Online Appendix for "Team-Specific Human Capital and Team Performance: Evidence from Doctors"

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A Interpretation of One Standard Deviation and Measurement Error in Shared Work Experience

Since my data is a 20 percent random sample of traditional Medicare patients, we can only observe shared work experience based on patients in the sample. In Appendix Figure A4, I run a series of simulations to estimate the value of one standard deviation in shared work experience among the population. To construct the figure, I first run a series of simulations that randomly draw subsamples (50 percent, 55 percent, 60 percent, ..., 95 percent) of patients from the 20 percent Medicare claims (e.g., 50 percent of the 20 percent claims is equal to 10 percent of traditional Medicare enrollees on the x-axis). To account for sampling error, I repeat 50 draws for each of the ten subsample groups that range from 50 to 95 percent and calculate the standard deviation of shared work experience in each draw. I then plot in solid lines the mean standard deviation of shared work experience for each subsample group. Since the solid lines suggest a linear relationship between the y- and the x-axis variable, I run linear regressions of the y-axis variable on the x-axis variable to predict the standard deviation of shared work experience beyond the 20 percent sample. Assuming that half of PCI and CABG procedures are performed on patients outside of traditional Medicare (see similar statistics reported in, for example, Ricciardi et al. 2008), the standard deviations of shared work experience are equal to 41.1 and 95.5 hospital visits for ED patients undergoing PCI and CABG, respectively, and equal to 78.2 and 149.6 visits for patients undergoing PCI and CABG in the two-way fixed effects analysis, respectively.

A related question is how measurement error in shared work experience due to a 20 percent random sample may affect my estimates. Although the sample is randomly drawn, measurement error in this setting may differ from classical measurement error if the size of the bias is proportional to the underlying true shared work experience. Appendix Figure A5 explores how measurement error may affect my estimates. Similar to Appendix Figure A4, I run a series of simulations that randomly draw subsamples (50 percent, 55 percent, 60 percent, ..., 95 percent) of patients from

the 20 percent Medicare claims and repeat 50 draws for each of the ten subsample groups. I then estimate the effect of shared work experience using each of the $50 \times 10 = 500$ randomly drawn subsamples. Appendix Figure A5 shows that, if anything, measurement error would lead to an underestimated effect of shared work experience on reducing mortality rates.

B Selection on Observables and Unobservables

In Table A3, I explore the stability of my estimates in Table 2 using an approach by Oster (2019), which adjusts treatment effect estimates by allowing for selection on unobservables. Specifically, I report the adjusted coefficient estimate β^* constructed as:

$$\beta^* = \tilde{\beta} - \delta[\mathring{\beta} - \tilde{\beta}]\frac{R_{max} - \tilde{R}}{\tilde{R} - \mathring{R}}, \tag{B1}$$

where $\tilde{\beta}$ and $\mathring{\beta}$ are the point estimates on shared work experience from the regressions with and without the tested patient or physician controls, respectively; $\tilde{R}$ and $\mathring{R}$ are the R-squareds from the corresponding regressions. Following Oster (2019), I set δ—the relative degree of selection on observed and unobserved characteristics—equal to one, and set R_{max}—the maximum R-squared possible—equal to $min(1, \Pi * \tilde{R})$. My benchmark estimation uses the rule of thumb of $\Pi = 1.3$, but I also move beyond the standard assumption and use a more stringent test that assumes $\Pi = 2$. Since my baseline specification already controls for proceduralist, hospital-year, and admission time category (month and day of the week) fixed effects, I report the R-squared after I partial out the controlled fixed effects (i.e., the within R-squared). Table A3 shows that all the adjusted coefficient estimates are in line with my main results, suggesting that the estimated treatment effects are unlikely to be explained away by unobserved physician or patient variation.

C Procedure Selection

Perhaps a question of interest is whether patients select into different procedures based on available doctor teams. For example, a patient may choose to undergo PCI instead of CABG (or non-procedural treatments) if there is an available PCI proceduralist-physician team with high shared work experience. In this case, patient characteristics would be systematically different across shared work experience. Yet it is reassuring that patient demographics and comorbidities are well balanced across shared work experience (see details in Table 1 and Appendix Table A5), which mitigates the concern about selection into procedures. In addition, if there is selection, we would expect that the marginal patients selecting into the procedure due to a high shared-work-experience team are worse

fits for the procedure. In this case, if anything, the selection issue would lead to an underestimated survival-improving effect of shared work experience.

As a further check, I restrict my sample to patients who have a high probability of undergoing PCI and CABG for PCI and CABG analysis, respectively. For example, since clinical guidelines recommend that patients older than 80 and patients with certain conditions not be treated with CABG, then regardless of the available doctor teams, these patients are likely to undergo an alternative treatment instead of a CABG. I compute predicted possibilities of undergoing PCI or CABG from patient-level regressions of procedure indicators on patient characteristics (five-year age bin fixed effects, gender, black race, Hispanic, Medicaid coverage, disability status, and dummies for the patient's health history of common comorbidities that include chronic kidney disease, chronic obstructive pulmonary disease, heart failure, Alzheimer's disease/dementia, diabetes, stroke, end-stage renal disease, and cancer). I then run my analysis using only patients with predicted possibilities in the top tercile of the sample. Appendix Table A21 shows a similar pattern that shared work experience reduces patient mortality, although the estimates are less significant with the smaller samples. Sample sizes in Appendix Table A21 are smaller than one-third of those reported in Tables 2 and 3. This is because, to control for proceduralist and (or) main physician fixed effects, patients treated by proceduralists and (or) main physicians with only one observed patient in the top-tercile are dropped from the analysis.

D Other Health Professionals Caring for the Patient

Patients may be cared for by health professionals other than proceduralists and physicians—for example, nurses and physician assistants—during the hospital stay. While interactions between these health professionals and proceduralists/physicians are interesting, this paper abstracts from them and focuses on shared work experience between proceduralists and physicians, since (i) Medicare claims data allow me to track proceduralist-physician collaboration histories and (ii) proceduralists and physicians could be associated with larger welfare implications since doctors play the major role in deciding patient treatments.

A related question is whether the presence of these other health professionals may confound my analysis. However, for such a confounding bias to exist, characteristics of these health professionals would need to be closely correlated with proceduralist-physician shared work experience. It seems reasonable to assume that such a correlation does not exist given that doctors and nurses/physician assistants have different scopes of tasks and different employment relationships with hospitals, making it difficult for them to systematically arrange the same work schedules. For example, anecdotal evidence suggests that nurses' schedules are independent of doctors' schedules outside of surgical

teams. Further, a possible empirical test is examining how the estimates change when adding other health professionals' characteristics as covariates. A significant change indicates potential estimation bias, while a robust estimate suggests the opposite. While I am not able to track the nurses who care for the patient and only a small proportion of analyzed patients receive care from physician assistants during the hospital stay,[1] I can observe the anesthesiologist who works in conjunction with the proceduralist for patients undergoing CABG. It is reassuring that controlling for anesthesiologist characteristics (age, gender, years of practice, and rank of medical school attended) results in virtually no change in my estimates: the coefficient on shared work experience changes only minimally from -1.24 to -1.22 in empirical strategy I and remains stable at -0.75 in empirical strategy II.

