Online Appendix: Complementarity of Performance Pay and Task Allocation

A1 Different types of performance pay

Tables A1 and A2 (below and next page) repeat our baseline test of joint adoption with disaggregated performance pay measures, where we considered each type of performance pay (individual, group, profit-sharing, and stock compensation) in isolation:

Table A1. Individual and group performance pay

	(1)	(2)	(3)	(4)	(5)	(6)
	Individual Incentives			Group Incentives		
Dependent variable: Control by	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV
PerformancePay	-8.140***	7.730***	-2.376**	-20.409***	19.381***	-5.958*
	(1.643)	(1.350)	(0.924)	(2.497)	(4.256)	(3.126)
Firm size	-0.993***	0.511***	0.125	-0.820***	0.346*	0.176
(logged total employees)	(0.234)	(0.131)	(0.129)	(0.162)	(0.193)	(0.166)
Establishment age	0.002	0.010	0.003	0.012*	0.000	0.006**
	(0.006)	(0.007)	(0.002)	(0.007)	(0.005)	(0.003)
Multi-unit enterprise	0.632**	-0.929**	-0.111	1.656*	-1.901**	0.187
	(0.296)	(0.416)	(0.182)	(0.916)	(0.780)	(0.380)
Exporter	0.602**	-0.665**	0.122	-0.178	0.076	-0.106
	(0.262)	(0.317)	(0.176)	(0.368)	(0.338)	(0.136)
Unionized	-1.566***	0.208	0.015	-0.737	-0.579	0.257
	(0.461)	(0.276)	(0.202)	(0.720)	(0.663)	(0.256)
Foreign-owned	-1.266***	0.995***	0.360	0.105	-0.307	0.760
	(0.467)	(0.311)	(0.251)	(0.740)	(0.567)	(0.476)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	11,753	11,753	11,753	11,753	11,753	11,753

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

Table A2. Profit sharing and stock compensation performance pay

	(1)	(2)	(3)	(4)	(5)	(6)
	Profit sharing			Stock compensation		
Dependent variable: Control by	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV
PerformancePay	-24.824***	23.573***	-7.247**	-61.546***	58.445***	-17.968***
	(5.736)	(5.974)	(3.215)	(22.490)	(15.769)	(6.001)
Firm size	-0.617*	0.154	0.235	-0.581*	0.120	0.245
(logged total employees)	(0.343)	(0.308)	(0.200)	(0.315)	(0.293)	(0.182)
Establishment age	0.018	-0.005	0.008**	-0.016	0.027**	-0.002
	(0.016)	(0.014)	(0.004)	(0.011)	(0.012)	(0.004)
Multi-unit enterprise	1.753**	-1.993**	0.216	13.656***	-13.297***	3.691**
	(0.701)	(0.999)	(0.372)	(4.117)	(3.650)	(1.844)
Exporter	0.294	-0.372	0.032	0.871**	-0.920***	0.201
	(0.385)	(0.339)	(0.116)	(0.342)	(0.306)	(0.148)
Unionized	-2.584***	1.174***	-0.282	-1.386*	0.037	0.068
	(0.513)	(0.312)	(0.321)	(0.747)	(0.588)	(0.263)
Foreign-owned	-1.124**	0.860	0.401	4.709	-4.679**	2.104***
	(0.498)	(0.541)	(0.328)	(3.068)	(2.207)	(0.584)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	11,753	11,753	11,753	11,753	11,753	11,753

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

As the results in Tables A1 and A2 show, our findings are similar to our original baseline regression results.

A2 Managerial performance pay only

For Tables A3 and A4, we exploit additional information about incentives provided at different hierarchical levels. For Table A3, respondents of the survey were asked whether performance pay was adopted at the managerial level of the hierarchy (at the exclusion of other levels), which we can measure as a dummy variable. One possible explanation for our results is that the concentration of tasks at the managerial level may simply be due to only managers receiving performance pay in the organization. If so, then dropping those observations from our estimation sample should change our statistically significant results. We show our results from this additional analysis on the following page:

Table A3. "Managerial performance pay only" observations dropped

	(1)	(2) IV	(3)
Dependent variable: Control by	Principal	Manager	Non-Manager
PerformancePay	-6.038***	5.309***	-2.128**
	(1.162)	(1.074)	(0.958)
Firm size (logged total employees)	-1.107***	0.663***	0.130
	(0.201)	(0.123)	(0.151)
Establishment age	-0.001	0.012*	0.003
	(0.005)	(0.007)	(0.003)
Multi-unit enterprise	0.650**	-1.210***	0.005
	(0.293)	(0.426)	(0.191)
Exporter	0.398	-0.404	0.030
	(0.293)	(0.260)	(0.149)
Unionized	-1.693***	0.197	0.019
	(0.478)	(0.245)	(0.242)
Foreign-owned	-1.805***	1.460***	0.355
	(0.437)	(0.385)	(0.273)
Year fixed effects	Y	Y	Y
Industry fixed effects	Y	Y	Y
Observations	10,498	10,498	10,498

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

As the results above show, our original findings remain robust to dropping these firms from our estimation sample, suggesting that our results are not primarily driven by performance pay adoption only at the managerial level. As an additional step, we are also able to observe in the data whether firms only provide performance pay to non-managerial employees (and not managers), since the survey asks whether other employees in the establishment in non-managerial types of occupational classes receive performance pay. We also drop these observations from our estimation to see if our results might change, which are on the following page:

Table A4. “Non-Manager performance pay only” observations dropped

	(1)	(2) IV	(3)
Dependent variable: Control by	Principal	Manager	Non-Manager
PerformancePay	-6.729***	6.509***	-1.911***
	(1.073)	(0.981)	(0.690)
Firm size (logged total employees)	-1.013***	0.527***	0.095
	(0.180)	(0.105)	(0.121)
Establishment age	0.005	0.009*	0.003
	(0.004)	(0.005)	(0.003)
Multi-unit enterprise	1.041***	-1.414***	0.013
	(0.283)	(0.450)	(0.187)
Exporter	0.383	-0.454	0.029
	(0.253)	(0.283)	(0.153)
Unionized	-1.510***	0.146	0.036
	(0.460)	(0.267)	(0.194)
Foreign-owned	-1.321***	0.899**	0.374
	(0.504)	(0.377)	(0.266)
Year fixed effects	Y	Y	Y
Industry fixed effects	Y	Y	Y
Observations	10,716	10,716	10,716

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

As shown above, the coefficients for PerformancePay are similar to our original baseline regression results. As Tables A3 and A4 show, our results are robust to these changes, suggesting that heterogeneity in the adoption of performance pay at different levels in the hierarchy does not appear to explain our results.

