

Appendix Table A.2: Effect of Union Status on Injury Frequency:
Expanded Covariate Report for Baseline, Public-Fields Specifications

	Nontraumatic Injury Model	Total Injury Model	Traumatic Injury Model	Fatality Model
Union	1.351*** (0.07)	1.148*** (0.05)	0.765*** (0.04)	0.346*** (0.13)
Union X Size	0.972 (0.02)	0.962* (0.02)	0.987 (0.02)	1.019 (0.03)
Mine Size	0.877*** (0.02)	0.892*** (0.02)	0.921*** (0.03)	0.899*** (0.03)
Log of Controller Size	0.937*** (0.01)	0.986* (0.01)	1.063*** (0.01)	1.021 (0.06)
Mine Age	0.999 (0.00)	0.999 (0.00)	0.998 (0.00)	1.007 (0.01)
Productivity	0.995 (0.00)	0.998 (0.00)	1.000 (0.00)	0.942*** (0.02)
Lost-Day Injuries in Prev. Year	1.000*** (0.00)	1.000*** (0.00)	1.000*** (0.00)	1.000 (0.00)
Penalty Points in Prev. Year	1.000*** (0.00)	1.000*** (0.00)	1.000*** (0.00)	1.000*** (0.00)
Longwall Indicator	0.887* (0.05)	0.873** (0.05)	0.882 (0.08)	1.572 (0.54)
Mining Subunit Dummies^a	Y	Y	Y	Y
District Fixed Effects^a	Y	Y	Y	Y
Quarter/Year Fixed Effects^a	Y	Y	Y	Y
Observations	38,890	38,890	38,890	11,045
# of Union Mines / # of Total Mines	355 / 2,635	355 / 2,635	355 / 2,635	352 / 2,568

Significance levels: *** 1%, ** 5%, * 10%. Standard errors, clustered at the mine level, are shown in parentheses.

Results Presented: The information presented in this table is identical to that presented in the Baseline/Public-Fields column of Table 2, but includes additional coefficient estimates. Each value represents the IRR (incidence rate ratio)^a coefficient on an independent variable in a negative binomial regression model. Hours worked is the exposure term.

Definitions: A quarterly FTE is defined as 500 hours worked.

Unit of Observation: The unit of observation is the mine-quarter for the nontraumatic, total, and traumatic injuries regressions. The unit of observation is the mine-year for fatality regressions.

Dependent Variables: The dependent variables are counts of injuries of each type (specified in the top row) that occur underground. *Traumatic injuries* are defined to include the following: amputations; enucleations; fractures; chips; dislocations; foreign bodies in eyes; cuts and lacerations; punctures; burns/scalds; crushings; chemical, electrical, and laser burns; and fatalities. (See footnote 13 for more details on the definition on traumatic injuries.) The sum of traumatic and nontraumatic injuries comprises *total injuries*.

Independent Variables: All models include the following regressors: union dummy, mine size (a continuous variable reflecting the mine's total number of FTEs), union X mine size, logged controller size (a continuous variable reflecting the controller's total number of FTEs), mine age, mine productivity, total lost-work injuries (in hundreds)

during previous calendar year (for fatality models) or previous four quarters (for non-fatality models), total penalty points (in thousands) during previous calendar year (for fatality models) or previous four quarters (for non-fatality models), dummies indicating presence of each respective mine subunit, quarter/year dummies, district dummies, longwall indicator, and a constant term. See Appendix C for complete variable definitions. An expanded version of this table, including a complete covariate report, is available at <http://amorantz.stanford.edu/companions/union-coal-mine-safety/>.

Sample: The sample consists of underground bituminous coal mines from 1993–2010 with positive coal production, positive hours worked, and non-missing controller size data. Because the historical variables (lost-work injuries and penalty points) are summed up over the previous four *quarters* in the nontraumatic, total, and traumatic injuries regressions but are summed up over the previous *calendar year* in the fatality regressions, some mines excluded from the fatality models are included in the other models. For example, if a mine is open for all of only one calendar year, it will have no historical data at the *yearly* level, but it will have historical data for three of the four *quarters* it was open. The number of union mines is computed by counting the mines that were unionized for any of the mine-quarters in the sample period. The total number of mines is computed by counting each mine in the sample, regardless of union status. Note that the confidential-fields versions of all models exclude any observations that lack information on confidential covariates.

^a A coefficient of 1 indicates no change at all in predicted injuries; coefficients between 0 and 1 represent a predicted fall in injuries (e.g. a coefficient of 0.97 represents a 3% decline); and coefficients greater than one represent predicted increases (e.g. a coefficient of 1.03 represents a 3% rise).