E Alternative Measures of Shared Work Experience

In Appendix Table A10, I consider alternative measures of shared work experience. Columns 1 and 3 measure shared work experience by the number of hospital visits the physicians provided to the proceduralist's patients in the past year and the past three years, respectively. Column 2 repeats the results from my main analysis. Columns 4 and 5 define shared work experience as the median and the mode of the shared work experience between the proceduralist and each of the physicians treating the patient during the hospital stay, respectively.[2] Column 6 defines shared work experience as that between the proceduralist and the first physician who treats the patient during the hospital stay. To facilitate comparison, all measures of shared work experience are scaled in units of standard deviations of the main measure (i.e., the one in Column 2). Columns 1-6 report the results for PCI, Columns 7-12 repeat the same measures of shared work experience for CABG.

Across all these different measures of shared work experience, results are stable and consistently show large effects of shared work experience on reducing patient 30-day mortality. Similar to studies suggesting that the effect of individual work experience decays with time (e.g., Benkard 2000; Kellogg 2011), Columns 1-3 of Appendix Table A10 show that shared work experience accumulated in the distant past has a smaller effect on patient mortality than does shared work experience accumulated more recently.

In Appendix Table A11, I define shared work experience as a function of a decay parameter

[1] In the ED sample, only 5 and 13 percent of PCI and CABG patients, respectively, receive care from physician assistants during the hospital stay. Among the two-way fixed effects sample, 5 and 10 percent of PCI and CABG patients, respectively, receive care from physician assistants.

[2] In cases of multiple modes, I define it as the highest value of the modes.

that captures experience depreciation over time:

$$E_i = \sum_{j \in J(i)} \sigma_{ij} \sum_{t<t(i)} N_{j,k(i);t} \times e^{\psi(t-t(i))/365}, \tag{E1}$$

where $N_{j,k(i);t}$ is the number of hospital visits provided by physician j to proceduralist $k(i)$'s patients on day t. ψ is the decay parameter. Appendix Table A11 reports the returns to shared work experience using different values of ψ based on the range reported in the literature (Benkard 2000; Kellogg 2011; Levitt, List and Syverson 2013; Ost 2014).[3,4]

F Simulation Algorithm for Counterfactual Mortality Reduction

The algorithm for the counterfactual analysis in Section VI is as follows:

1. In each hospital, I hold fixed the number of patients and the number of hospital visits associated with each patient. By reducing the number of unique physicians a proceduralist collaborates with by half and evenly distributing patient care to each proceduralist-physician pair, the counterfactual shared work experience for patient i, $\tilde{E}_i$, is calculated as:

$$\sum_{\tau=t(i)-730}^{\tau=t(i)-1} N^p_{\tau,h(i)} = \frac{\parallel Q^p_{h(i),t(i)} \parallel}{2} \tilde{E}_i, \tag{F1}$$

   where $N^p_{\tau,h(i)}$ is the number of hospital visits provided to PCI and CABG patients on day τ at hospital $h(i)$ for patient i undergoing PCI and CABG, respectively. $p \in \{PCI, CABG\}$ indicates procedure. $\parallel Q^p_{h(i),t(i)} \parallel$ is the number of unique proceduralist-physician pairs that have worked together on PCI and CABG patients at hospital $h(i)$ in $[t(i) - 730, t(i) - 1]$ for i undergoing PCI and CABG, respectively. I estimate $\tilde{E}_i$ separately for PCI and CABG for each hospital.

2. Assuming that reorganizing doctor teams acts solely through the effect of shared work experience, this hypothetical scenario would yield the following (mean) mortality decline for all patients undergoing PCI and CABG:

[3]While Benkard (2000), Levitt, List and Syverson (2013) and Ost (2014) are not specific about shared work experience, they study a closely related concept—individual work experience, which could shed light on the decaying effects of shared work experience.

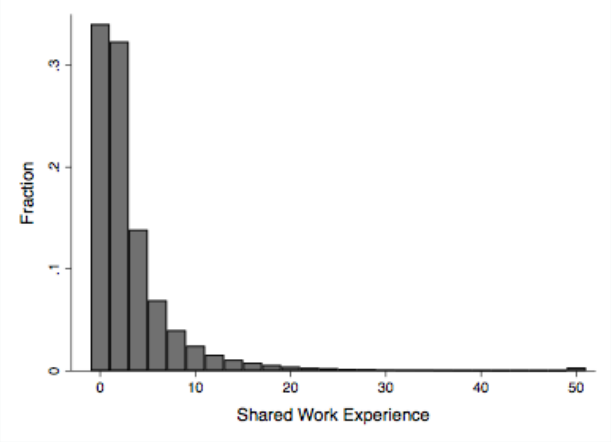
[4]To the extent that my data start in the year 2008, I cannot track collaboration between a proceduralist and a physician since the start of their collaboration. To mitigate this concern, I restrict the regression sample to patients admitted in 2010 or after and 2011 or after, respectively, for $\psi = 1.5$ to 2.5 and $\psi = 1$, so that there is a long enough look-back window for each proceduralist-physician team and past interactions more distant than those observed in the data are essentially not relevant.

$$\text{(F2)} \qquad \Delta y = \| \, i \, \|^{-1} \sum_{i} \sum_{p} (\tilde{E}_i - E_i) \times \hat{\beta}_p \times I(p(i) = p),$$

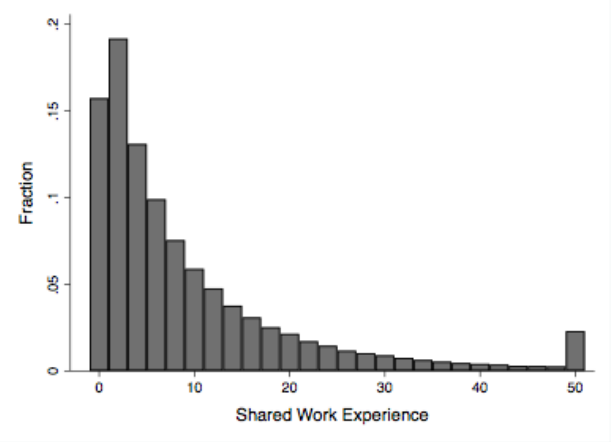
where $\tilde{E}_i$ and E_i are, respectively, the counterfactual and actual shared work experience for patient i. $\hat{\beta}_p$ is the estimated effect of shared work experience. In this analysis, I apply $\hat{\beta}_p$ reported in Table 3. Note that since shared work experience in Table 3 is scaled in units of standard deviations, I transform the estimates in Table 3 to $\hat{\beta}_p$ by dividing by the standard deviation of shared work experience. $I(p(i) = p)$ is an indicator that equals one if the procedure the patient undergoes is p, where $p \in \{PCI, CABG\}$.