A3 Unobserved regional variation

Tables A5-A8 examine the robustness of our instrumental variables results with the inclusion of additional controls related to the location of firms that may potentially confound our estimation. We note that due to the strict regulations Statistics Canada has about disclosing any information that may identify individual firms, the precise locations of firms in our data are not available. However, economic activity within Canadian provinces tends to be highly concentrated in each province's major urban areas (Brown and Rispoli 2014), so we are able to reasonably approximate the center of economic activity within each province by identifying a population-weighted midpoint between each province's three most populated cities.

For our distance measures that we use as control variables, we considered both the driving (which is more likely to represent transportation of economic goods) and straight line distances between the midpoint in an establishment's province and the midpoint in the province of interest. To measure the distance to the United States, we identified the locations of all border crossings between Canada and the U.S. (excluding the state of Alaska), and chose the closest one to calculate each distance to the U.S. We note that because provinces in Canada essentially run in a horizontal west-to-east line, north-south differences can be captured by measuring the distance to the US border to the south. Distance from the west can be measured as the distance from British Columbia, Canada's western coastal province. Distance from the east can be measured from Quebec, which is also a reasonable measure of the strength of influence of Francophone Canadian culture. We also include the distance to Ontario, since Toronto is considered by many to be the economic center of Canada.

Our results including these additional distance measures as controls are shown here, starting on the following page:

Table A5. Distance to the U.S. control included

Dependent variable: Control by	(1) Principal IV	(2) Manager IV	(3) Non-Manager IV	(4) Principal IV	(5) Manager IV	(6) Non-Manager IV
PerformancePay	-6.376***	6.112***	-1.841**	-6.246***	5.924***	-1.673**
	(1.076)	(0.989)	(0.783)	(1.040)	(0.886)	(0.774)
Driving distance to US	0.678	-0.145	0.372			
	(0.707)	(0.733)	(0.441)			
Straight line distance to US				0.711	-0.698	0.719
				(0.718)	(0.764)	(0.463)
Firm size	-0.986***	0.496***	0.124	-1.003***	0.521***	0.102
(logged total employees)	(0.182)	(0.119)	(0.134)	(0.178)	(0.115)	(0.133)
Establishment age	0.001	0.011*	0.003	0.001	0.011*	0.003
	(0.004)	(0.006)	(0.003)	(0.004)	(0.006)	(0.003)
Multi-unit enterprise	0.943***	-1.249***	-0.030	0.924***	-1.204***	-0.065
	(0.251)	(0.395)	(0.179)	(0.246)	(0.377)	(0.166)
Exporter	0.390	-0.453	0.064	0.386	-0.459	0.066
	(0.262)	(0.294)	(0.146)	(0.260)	(0.290)	(0.144)
Unionized	-1.536***	0.199	0.031	-1.534***	0.177	0.045
	(0.464)	(0.261)	(0.214)	(0.460)	(0.260)	(0.219)
Foreign-owned	-1.455***	1.168***	0.302	-1.472***	1.191***	0.281
	(0.398)	(0.290)	(0.252)	(0.398)	(0.284)	(0.251)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	11,753	11,753	11,753	11,753	11,753	11,753

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

Table A6. Distance to British Columbia control included

Dependent variable: Control by	(1) Principal IV	(2) Manager IV	(3) Non-Manager IV	(4) Principal IV	(5) Manager IV	(6) Non-Manager IV
PerformancePay	-7.315***	7.194***	-2.177***	-7.406***	5.924***	-1.673**
	(1.311)	(0.646)	(0.625)	(1.323)	(0.886)	(0.774)
Driving distance to BC	-0.136**	0.168***	-0.046***			
	(0.054)	(0.023)	(0.013)			
Straight line distance to BC				-0.179***	0.216***	-0.061***
				(0.068)	(0.029)	(0.017)
Firm size	-0.806***	0.284***	0.188	-0.792***	0.521***	0.102
(logged total employees)	(0.208)	(0.094)	(0.116)	(0.209)	(0.115)	(0.133)
Establishment age	-0.001	0.013**	0.002	-0.001	0.011*	0.003
	(0.004)	(0.006)	(0.003)	(0.004)	(0.006)	(0.003)
Multi-unit enterprise	1.168***	-1.492***	0.054	1.183***	-1.204***	-0.065
	(0.268)	(0.338)	(0.146)	(0.272)	(0.377)	(0.166)
Exporter	0.355	-0.423	0.049	0.356	-0.459	0.066
	(0.281)	(0.330)	(0.160)	(0.282)	(0.290)	(0.144)
Unionized	-1.601***	0.252	0.003	-1.601***	0.177	0.045
	(0.477)	(0.280)	(0.199)	(0.479)	(0.260)	(0.219)
Foreign-owned	-1.339***	1.034***	0.344	-1.327***	1.191***	0.281
	(0.432)	(0.312)	(0.244)	(0.432)	(0.284)	(0.251)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	11,753	11,753	11,753	11,753	11,753	11,753

