704577026360072268418.html. Last access on April 23, 2012.

Moe, Terry M. (2009). Collective Bargaining and the Performance of the Public Schools. American Journal of Political Science, 53(1): 156-174.

Moe, Terry M., and Anzia, Sarah F. (2010). "Collective Bargaining, Transfer Rights, and Disadvantaged Schools." Working Paper.

Strunk, K.O. & Reardon, S. (2010). "Measuring Union Strength: A Partial Independence Item Response Approach to Measuring the Restrictiveness of Teachers' Union Contracts." *Journal of Educational and Behavioral Statistics* 35(6): 629-670.