Figure A1: Distribution of Shared Work Experience

A. PCI



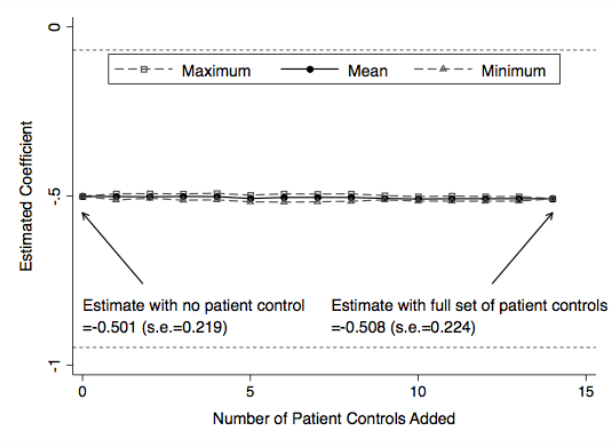
B. CABG



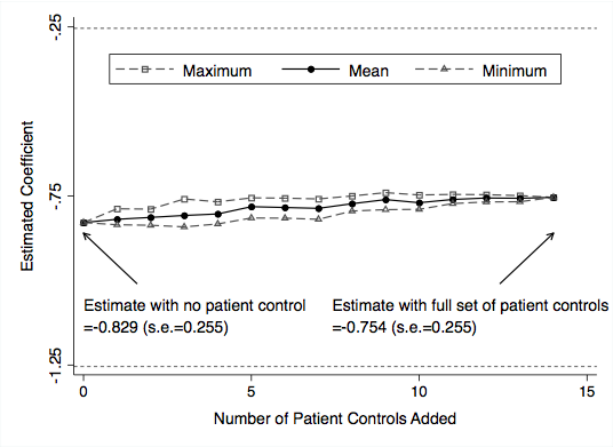
Notes: These figures plot the distribution of shared work experience estimated based on Equation (2). The sample includes all PCI (Panel A) and CABG (Panel B) patients observed in the data. In each figure, the first bin shows the fraction of patients treated by a proceduralist-physician team with shared work experience equal to zero, the ith (i = 2, 3, ..., 26) bin shows the fraction of patients treated by a proceduralist-physician team with shared work experience in the interval ($2\times(i\text{-}2)$, $2\times(i\text{-}1)$]. Shared work experience is winsorized at a value of 50 for improved readability.

Figure A2: Sensitivity of Effect of Shared Work Experience on 30-Day Mortality: Two-Way Fixed Effects Model

A. PCI



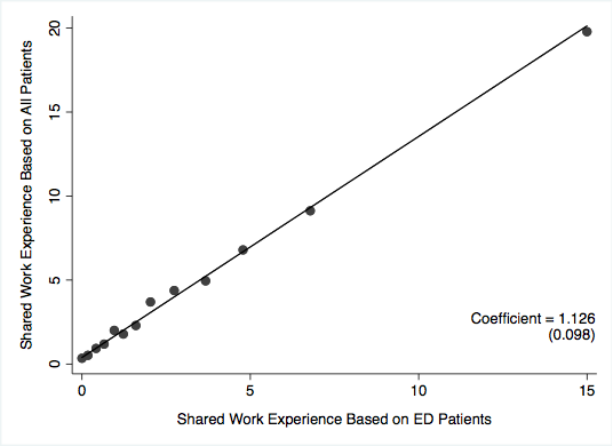
B. CABG



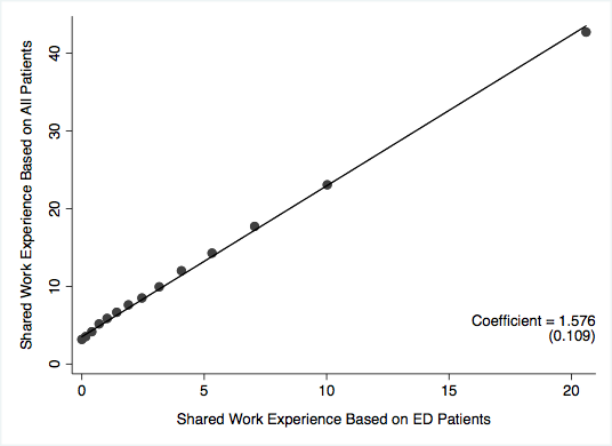
Notes: These figures plot the estimated effect of shared work experience on patient 30-day mortality with the inclusion of different sets of patient controls based on empirical strategy II (i.e., the two-way fixed effects model). Specifically, from the 14 patient demographic and comorbidity variables described under Table 2, I randomly select subsets of n covariates to include in the regression for each integer $n = 0, 1, ..., 14$. By definition, only $C_{14}^{0} = C_{14}^{14} = 1$ set of patient controls is available when $n = 0$ or $n = 14$. For $n = 1, 2, .., 13$, I repeat 14 (the maximum number of possible subsets of patient controls when $n = 1$ or $n = 13$) random draws for each n. Therefore, each panel summarizes results from $C_{14}^{0} + 14 \times 13 + C_{14}^{14} = 184$ different regression specifications. I plot the maximum, mean, and minimum of the estimated coefficients on shared work experience for each integer $n = 0, 1, ..., 14$. To provide a benchmark, I show in short-dashed lines 95% confidence intervals of the coefficient estimates with the full set of patient controls.

Figure A3: Shared Work Experience Based on All Patients versus ED Patients

A. PCI



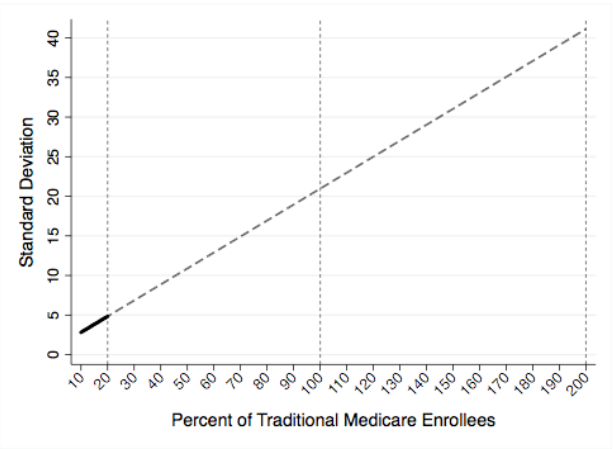
B. CABG



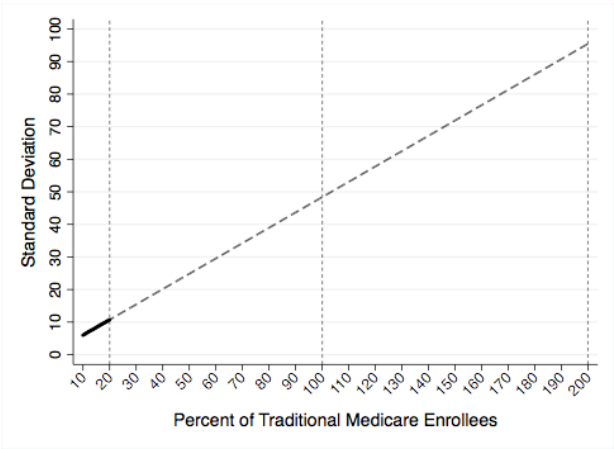
Notes: These figures show shared work experience measured based on all patients in the data (y-axis) versus that based on only ED patients (x-axis). The coefficients show the estimated relationship between the y-axis and the x-axis measure of shared work experience, conditional on individual work experience to partial out the variation due to individual experience. Standard errors clustered at the proceduralist level are reported in parentheses.