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

Table A7. Distance to Quebec control included

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Control by	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV
PerformancePay	-6.342***	6.695***	-2.261***	-6.328***	6.776***	-2.302***
	(1.227)	(0.986)	(0.789)	(1.235)	(0.962)	(0.793)
Driving distance to QB	-0.018	-0.090***	0.060*			
	(0.055)	(0.034)	(0.031)			
Straight line distance to QB				-0.023	-0.120***	0.077**
				(0.069)	(0.041)	(0.039)
Firm size	-0.988***	0.425***	0.176	-0.990***	0.415***	0.181
(logged total employees)	(0.208)	(0.124)	(0.138)	(0.209)	(0.121)	(0.139)
Establishment age	0.001	0.011*	0.003	0.001	0.011*	0.003
	(0.004)	(0.006)	(0.003)	(0.004)	(0.006)	(0.003)
Multi-unit enterprise	0.950***	-1.391***	0.079	0.947***	-1.409***	0.088
	(0.242)	(0.415)	(0.179)	(0.242)	(0.410)	(0.181)
Exporter	0.378	-0.443	0.052	0.378	-0.443	0.052
	(0.267)	(0.305)	(0.156)	(0.267)	(0.307)	(0.156)
Unionized	-1.564***	0.193	0.024	-1.564***	0.193	0.024
	(0.451)	(0.271)	(0.202)	(0.451)	(0.273)	(0.202)
Foreign-owned	-1.461***	1.094***	0.355	-1.462***	1.086***	0.359
	(0.429)	(0.292)	(0.255)	(0.431)	(0.294)	(0.255)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	11,753	11,753	11,753	11,753	11,753	11,753

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

Table A8. Distance to Ontario control included

Dependent variable: Control by	(1) Principal IV	(2) Manager IV	(3) Non-Manager IV	(4) Principal IV	(5) Manager IV	(6) Non-Manager IV
PerformancePay	-6.429***	6.240***	-1.957***	-6.430***	6.232***	-1.950***
	(1.155)	(0.914)	(0.700)	(1.153)	(0.898)	(0.694)
Driving distance to ON	-0.017	-0.074**	0.049**			
	(0.053)	(0.037)	(0.023)			
Straight line distance to ON				-0.023	-0.099**	0.063**
				(0.069)	(0.046)	(0.030)
Firm size	-0.976***	0.485***	0.136	-0.976***	0.486***	0.135
(logged total employees)	(0.199)	(0.119)	(0.126)	(0.198)	(0.118)	(0.126)
Establishment age	0.001	0.011*	0.003	0.001	0.011*	0.003
	(0.004)	(0.006)	(0.003)	(0.004)	(0.006)	(0.003)
Multi-unit enterprise	0.966***	-1.302***	0.019	0.966***	-1.302***	0.018
	(0.238)	(0.399)	(0.157)	(0.238)	(0.396)	(0.155)
Exporter	0.378	-0.444	0.052	0.378	-0.444	0.052
	(0.268)	(0.298)	(0.151)	(0.268)	(0.298)	(0.151)
Unionized	-1.566***	0.187	0.028	-1.566***	0.186	0.028
	(0.451)	(0.263)	(0.204)	(0.451)	(0.263)	(0.204)
Foreign-owned	-1.452***	1.143***	0.322	-1.452***	1.144***	0.321
	(0.422)	(0.295)	(0.244)	(0.422)	(0.297)	(0.243)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	11,753	11,753	11,753	11,753	11,753	11,753

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

As Tables A5-A8 show, our results remain robust to the inclusion of these additional controls. As an additional step, we also considered whether other differences across provinces may influence our results. To test for this possibility, we also included: 1) per capita GDP; 2) the provincial unemployment rate; 3) an index measuring the efficiency of transportation in each Canadian province[1]; 4) the industry concentration of labor employment by province, calculated in a manner similar to a Herfindahl index; 5) the percentage of voters who voted in favor of the New Democratic Party in 2003 (one of Canada's 3 main political parties); and 6) the percentage of voters who voted in favor of the Liberal Party in 2003 (another of Canada's 3 main political parties; the Conservative Party is excluded as the third).[2][3]

[1] Source: *Transportation Performance of the Canadian Provinces*, 2008 from the Fraser Institute.
[2] All economic data comes from Statistics Canada for the year 2003 except per capita GDP, which covers the 2003-2004 period.
[3] Political voting data comes from Wesley (2010)

Table A9. Per capita GDP and unemployment rate controls included

Dependent variable: Control by	(1) Principal IV	(2) Manager IV	(3) Non-Manager IV	(4) Principal IV	(5) Manager IV	(6) Non-Manager IV
PerformancePay	-6.829***	7.307***	-3.135***	-6.430***	6.232***	-1.950***
	(1.597)	(1.476)	(0.782)	(1.153)	(0.898)	(0.694)
Provincial per capita GDP	0.007	-0.023	0.024**			
	(0.012)	(0.014)	(0.010)			
Provincial unemployment rate				-0.174	0.302	-0.165*
				(0.150)	(0.195)	(0.085)
Firm size	-0.926***	0.340*	0.293***	-0.976***	0.486***	0.135
(logged total employees)	(0.254)	(0.185)	(0.108)	(0.198)	(0.118)	(0.126)
Establishment age	0.001	0.012**	0.002	0.001	0.011*	0.003
	(0.004)	(0.006)	(0.003)	(0.004)	(0.006)	(0.003)
Multi-unit enterprise	1.041***	-1.459***	0.204	0.966***	-1.302***	0.018
	(0.305)	(0.463)	(0.204)	(0.238)	(0.396)	(0.155)
Exporter	0.384	-0.475	0.083	0.378	-0.444	0.052
	(0.267)	(0.318)	(0.171)	(0.268)	(0.298)	(0.151)
Unionized	-1.562***	0.205	0.016	-1.566***	0.186	0.028
	(0.463)	(0.274)	(0.194)	(0.451)	(0.263)	(0.204)
Foreign-owned	-1.399***	1.016***	0.466*	-1.452***	1.144***	0.321
	(0.465)	(0.329)	(0.260)	(0.422)	(0.297)	(0.243)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	11,753	11,753	11,753	11,753	11,753	11,753

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

Table A10. Transportation efficiency index and industry employment concentration controls included

Dependent variable: Control by	(1) Principal IV	(2) Manager IV	(3) Non-Manager IV	(4) Principal IV	(5) Manager IV	(6) Non-Manager IV
PerformancePay	-6.432***	6.249***	-1.954***	-6.982***	6.507***	-1.887***
	(1.125)	(0.697)	(0.633)	(1.212)	(1.069)	(0.696)
Transportation efficiency Index	-0.013	-0.070***	0.040***			
	(0.031)	(0.023)	(0.011)			
Industry employment concentration				0.028**	-0.020**	0.000
				(0.013)	(0.010)	(0.007)
Firm size	-0.979***	0.468***	0.145	-0.858***	0.410***	0.131
(logged total employees)	(0.193)	(0.112)	(0.120)	(0.191)	(0.121)	(0.116)
Establishment age	0.001	0.010*	0.003	-0.001	0.012**	0.003
	(0.004)	(0.006)	(0.003)	(0.004)	(0.006)	(0.002)
Multi-unit enterprise	0.973***	-1.278***	0.002	1.046***	-1.306***	-0.010
	(0.243)	(0.352)	(0.137)	(0.252)	(0.425)	(0.170)
Exporter	0.382	-0.416	0.037	0.373	-0.448	0.056
	(0.268)	(0.301)	(0.151)	(0.276)	(0.305)	(0.149)
Unionized	-1.564***	0.193	0.023	-1.624***	0.249	0.016
	(0.453)	(0.269)	(0.206)	(0.458)	(0.263)	(0.199)
Foreign-owned	-1.447***	1.163***	0.309	-1.392***	1.127***	0.307
	(0.418)	(0.315)	(0.235)	(0.428)	(0.289)	(0.243)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	11,753	11,753	11,753	11,753	11,753	11,753

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

Table A11. New Democratic Party (NDP) and Liberal voter percentage controls included

Dependent variable: Control by	(1) Principal IV	(2) Manager IV	(3) Non-Manager IV	(4) Principal IV	(5) Manager IV	(6) Non-Manager IV
PerformancePay	-6.562***	6.753***	-1.887*	-6.992***	6.869***	-2.274***
	(1.198)	(1.438)	(1.115)	(1.382)	(1.432)	(0.832)
NDP voter percentage	0.002	-0.013	0.000			
	(0.011)	(0.012)	(0.008)			
Liberal voter percentage				-0.020	0.028*	-0.015*
				(0.015)	(0.017)	(0.008)
Firm size	-0.959***	0.402**	0.131	-0.901***	0.392**	0.184
(logged total employees)	(0.205)	(0.176)	(0.191)	(0.226)	(0.182)	(0.125)
Establishment age	0.001	0.012*	0.003	-0.000	0.012*	0.002
	(0.005)	(0.006)	(0.003)	(0.005)	(0.006)	(0.003)
Multi-unit enterprise	0.994***	-1.355***	-0.010	1.051***	-1.358***	0.043
	(0.251)	(0.476)	(0.237)	(0.296)	(0.458)	(0.179)
Exporter	0.373	-0.434	0.056	0.394	-0.475	0.069
	(0.268)	(0.305)	(0.143)	(0.267)	(0.309)	(0.158)
Unionized	-1.565***	0.221	0.017	-1.544***	0.179	0.030
	(0.466)	(0.274)	(0.210)	(0.468)	(0.274)	(0.206)
Foreign-owned	-1.434***	1.092***	0.307	-1.378***	1.072***	0.357
	(0.405)	(0.269)	(0.264)	(0.408)	(0.278)	(0.276)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	11,753	11,753	11,753	11,753	11,753	11,753

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

We note that Tables A9-A11 show a consistent pattern of results. While many of the added controls are indeed statistically significant and suggestive of other factors that might matter when considering task allocation outcomes, they do not change the main findings of the paper.

As an additional step to examine whether higher tax progressivity may affect our decentralization results through increased worker skills, we plot the relationship between our tax progressivity measure and the average educational expenditure per student in each province for pre-postsecondary and postsecondary education. To obtain educational expenditure data, we use the Education Indicators in Canada in 2003 report produced jointly by the Council of Ministers of Education and Statistics Canada. If tax progressivity affects decentralization through greater education of the labor force, then progressivity should be positively related to the average educational expenditure per student. However, as shown in Figures A12 and A14 on the following page, we find no evidence of a systematic positive relationship. We note, however, that we do find evidence of a positive relationship between average tax rates and average educational expenditure (see Figures A13 and A15 on the following page), suggesting that exclusion restriction concerns regarding tax progressivity may not be analogous with similar concerns when using average tax rates as an instrumental variable.

Another possible threat to our exclusion restriction is that greater tax progressivity may also be related to labor contracting institutions that favor employees over firms. Regulations that favor employees may increase the degree of decentralization of firms, and confound our estimation since we do not control for labor contracting regulations in our full sample analysis. To examine whether this might be the case, we plot the relationship between labor contracting regulations and our tax progressivity measure for each province, using an index measure of the strength of labor contracting institutions by Block, Roberts, and Clarke (2003), where greater values of the index indicate a contracting environment that favors employees over firms. As Figure A16 on the following page shows, instead of finding a positive relationship between greater tax progressivity and strength of labor contracting institutions, we find a negative relationship, suggesting that this is unlikely to explain our results. However, similar to our educational expenditure analysis, average tax rates and the contracting environment measure are positively related, as shown in Figure A17, again suggesting the two tax measures are conceptually and meaningfully distinct.