Figure A4: Standard Deviation of Shared Work Experience

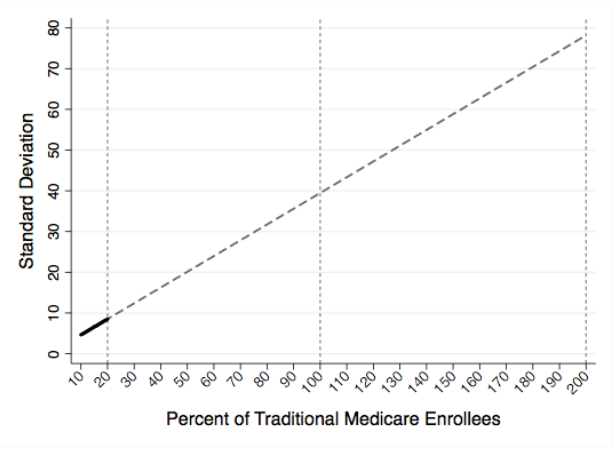
A. PCI, ED Sample



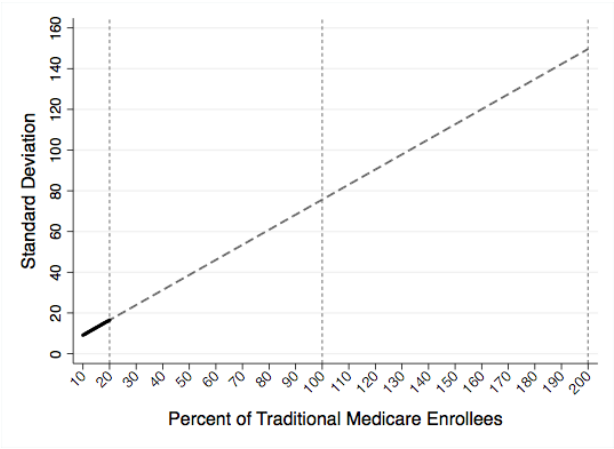
B. CABG, ED Sample



C. PCI, Two-Way Fixed Effects Sample



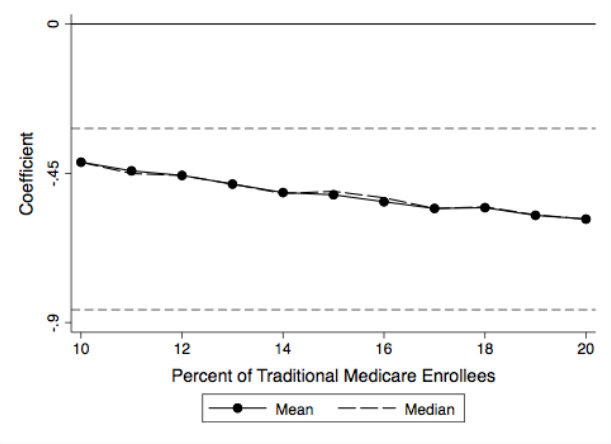
D. CABG, Two-Way Fixed Effects Sample



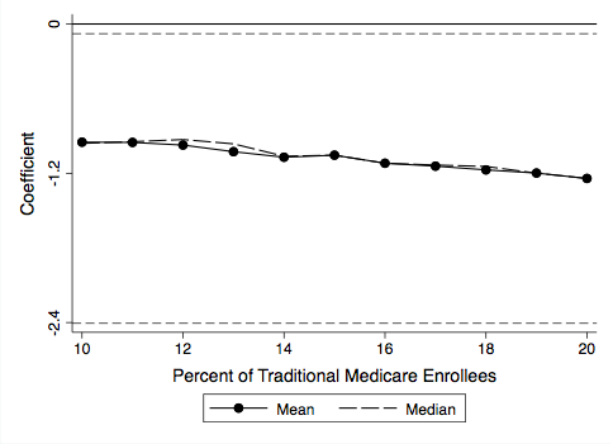
Notes: These figures infer the standard deviation of shared work experience by considering patients unobservable in the Medicare data. To construct these figures, I first run a series of simulations that randomly draw subsamples (50 percent, 55 percent, 60 percent, ..., 95 percent) of patients from the 20 percent Medicare claims (e.g., 50 percent of the 20 percent claims is equal to 10 percent of traditional Medicare enrollees on the x-axis), and plot in solid lines the standard deviation of shared work experience based on each subsample. To account for sampling error, I repeat 50 random draws for each percentage subsample and report the mean standard deviation. Since the solid lines suggest a linear relationship between the y- and the x-axis variable, I run linear regressions of the y-axis variable on the x-axis variable to predict the standard deviation of shared work experience beyond the 20 percent sample (with the predicted values plotted in dashed lines). The first, second, and third dotted vertical line in each panel marks the 20 percent traditional Medicare sample, the 100 percent traditional Medicare sample, and the population (assuming half of PCI and CABG procedures are performed on patients outside of traditional Medicare, see similar statistics reported in, for example, Ricciardi et al. 2008). Panels A and B plot the simulation results for ED patients undergoing PCI and CABG, respectively (i.e., the sample included in empirical strategy I). Panels C and D plot the simulation results for patients included in the two-way fixed effects model (i.e., empirical strategy II) for PCI and CABG, respectively.