Figure A12. Postsecondary educational expenditure vs. income tax progressivity

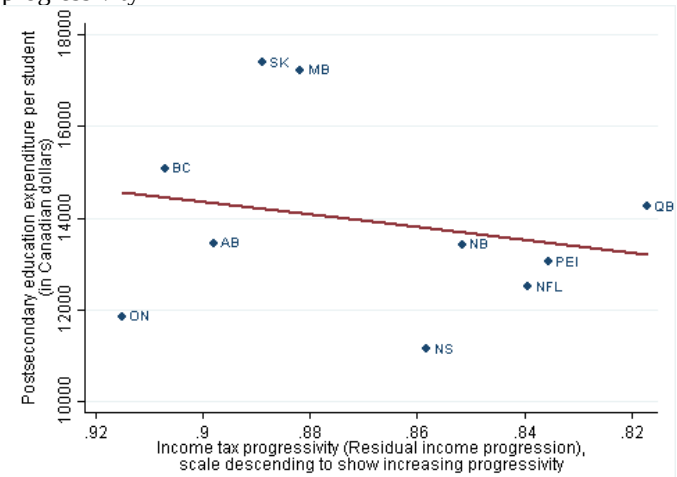


Figure A13. Postsecondary educational expenditure vs. avg. income tax rate

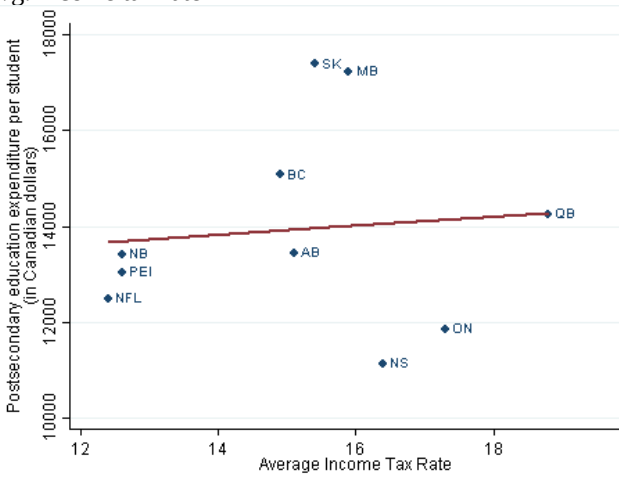


Figure A14. Pre-postsecondary educational expenditure vs. income tax progressivity

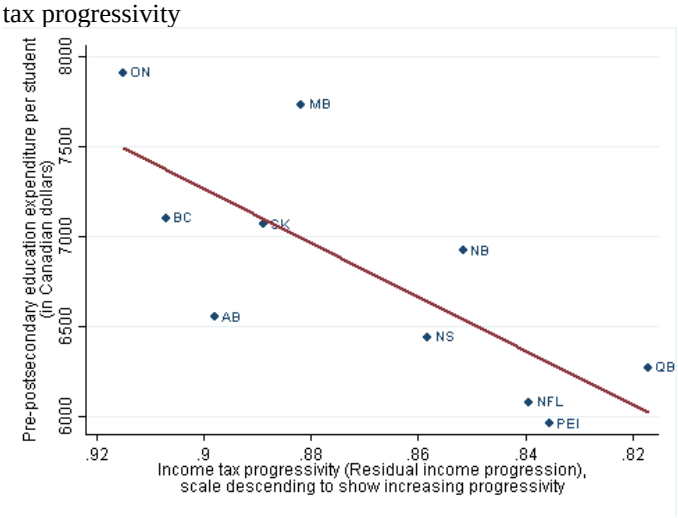


Figure A15. Pre-postsecondary educational expenditure vs. avg. income tax rate

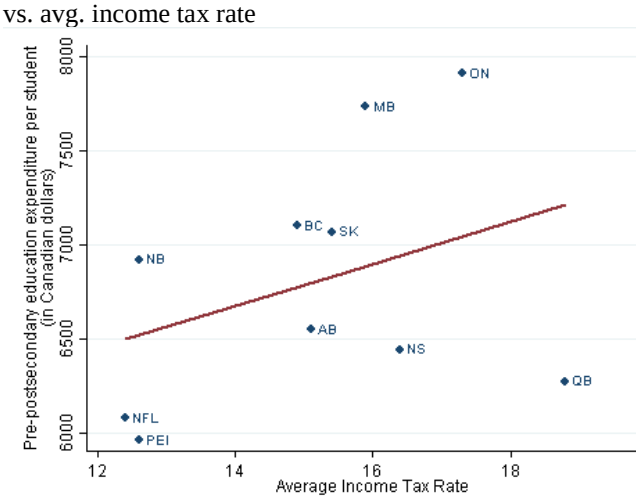


Figure A16. Labor contracting regulations vs. income tax progressivity

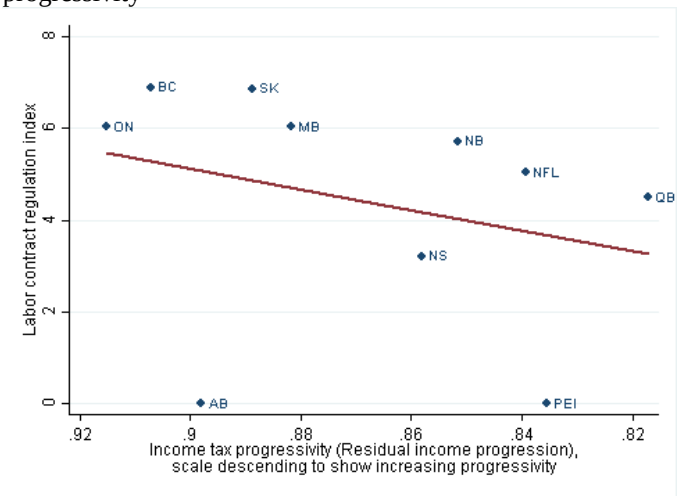
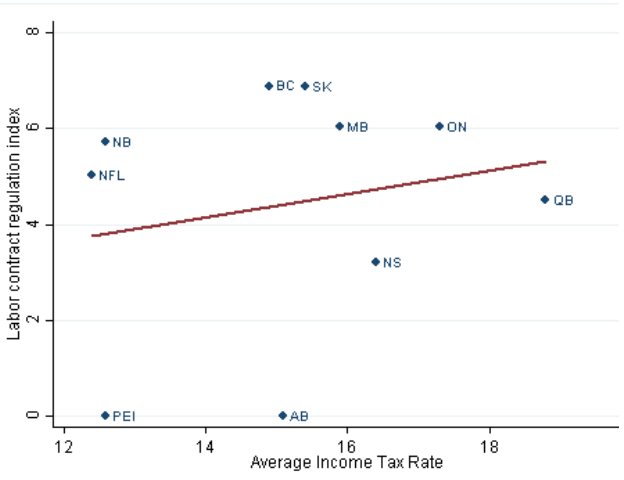