Figure A5: Exploring Measurement Error

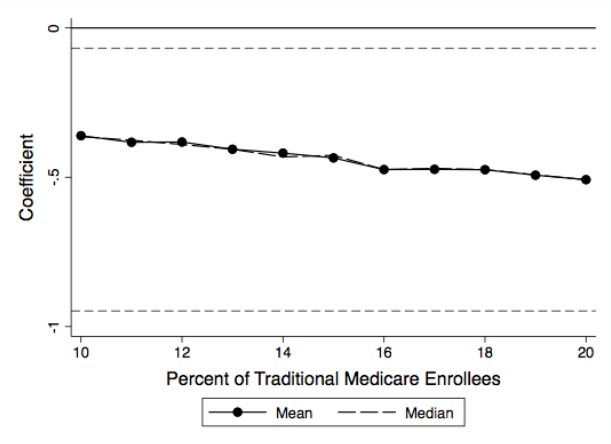
A. Empirical Strategy I, PCI



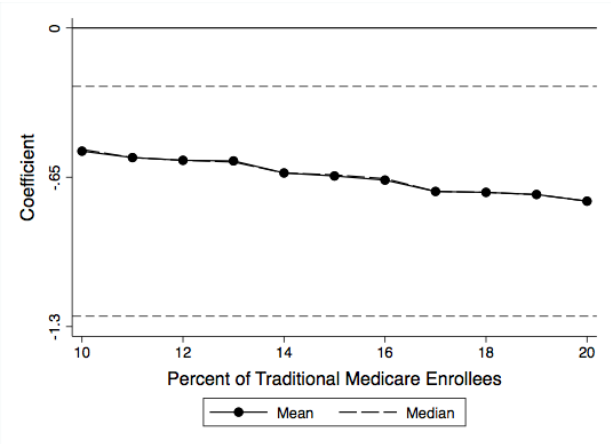
B. Empirical Strategy I, CABG



C. Empirical Strategy II, PCI



D. Empirical Strategy II, CABG



Notes: These figures explore the impact of measurement error on the estimated effect of shared work experience on 30-day mortality. To construct these figures, I run a series of simulations that randomly draw subsamples (50 percent, 55 percent, 60 percent, ..., 95 percent) of patients from the 20 percent Medicare claims (e.g., 50 percent of the 20 percent claims is equal to 10 percent of traditional Medicare enrollees on the x-axis). To account for sampling error, I repeat 50 random draws for each of the ten different percentage subsamples that range from 50 to 95 percent. I then estimate the effect of shared work experience on 30-day mortality using each draw. The solid and long-dashed lines connect the mean and the median of the estimated coefficients on shared work experience for each percentage subsample, respectively; the short-dashed lines plot the 95% confidence interval of the coefficient on shared work experience based on the 20 percent Medicare claims. Panels A and B plot the simulation results based on empirical strategy I for PCI and CABG, respectively. Panels C and D plot the simulation results based on empirical strategy II for PCI and CABG, respectively. Shared work experience is scaled in units of standard deviations.

Table A1: Sample Construction

	PCI		CABG	
	N	%	N	%
Panel A. ED analysis sample				
Hospitalized in January 1, 2010 - December 1, 2016[a]	201,140	100.0	108,021	100.0
Hospital visits in the first two days after admission and the last two days before discharge[b]	156,503	77.8	76,721	71.0
Between 65 and 100 years old	132,024	65.6	67,706	62.7
Admitted through the ED	81,177	40.4	16,935	15.7
No missing variables	79,843	39.7	16,909	15.7
Treated by proceduralists with at least two patients in the sample	75,931	37.8	14,122	13.1
Panel B. Two-way fixed effects sample				
Hospitalized in January 1, 2010 - December 1, 2016[a]	201,140	100.0	108,021	100.0
Hospital visits in the first two days after admission and the last two days before discharge[b]	156,503	77.8	76,721	71.0
Between 65 and 100 years old	132,024	65.6	67,706	62.7
No missing variables	129,622	64.4	67,542	62.5
Treated by proceduralists and physicians with at least two patients in the sample	91,847	45.7	49,699	46.0

Notes: This table reports changes in sample size when applying each of the listed sample restrictions. Columns 1 and 3 report the number of observations. Columns 2 and 4 report the share as a percentage of the total number of observations reported in the first row of each panel.

[a] Since I measure doctors' shared work experience based on collaboration in the past two years and my data start in the year 2008, my empirical regression restricts the sample to patients admitted to the hospital in 2010 or after to allow for an at least two-year look-back window to measure doctors' shared work experience. To measure patient 30-day mortality outcome, I also restrict the sample to patients discharged from the hospital on December 1, 2016 or before, to allow for a 30-day observation window after the hospital discharge (my data track patient mortality outcomes until December 31, 2016).

[b] For PCI, which is less invasive than CABG and hence generally involves a shorter hospital stay, I further exclude patients without any physician visits in the first day after the hospital admission.

Table A2: Summary Statistics

	Whole sample[a]		ED analysis sample		Two-way fixed effects sample	
	PCI	CABG	PCI	CABG	PCI	CABG
Number of proceduralists	9,477	3,040	7,522	1,881	7,422	2,434
Number of physicians	138,063	100,846	100,936	47,880	92,212	69,704
Number of cases	156,503	76,721	75,931	14,122	91,847	49,699
Number of physicians per patient						
Mean	3.4	6.0	3.6	7.5	3.3	5.8
Standard deviation	2.9	4.6	2.9	4.9	2.9	4.5
25th percentile	1	3	2	4	1	3
50th percentile	3	5	3	6	2	5
75th percentile	4	8	4	9	4	7

Notes: This table shows the number of proceduralists, physicians, patients, and physicians per team in my data. Columns 1-2, 3-4, and 5-6 show summary statistics for the whole sample (defined in Row 2 of Table A1), the sample included in empirical strategy I (i.e., the ED analysis), and the sample included empirical strategy II (i.e., the two-way fixed effects estimation), respectively.

[a] Sample refers to that defined in Row 2 of Table A1.

Table A3: Selection on Observables and Unobservables

	PCI						CABG					
	$\mathring{\beta}$	$\mathring{R}$	$\tilde{\beta}$	$\tilde{R}$	$\beta^*_{\Pi=1.3}$	$\beta^*_{\Pi=2}$	$\mathring{\beta}$	$\mathring{R}$	$\tilde{\beta}$	$\tilde{R}$	$\beta^*_{\Pi=1.3}$	$\beta^*_{\Pi=2}$
Physician controls	-0.852	0.001	-0.586	0.041	-0.504	-0.312	-1.716	0.002	-1.279	0.039	-1.142	-0.823
Patient controls	-0.586	0.041	-0.588	0.052	-0.591	-0.597	-1.279	0.039	-1.242	0.057	-1.206	-1.121

Notes: Row 1 tests the stability of my estimates to possible selection on physician unobservables; Row 2 tests the stability of my estimates to possible selection on patient unobservables. In Row 1, $\mathring{\beta}$ and $\mathring{R}$ are, respectively, the point estimate and R-squared from the regression without physician controls (i.e., the specification of Table 2, Column 3); $\tilde{\beta}$ and $\tilde{R}$ are, respectively, the point estimate and R-squared from the regression with physician controls (i.e., the specification of Table 2, Column 4). Row 2 repeats the same exercise for patient controls, which corresponds to the change of the specification from Column 4 to Column 5 of Table 2. $\beta^*_{\Pi=1.3}$ is the adjusted point estimate when using a value for the maximum R-squared possible R_{max} equal to $1.3 * \tilde{R}$. $\beta^*_{\Pi=2}$ is the adjusted point estimate when using a more stringent value of $R_{max} = 2 * \tilde{R}$. Since my baseline specification already controls for proceduralist, hospital-year, and admission time category (month and day of the week) fixed effects, I report the R-squareds after I partial out the controlled fixed effects. See more details in Appendix Section B.