Figure A17. Labor contracting regulations vs. avg. income tax rate



A4 Performance pay induced selection

In Table A18, we examine managerial hiring and turnover patterns in the data for firms that adopt performance pay. Because of the significant number of observations left-censored at zero, we estimate Tobit models for our regression specifications, and use the same control variables as in our task allocation specifications. To measure hiring activity, we calculate the total number of managerial hires divided by the total number of employees at the establishment. Column 1 of Table A18 shows the relationship between performance pay adoption and managerial hiring. The coefficient for performance pay is positive and significant, suggesting that adopting performance pay predicts greater hiring of managers. In Column 2, we examine whether performance pay adoption may also predict higher managerial turnover, and do not find a significant relationship.[4] When considered together, the results suggest that managerial hiring induced by performance pay is more likely to be related to expansion of the management layer, as opposed to a selection effect that retains high-skill managers but forces out low-skill managers, as found in Lazear (2000).

Table A18. Managerial hiring and turnover on performance pay adoption

	(1)	(2)
	Tobit	Tobit
Dependent variable:	Mgr. Hiring Rate	Mgr. Turnover
PerformancePay	0.104***	0.126
	(0.028)	(0.130)
Firm size	0.099***	0.789***
(logged total employees)	(0.008)	(0.052)
Establishment age	-0.001	-0.000
	(0.001)	(0.002)
Multi-unit enterprise	-0.052***	-0.086
	(0.017)	(0.227)
Exporter	0.015	-0.108
	(0.034)	(0.139)
Unionized	-0.008	-0.075
	(0.016)	(0.195)
Foreign-owned	-0.022	-0.016
	(0.028)	(0.279)
Year fixed effects	Y	Y
Industry fixed effects	Y	Y
Observations	11,753	11,753
Pseudo R-squared	0.37	0.16

Standard errors in parentheses, clustered by province-year. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

[4] Managerial turnover is calculated as the total number of managers who leave the firm in the relevant year divided by the total number of managers at the establishment.

A5 Examination of Athey-Stern conditions

(1) Firms optimize

Table A19. First stage estimation: Performance pay adoption on tax progressivity

Dependent variable: PerformancePay	(1) OLS Full sample	(2) OLS Multi-Province Sample
Residual Income Progression	1.641***	2.319***
	(0.280)	(0.558)
Firm size (logged total employees)	0.134***	0.048*
	(0.008)	(0.025)
Establishment age	-0.001**	-0.001
	(0.001)	(0.002)
Multi-unit enterprise	0.176***	0.077
	(0.021)	(0.098)
Exporter	0.004	0.102*
	(0.025)	(0.053)
Unionized	-0.027	-0.068
	(0.030)	(0.050)
Foreign-owned	0.126***	0.008
	(0.040)	(0.054)
Year fixed effects	Y	Y
Industry fixed effects	Y	Y
Observations	11,753	1,544
Adj R-squared	0.27	0.48

Standard errors in parentheses, clustered by province-year. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

(2) Variables are ordered in such a way that profits remain supermodular even after adding several system and practice-specific noise terms; (3) there are no system-specific error terms, or the model is not a "Random-Systems Model."

Table A20. Joint adoption results for organization size quintiles

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Size Quintile 1			Size Quintile 2			Size Quintile 3		
Dependent variable: Control by	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV
PerformancePay	-11.026***	7.782***	-1.500	-5.950***	5.102	-3.208***	-1.698	5.715***	-1.071***
	(2.004)	(2.100)	(1.376)	(1.563)	(3.326)	(0.773)	(1.768)	(1.136)	(0.316)
Firm size	-0.244	0.305	-0.114	-1.781***	0.319	0.420	-2.059***	2.104***	0.461*
(logged total employees)	(0.545)	(0.305)	(0.286)	(0.665)	(0.604)	(0.389)	(0.604)	(0.612)	(0.236)
Establishment age	-0.012	0.016*	0.008	-0.001	0.007	-0.003	0.053***	-0.035***	0.001
	(0.015)	(0.009)	(0.005)	(0.013)	(0.016)	(0.006)	(0.010)	(0.011)	(0.003)
Multi-unit enterprise	0.552	-1.258	-0.661	-0.471	0.111	0.917**	1.006***	-2.805***	-0.183
	(1.502)	(0.821)	(0.538)	(0.704)	(1.039)	(0.425)	(0.377)	(0.846)	(0.208)
Exporter	1.655***	-1.032**	0.045	-0.053	0.020	-0.321	-0.109	-0.105	0.003
	(0.392)	(0.407)	(0.267)	(0.740)	(0.543)	(0.329)	(0.334)	(0.438)	(0.188)
Unionized	-2.263**	-0.273	0.605	-1.539***	-0.092	-0.533***	-1.671***	0.504	0.277*
	(1.023)	(0.410)	(0.519)	(0.550)	(0.397)	(0.162)	(0.358)	(0.434)	(0.168)
Foreign-owned	-2.470**	2.623***	0.869	-2.358***	1.644**	0.190	-0.386	1.430**	0.101
	(1.087)	(0.893)	(0.558)	(0.435)	(0.814)	(0.281)	(0.384)	(0.596)	(0.165)
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,487	2,487	2,487	2,165	2,165	2,165	2,414	2,414	2,414

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

Table A21. Joint adoption results for organization size quintiles

	(1)	(2)	(3)	(4)	(5)	(6)
	Size Quintile 4			Size Quintile 5		
Dependent variable: Control by	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV
PerformancePay	-1.246***	3.742***	-0.651**	0.212	0.479	-2.013***
	(0.457)	(0.953)	(0.260)	(0.480)	(1.166)	(0.478)
Firm size	-1.179***	-0.176	0.047	-0.139***	-0.268	-0.038
(logged total employees)	(0.290)	(0.653)	(0.069)	(0.050)	(0.177)	(0.033)
Establishment age	-0.005	0.017	0.001	-0.001	0.020***	0.002
	(0.003)	(0.015)	(0.002)	(0.001)	(0.007)	(0.002)
Multi-unit enterprise	0.120	0.622	-0.016	0.022	-0.618**	0.033
	(0.253)	(0.497)	(0.081)	(0.127)	(0.275)	(0.107)
Exporter	-0.447***	-0.916***	0.150	-0.153	-1.155***	0.303**
	(0.156)	(0.300)	(0.117)	(0.204)	(0.282)	(0.129)
Unionized	-0.289	0.022	-0.054	0.269*	-0.534	-0.122**
	(0.250)	(0.426)	(0.155)	(0.141)	(0.362)	(0.050)
Foreign-owned	0.015	-0.131	-0.229	-0.177	0.243	0.163
	(0.157)	(0.487)	(0.169)	(0.136)	(0.275)	(0.109)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	2,405	2,405	2,405	2,282	2,282	2,282

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

Table A22. Joint adoption results for organization age quintiles

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Age Quintile 1			Age Quintile 2			Age Quintile 3		
Dependent variable: Control by	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV
PerformancePay	-5.305	10.490**	-2.549***	-7.473***	7.244***	-2.036	-10.156**	9.975*	-0.456
	(4.200)	(4.235)	(0.943)	(2.195)	(1.438)	(0.000)	(5.146)	(5.940)	(1.358)
Firm size	-1.477***	0.233	0.224	-0.772**	0.436**	0.109	-0.747	0.048	-0.043
(logged total employees)	(0.456)	(0.609)	(0.147)	(0.387)	(0.206)	(0.000)	(0.716)	(0.850)	(0.245)
Establishment age	-0.373**	0.241	-0.057**	-0.114	0.214	-0.070	0.075	-0.005	-0.015
	(0.175)	(0.203)	(0.029)	(0.229)	(0.145)	(0.000)	(0.124)	(0.124)	(0.024)
Multi-unit enterprise	0.167	-1.081	-0.320	1.650**	-1.426	-0.014	1.300	-2.443	-0.201
	(0.993)	(1.060)	(0.402)	(0.840)	(0.875)	(0.000)	(1.741)	(1.674)	(0.443)
Exporter	0.854	-2.116***	0.249	-0.200	-0.138	0.197	0.648	-0.794	0.109
	(0.645)	(0.822)	(0.192)	(0.579)	(0.605)	(0.000)	(0.672)	(0.670)	(0.176)
Unionized	-2.679***	-0.155	0.102	-1.717***	0.426	-0.313	-1.184	0.058	0.020
	(1.007)	(0.778)	(0.143)	(0.584)	(0.525)	(0.000)	(0.892)	(0.927)	(0.182)
Foreign-owned	-1.445	-0.568	0.455	-0.854	1.247***	0.505	-0.467	-0.001	-0.128
	(0.920)	(0.898)	(0.359)	(0.616)	(0.460)	(0.000)	(0.966)	(0.915)	(0.203)
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,932	1,932	1,932	2,467	2,467	2,467	2,539	2,539	2,539

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

Table A23. Joint adoption results for organization age quintiles

	(1)	(2)	(3)	(4)	(5)	(6)
	Age Quintile 4			Age Quintile 5		
Dependent variable: Control by	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV
PerformancePay	-8.951***	11.953***	-3.715***	-2.862	1.018	-3.144**
	(2.269)	(2.753)	(1.055)	(2.298)	(2.728)	(1.432)
Firm size	-0.602	-0.930*	0.717***	-0.883***	1.273***	0.040
(logged total employees)	(0.521)	(0.503)	(0.212)	(0.269)	(0.206)	(0.263)
Establishment age	-0.178***	0.132**	0.041	0.022	0.020	-0.005
	(0.068)	(0.064)	(0.029)	(0.018)	(0.020)	(0.007)
Multi-unit enterprise	1.329**	-1.512	0.303	0.214	0.297	0.203
	(0.628)	(1.155)	(0.337)	(0.599)	(0.835)	(0.324)
Exporter	-0.042	0.028	-0.246	0.202	-0.861*	-0.026
	(0.526)	(0.462)	(0.283)	(0.451)	(0.482)	(0.327)
Unionized	-1.961***	1.605***	-0.427	-1.158*	-1.054*	1.054*
	(0.441)	(0.428)	(0.410)	(0.668)	(0.634)	(0.632)
Foreign-owned	-1.642	2.015*	0.791	-1.097	0.496	1.083***
	(1.552)	(1.140)	(0.516)	(1.018)	(1.094)	(0.241)
Year fixed effects	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y
Observations	2,360	2,360	2,360	2,455	2,455	2,455

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. *** p<0.01, ** p<0.05, * p<0.1