Table A4: Shared Work Experience and 30-day Mortality: ED Analysis with Main Physician Fixed Effects

	(1) PCI	(2) CABG
Shared work experience	-0.596	-1.264
	(0.382)	(1.434)
Full control	Y	Y
Mean dep. var.	6.34	7.33
S.D. dep. var.	24.36	26.06
Observations	29,508	3,890

Notes: This table reports the effect of shared work experience on 30-day mortality based on empirical strategy I by replacing average physician characteristics with main physician fixed effects and average characteristics of the physicians other than the main physician who treat the patient during the hospital stay as controls. For patients treated by only one physician (i.e., only the main physician) during the hospital stay, the non-main physician average characteristics by definition contain missing values; I thus replace the missing values with zero and add a dummy that equals one if the variable is missing. Sample sizes are smaller than those reported in Table 2 because patients treated by singleton main physicians (i.e., main physicians who have only one patient in the data) are dropped from the analysis. Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A5: Balance in Patient Characteristics: Two-Way Fixed Effects Sample

	PCI			CABG		
	Shared experience below mean	Shared experience above mean	p-value	Shared experience below mean	Shared experience above mean	p-value
Age	76.06	76.05	0.77	74.49	74.45	0.35
	(4.97)	(5.67)		(4.44)	(5.03)	
Female	0.426	0.423	0.19	0.314	0.310	0.32
	(0.346)	(0.397)		(0.344)	(0.397)	
Black	0.073	0.072	0.55	0.051	0.051	0.99
	(0.164)	(0.189)		(0.157)	(0.173)	
Hispanic	0.015	0.015	0.67	0.011	0.011	0.96
	(0.076)	(0.095)		(0.072)	(0.081)	
Medicaid	0.164	0.163	0.47	0.110	0.108	0.43
	(0.243)	(0.283)		(0.217)	(0.255)	
Disabled	0.161	0.159	0.43	0.120	0.119	0.59
	(0.255)	(0.294)		(0.239)	(0.276)	
Number of comorbidities	2.298	2.299	0.97	1.876	1.865	0.31
	(1.096)	(1.251)		(1.023)	(1.167)	
Predicted 30-day mortality (%)	5.088	5.087	0.94	5.867	5.826	0.13
(by patient characteristics)	(1.708)	(1.947)		(2.632)	(3.001)	
Observations	66,149	25,698		33,227	16,472	

Notes: This table shows average characteristics of patients treated by proceduralist-physician teams with shared work experience below versus above the mean of the sample for patients included in empirical strategy II (i.e., the two-way fixed effects model). Standard deviations are reported in parentheses. Each characteristic is residualized with respect to proceduralist fixed effects, main physician fixed effects, average characteristics of the physicians other than the main physician who treat the patient, and other controls included in empirical strategy II, except for patient demographics and comorbidities. The unconditional mean of each characteristic is added back for ease of interpretation. Predicted 30-day mortality is predicted based on logistic regressions of patient actual 30-day mortality outcomes on patient characteristics that include five-year age bin fixed effects, gender, black race, Hispanic, Medicaid coverage, disability status, and dummies for the patient's health history of common comorbidities that include chronic kidney disease, chronic obstructive pulmonary disease, heart failure, Alzheimer's disease/dementia, diabetes, stroke, end-stage renal disease, and cancer. p-values of t-tests for the equivalence of means between the two subgroups are shown in the third and the last column.

Table A6: Excluding Matching as a Mechanism: ED Analysis

	Two-way fixed effects		Team fixed effects		Different practices		Shared experience by ED patients	
	(1) PCI	(2) CABG	(3) PCI	(4) CABG	(5) PCI	(6) CABG	(7) PCI	(8) CABG
Shared work experience	-0.534	-1.487	-0.636	-1.564	-0.625	-1.535	-0.632	-1.261
	(0.375)	(1.928)	(0.328)	(1.709)	(0.173)	(0.582)	(0.181)	(1.185)
Full control	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R-squared	0.10	.07	0.10	.06				
Mean dep. var.	5.01	6.89	5.01	6.89	6.70	8.94	5.95	9.06
S.D. dep. var.	21.81	25.33	21.81	25.33	25.01	28.53	23.66	28.71
Observations	17,487	2,293	17,487	2,293	56,508	12,768	75,931	14,122

Notes: Columns 1 and 2 report the estimates from the two-way fixed effects model using the sample analyzed in Columns 3 and 4, respectively. Columns 3 and 4 report the estimates using the team fixed effects model. Sample sizes of Columns 1-4 are smaller than those reported in Table 2 because patients treated by proceduralist-main physician teams with only one observed patient are dropped from the analysis. Columns 5 and 6 report the results using patients treated by proceduralists and physicians from different practice groups. Columns 7 and 8 report the results using shared work experience measured by ED patients. Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A7: Controlling for Hospital-Specific Experience

	PCI				CABG			
	(1) Linear	(2) Linear spline	(3) Cubic spline	(4) Practice years	(5) Linear	(6) Linear spline	(7) Cubic spline	(8) Practice years
Panel A. ED analysis								
Shared work experience	-0.573	-0.553	-0.550	-0.573	-1.185	-1.179	-1.187	-1.197
	(0.139)	(0.140)	(0.139)	(0.140)	(0.601)	(0.604)	(0.603)	(0.597)
Full control	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.95	5.95	5.95	5.95	9.06	9.06	9.06	9.06
S.D. dep. var.	23.66	23.66	23.66	23.66	28.71	28.71	28.71	28.71
Observations	75,931	75,931	75,931	75,931	14,122	14,122	14,122	14,122
Panel B. Two-way fixed effects model								
Shared work experience	-0.494	-0.479	-0.477	-0.498	-0.685	-0.634	-0.628	-0.734
	(0.220)	(0.222)	(0.220)	(0.225)	(0.258)	(0.258)	(0.257)	(0.256)
Full control	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.09	5.09	5.09	5.09	5.85	5.85	5.85	5.85
S.D. dep. var.	21.97	21.97	21.97	21.97	23.47	23.47	23.47	23.47
Observations	91,847	91,847	91,847	91,847	49,699	49,699	49,699	49,699

Notes: This table shows results that control for proceduralists' and physicians' patient volume/years of practice at the hospital to which the patient is admitted. The outcome variable is patient 30-day mortality. Patient volume and years of practice at the hospital are measured, respectively, as the number of observed patients the doctor has treated and the number of observed years the doctor has practiced at the hospital in the two years prior to the admission of the current patient (i.e., the same time window as that used for measuring shared work experience). Columns 1 and 5 control for patient volume linearly. Columns 2 and 6 control for patient volume as linear splines. Columns 3 and 7 control for patient volume as restricted cubic splines. Columns 4 and 8 control for years of practice at the hospital. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A8: Sample Restricted to Patients Treated by Doctors Continuously Practicing at the Hospital

	(1) PCI	(2) CABG
Panel A. ED analysis		
Shared work experience	-0.555	-1.397
	(0.162)	(0.721)
Full control	Y	Y
Mean dep. var.	5.85	8.80
S.D. dep. var.	23.46	28.33
Observations	51,157	9,226
Panel B. Two-way fixed effects model		
Shared work experience	-0.434	-0.625
	(0.255)	(0.290)
Full control	Y	Y
Mean dep. var.	4.76	5.51
S.D. dep. var.	21.29	22.82
Observations	57,091	34,244

Notes: This table shows the effect of shared work experience on patient 30-day mortality. The sample is restricted to patients treated by proceduralists and physicians who have been practicing at the hospital to which the patient is admitted in the two years prior to the admission. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A9: Controlling for Severity of Current Condition