Table A24. Joint adoption results by industry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Manufacturing			Wholesale Trade			Retail		
Dependent variable: Control by	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV
PerformancePay	-2.724	2.045	-0.561**	-2.580	7.721*	-2.942*	-5.326*	6.343***	-2.321*
	(1.813)	(1.298)	(0.248)	(5.433)	(4.176)	(1.766)	(2.958)	(2.137)	(1.277)
Firm size	-1.416***	0.991***	0.117**	-1.925**	-0.051	0.480*	-0.958**	0.443	-0.027
(logged total employees)	(0.347)	(0.247)	(0.056)	(0.834)	(0.562)	(0.263)	(0.474)	(0.270)	(0.295)
Establishment age	0.003	0.029***	-0.004**	0.001	-0.026**	0.015**	0.020	0.010	-0.017
	(0.007)	(0.009)	(0.002)	(0.013)	(0.013)	(0.007)	(0.024)	(0.009)	(0.013)
Multi-unit enterprise	0.851	0.432	-0.053	0.553	-2.567**	0.460	2.111*	-2.503*	0.974
	(0.535)	(0.440)	(0.136)	(2.023)	(1.185)	(0.725)	(1.266)	(1.383)	(0.743)
Exporter	-0.535**	-0.036	0.050	0.090	-0.146	-0.139	1.188	0.484	-0.294
	(0.212)	(0.234)	(0.112)	(0.509)	(0.674)	(0.267)	(1.031)	(0.566)	(0.465)
Unionized	-1.928***	0.056	-0.298***	0.147	0.851	-0.247	-2.931**	1.853	-0.086
	(0.724)	(0.766)	(0.110)	(1.176)	(0.882)	(0.274)	(1.406)	(1.235)	(0.629)
Foreign-owned	-2.097***	-0.309	0.186	-1.864	2.612**	0.806	-2.182	-0.179	0.111
	(0.192)	(0.996)	(0.205)	(1.135)	(1.322)	(0.525)	(1.786)	(0.665)	(0.509)
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,568	2,568	2,568	920	920	920	468	468	468

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. Manufacturing includes NAICS 31-33, Wholesale Trade includes NAICS 41, and Retail includes NAICS 44-45. *** p<0.01, ** p<0.05, * p<0.1

Table A25. Joint adoption results by industry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Transportation and Warehousing			Accommodation and food services			Other Services		
Dependent variable: Control by	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV	Principal IV	Manager IV	Non-Manager IV
PerformancePay	-17.274***	10.728**	0.260	-5.588	9.568**	-2.697	-7.361***	6.463*	-1.392
	(6.156)	(4.804)	(0.777)	(6.014)	(4.626)	(2.308)	(2.033)	(3.914)	(1.239)
Firm size	-0.071	0.115	-0.042	-0.941	0.201	0.093	-0.100	-0.180	0.289
(logged total employees)	(0.473)	(0.482)	(0.097)	(0.811)	(0.503)	(0.410)	(0.585)	(1.209)	(0.395)
Establishment age	-0.028	0.018	-0.009*	0.014	0.034	0.013	0.022	0.009	0.014
	(0.054)	(0.043)	(0.005)	(0.024)	(0.027)	(0.022)	(0.064)	(0.037)	(0.020)
Multi-unit enterprise	-0.349	0.474	-0.366	1.053	-2.086	1.210	4.484**	-6.140**	0.003
	(2.157)	(1.024)	(0.264)	(2.136)	(1.959)	(0.795)	(1.862)	(2.847)	(0.968)
Exporter	1.445	-1.137	0.096	1.008	-1.219	-0.184	1.366	-1.614**	-0.445*
	(2.069)	(1.370)	(0.323)	(0.971)	(0.742)	(0.328)	(1.413)	(0.700)	(0.270)
Unionized	-0.867	-0.757	0.396	-2.974*	-1.698	1.824*	1.593	-5.871**	-0.279
	(1.379)	(1.304)	(0.401)	(1.664)	(1.887)	(1.056)	(3.860)	(2.571)	(1.102)
Foreign-owned	-0.394	-0.414	-0.087	-6.549***	5.367***	0.930***	-7.747**	9.468**	-0.098
	(2.023)	(1.145)	(0.353)	(1.172)	(1.101)	(0.291)	(3.841)	(3.783)	(1.841)
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	923	923	923	493	493	493	176	176	176

Standard errors in parentheses, clustered by province-year. Instrumental variable results use a limited information maximum likelihood IV estimator. All regressions use sampling weights. Transportation and Warehousing includes NAICS 48-49, Accommodation and Food Services includes NAICS 72, and Other Services includes NAICS 81. *** p<0.01, ** p<0.05, * p<0.1

(4) An exclusion restriction applies to the instrument being used

See Appendix Tables A5-A11 as well as Figures A12-A17 and accompanying discussion.

(5) There are no interactions of practices outside the production function

Table A26. Effects of misalignment on other organizational outcome variables

	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
Dependent variable:	Wage Inequality (Gini coefficient)	Wage Inequality (Gini coefficient)	Logged number of grievances	Logged number of grievances
PrincipalControl misalignment	-0.0006	0.0007	-0.4918	-0.4923
	(0.016)	(0.016)	(0.422)	(0.422)
NonManagerControl misalignment		-0.0303		-0.6112
		(0.025)		(0.653)
Firm size	10.1395***	10.0156***	0.1749**	0.1758**
(logged total employees)	(2.046)	(1.944)	(0.067)	(0.067)
Multi-unit enterprise	7.2522	7.2987	0.0856	0.0861
	(4.508)	(4.525)	(0.122)	(0.123)
Herfindahl Index	-0.0072	-0.0072	0.0432	0.0525
	(0.005)	(0.005)	(0.458)	(0.452)
Foreign-owned	1.8142	1.7581	0.0331	0.0311
	(1.632)	(1.635)	(0.025)	(0.026)
Exporter	0.9990	0.9966	0.0460**	0.0455**
	(1.315)	(1.313)	(0.021)	(0.021)
Unionized	-2.4544	-2.2602	0.0166	0.0173
	(2.533)	(2.338)	(0.019)	(0.018)
Average wage	0.1140***	0.1136***	0.0019**	0.0019**
	(0.030)	(0.030)	(0.001)	(0.001)
Year fixed effects	Y	Y	Y	Y
Organization fixed effects	Y	Y	Y	Y
Observations	11,670	11,670	7,618	7,618

Standard errors in parentheses, clustered by province-year. All regressions use sampling weights. Product and process innovations are removed as controls due to lack of theoretical justification, but their inclusion does not change the results. Gini coefficients were multiplied by 100 for ease of presentation. *** p<0.01, ** p<0.05, * p<0.1

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