	(1) PCI	(2) CABG
Panel A. ED analysis		
Shared work experience	-0.441	-1.189
	(0.135)	(0.588)
Full control	Y	Y
Mean dep. var.	5.95	9.06
S.D. dep. var.	23.66	28.71
Observations	75,931	14,122
Panel B. Two-way fixed effects model		
Shared work experience	-0.422	-0.743
	(0.205)	(0.250)
Full control	Y	Y
Mean dep. var.	5.09	5.85
S.D. dep. var.	21.97	23.47
Observations	91,847	49,699

Notes: This table shows the effect of shared work experience on 30-day mortality when controlling for fixed effects for 4-digit ICD-10 code of the primary diagnosis of the current hospital stay. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A10: Alternative Measures of Shared Work Experience I

	PCI						CABG					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Past year	Past two years	Past three years	Median	Mode	First physician	Past year	Past two years	Past three years	Median	Mode	First physician
Panel A. ED analysis												
Shared work experience	-0.655	-0.588	-0.496	-1.072	-0.903	-0.277	-1.882	-1.242	-0.477	-1.474	-0.918	-1.535
	(0.203)	(0.139)	(0.131)	(0.119)	(0.106)	(0.112)	(0.930)	(0.593)	(0.493)	(0.411)	(0.341)	(0.478)
Full control	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.95	5.95	5.87	5.95	5.95	5.95	9.06	9.06	8.96	9.06	9.06	9.06
S.D. dep. var.	23.66	23.66	23.51	23.66	23.66	23.66	28.71	28.71	28.56	28.71	28.71	28.71
Observations	75,931	75,931	59,892	75,931	75,931	75,931	14,122	14,122	11,571	14,122	14,122	14,122
Panel B. Two-way fixed effects model												
Shared work experience	-0.646	-0.508	-0.262	-0.955	-0.901	-0.277	-1.066	-0.754	-0.687	-0.960	-0.633	-0.387
	(0.286)	(0.224)	(0.274)	(0.214)	(0.186)	(0.167)	(0.413)	(0.255)	(0.221)	(0.242)	(0.195)	(0.204)
Full control	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.09	5.09	5.01	5.09	5.09	5.09	5.85	5.85	5.71	5.85	5.85	5.85
S.D. dep. var.	21.97	21.97	21.81	21.97	21.97	21.97	23.47	23.47	23.21	23.47	23.47	23.47
Observations	91,847	91,847	65,981	91,847	91,847	91,847	49,699	49,699	39,486	49,699	49,699	49,699

Notes: This table shows estimation results based on alternative measures of shared work experience. The outcome variable is patient 30-day mortality. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). Column 2 repeats the results from Tables 2 and 3 for ease of comparison and measures shared work experience of a proceduralist-physician team based on collaboration in the past two years. Columns 1 and 3 measure shared work experience in the past year and the past three years, respectively. Columns 4 and 5 define shared work experience as the median and the mode of the shared work experience between the proceduralist and each of the physicians who treat the patient during the hospital stay, respectively. Column 6 defines shared work experience as that between the proceduralist and the first physician who treats the patient during the hospital stay. The same measures of shared work experience are used in Columns 7-12 for CABG. Columns 3 and 9 have smaller samples than do other columns because, to allow for a three-year look-back window, the two columns drop observations in 2010. For ease of comparison, all measures of shared work experience are scaled in units of standard deviations of the baseline measure (i.e., the measure in Columns 2 and 8). Standard errors clustered at the proceduralist level are reported in parentheses.

Table A11: Alternative Measures of Shared Work Experience II

	PCI				CABG			
	(1) ψ=1	(2) ψ=1.5	(3) ψ=2	(4) ψ=2.5	(5) ψ=1	(6) ψ=1.5	(7) ψ=2	(8) ψ=2.5
Panel A. ED analysis								
Shared work experience	-1.035	-1.137	-1.183	-1.198	-2.287	-3.452	-4.030	-4.474
	(0.330)	(0.339)	(0.402)	(0.459)	(1.350)	(1.609)	(1.948)	(2.257)
Full control	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.87	5.95	5.95	5.95	8.96	9.06	9.06	9.06
S.D. dep. var.	23.51	23.66	23.66	23.66	28.56	28.71	28.71	28.71
Observations	59,892	75,931	75,931	75,931	11,571	14,122	14,122	14,122
Panel B. Two-way fixed effects model								
Shared work experience	-0.776	-0.859	-0.785	-0.660	-1.989	-2.063	-2.375	-2.633
	(0.607)	(0.488)	(0.558)	(0.627)	(0.629)	(0.725)	(0.878)	(1.011)
Full control	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.01	5.09	5.09	5.09	5.71	5.85	5.85	5.85
S.D. dep. var.	21.81	21.97	21.97	21.97	23.21	23.47	23.47	23.47
Observations	65,981	91,847	91,847	91,847	39,486	49,699	49,699	49,699

Notes: This table measures shared work experience as a function of a decay parameter (ψ) that captures experience depreciation over time (see details in Appendix Section E). For ease of comparison, all measures of shared work experience are scaled in units of standard deviations of the baseline measure defined in Equation (2). Columns 1 and 5 include fewer observations than do other columns because, given that shared work experience in the year that is three years before the admission matters relatively importantly when $\psi = 1$, I restrict the sample to patients admitted to the hospital in 2011 or after to allow for an at least three-year look-back window. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). Standard errors clustered at the proceduralist level are reported in parentheses.

Table A12: Controlling for Individual Work Experience in Alternative Forms

	PCI						CABG					
	(1) Quadratic	(2) Cubic	(3) Linear spline	(4) Cubic spline	(5) Fixed effects	(6) Interaction	(7) Quadratic	(8) Cubic	(9) Linear spline	(10) Cubic spline	(11) Fixed effects	(12) Interaction
Panel A. ED analysis												
Shared work experience	-0.559	-0.552	-0.581	-0.574	-0.637	-0.759	-1.224	-1.178	-1.142	-1.157	-1.191	-1.287
	(0.140)	(0.140)	(0.139)	(0.139)	(0.142)	(0.145)	(0.602)	(0.610)	(0.606)	(0.607)	(0.647)	(0.653)
Full control	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.95	5.95	5.95	5.95	5.95	5.95	9.06	9.06	9.06	9.06	9.09	9.06
S.D. dep. var.	23.66	23.66	23.66	23.66	23.66	23.66	28.71	28.71	28.71	28.71	28.75	28.71
Observations	75,931	75,931	75,931	75,931	75,847	75,931	14,122	14,122	14,122	14,122	14,067	14,122
Panel B. Two-way fixed effects model												
Shared work experience	-0.392	-0.381	-0.485	-0.462	-0.493	-0.871	-0.710	-0.712	-0.708	-0.704	-0.776	-0.783
	(0.181)	(0.182)	(0.208)	(0.200)	(0.206)	(0.197)	(0.251)	(0.249)	(0.251)	(0.249)	(0.280)	(0.263)
Full control	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.09	5.09	5.09	5.09	5.09	5.09	5.85	5.85	5.85	5.85	5.86	5.85
S.D. dep. var.	21.97	21.97	21.97	21.97	21.98	21.97	23.47	23.47	23.47	23.47	23.48	23.47
Observations	91,847	91,847	91,847	91,847	91,713	91,847	49,699	49,699	49,699	49,699	49,625	49,699

Notes: This table examines the robustness of my estimation results to controlling for proceduralists' and physicians' individual work experience in alternative forms. The outcome variable is patient 30-day mortality. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). Columns 1 and 7 control for polynomials of individual work experience that include both a linear and a quadratic term; Columns 2 and 8 further add a cubic term of shared work experience; Columns 3 and 9 control for linear splines of individual work experience; Columns 4 and 10 control for restricted cubic splines of individual work experience; Columns 5 and 11 control for individual work experience non-parametrically by fixed effects; Columns 6 and 12 control for linear splines of individual work experience as well as interactions of the splines of proceduralists' and physicians' individual work experience. A small number of observations are dropped in Columns 5 and 11 with the fixed effects, resulting in slightly smaller samples in those two columns. Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A13: 30-Day Mortality from Admission

	(1) PCI	(2) CABG
Panel A. ED analysis		
Shared work experience	-0.416	-0.695
	(0.128)	(0.560)
Full control	Y	Y
Mean dep. var.	5.32	6.95
S.D. dep. var.	22.44	25.44
Observations	75,931	14,122
Panel B. Two-way fixed effects model		
Shared work experience	-0.338	-0.602
	(0.201)	(0.228)
Full control	Y	Y
Mean dep. var.	4.50	4.43
S.D. dep. var.	20.73	20.57
Observations	91,847	49,699

Notes: This table shows estimation results by measuring 30-day mortality from the day of the hospital admission. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A14: Alternative Measurement Windows of Patient Mortality

	PCI			CABG		
	(1) Two weeks	(2) 30-day	(3) 60-day	(4) Two weeks	(5) 30-day	(6) 60-day
Panel A. ED analysis						
Shared work experience	-0.518	-0.588	-0.605	-1.040	-1.242	-1.106
	(0.126)	(0.139)	(0.157)	(0.548)	(0.593)	(0.632)
Full control	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.00	5.95	7.35	7.95	9.06	10.63
S.D. dep. var.	21.78	23.66	26.10	27.05	28.71	30.83
Observations	75,931	75,931	75,563	14,122	14,122	13,918
Panel B. Two-way fixed effects model						
Shared work experience	-0.360	-0.508	-0.477	-0.646	-0.754	-1.167
	(0.190)	(0.224)	(0.261)	(0.243)	(0.255)	(0.286)
Full control	Y	Y	Y	Y	Y	Y
Mean dep. var.	4.20	5.09	6.34	5.06	5.85	6.89
S.D. dep. var.	20.06	21.97	24.37	21.91	23.47	25.33
Observations	91,847	91,847	91,341	49,699	49,699	49,042

Notes: This table shows estimation results based on alternative measurement windows of patient mortality. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). The outcome variables in Columns 1-3 (4-6) are, respectively, whether the patient died within two weeks, 30 days, and 60 days after the hospital discharge. Sample sizes are slightly smaller in Columns 3 and 6 because, to observe 60-day mortality outcomes, I drop patients discharged from the hospital less than 60 days before the end of the data observation period. Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A15: Alternative Levels of Standard Error Clustering

	PCI			CABG		
	(1) Proceduralist	(2) Hospital	(3) Hospital-year	(4) Proceduralist	(5) Hospital	(6) Hospital-year
Panel A. ED analysis						
Shared work experience	-0.588	-0.588	-0.588	-1.242	-1.242	-1.242
	(0.139)	(0.132)	(0.134)	(0.593)	(0.583)	(0.572)
Full control	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.95	5.95	5.95	9.06	9.06	9.06
S.D. dep. var.	23.66	23.66	23.66	28.71	28.71	28.71
Observations	75,931	75,931	75,931	14,122	14,122	14,122
Panel B. Two-way fixed effects model						
Shared work experience	-0.508	-0.508	-0.508	-0.754	-0.754	-0.754
	(0.224)	(0.199)	(0.177)	(0.255)	(0.275)	(0.260)
Full control	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.09	5.09	5.09	5.85	5.85	5.85
S.D. dep. var.	21.97	21.97	21.97	23.47	23.47	23.47
Observations	91,847	91,847	91,847	49,699	49,699	49,699

Notes: This table examines the robustness of my estimates to alternative levels of standard error clustering. The outcome variable is patient 30-day mortality. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). Columns 1 and 4 repeat the main analysis that clusters standard errors by proceduralist; Columns 2 and 5 cluster standard errors by hospital; Columns 3 and 6 cluster standard errors by hospital-year. Shared work experience is scaled in units of standard deviations.

Table A16: Robustness to Excluding Patients Treated by Proceduralists/Physicians with Few Patients

	(1) PCI	(2) CABG
Panel A. ED analysis		
Shared work experience	-0.584	-1.289
	(0.142)	(0.635)
Full control	Y	Y
Mean dep. var.	5.86	8.68
S.D. dep. var.	23.48	28.16
Observations	69,056	11,688
Panel B. Two-way fixed effects model		
Shared work experience	-0.474	-0.848
	(0.219)	(0.251)
Full control	Y	Y
Mean dep. var.	4.71	5.44
S.D. dep. var.	21.19	22.67
Observations	65,150	38,488

Notes: Panel A examines the robustness of my estimates to excluding patients treated by proceduralists with less than five patients in the data (about the 10th percentile of the ED sample) for empirical strategy I (i.e., the ED analysis, which controls for proceduralist fixed effects). Panel B examines the robustness of my estimates to excluding patients treated by proceduralists with less than five patients (about the 5th percentile of the sample) or main physicians with less than four patients (about the 40th percentile of the sample) for empirical strategy II (i.e., the two-way fixed effects model, which controls for both proceduralist and main physician fixed effects). Shared work experience is scaled in units of standard deviations. Standard errors are clustered at the proceduralist level.

Table A17: Shared Work Experience and Medical Resource Use: ED Analysis

	PCI			CABG		
	(1) Length of stay	(2) Number tests exams	(3) Outlier payments	(4) Length of stay	(5) Number tests exams	(6) Outlier payments
Shared work experience	-0.172	-0.242	-0.005	-0.227	-0.692	-0.007
	(0.027)	(0.037)	(0.001)	(0.149)	(0.232)	(0.009)
Full control	Y	Y	Y	Y	Y	Y
Mean dep. var.	4.53	7.78	0.06	12.98	20.75	0.21
S.D. dep. var.	4.45	6.36	0.24	7.67	12.72	0.41
Observations	72,975	72,975	72,975	12,930	12,930	12,930

Notes: This table reports results from regressing patient medical resource use outcomes on shared work experience based on empirical strategy I (i.e., the ED analysis). Shared work experience is scaled in units of standard deviations. The dependent variables in Columns 1-3 are, respectively, length of hospital stay, number of tests and exams performed on the patient during the hospital stay, and whether the stay incurs outlier payments. Columns 4-6 repeat the same set of outcome variables. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A18: Shared Work Experience and Post-Discharge Medical Resource Use

	PCI			CABG		
	(1)	(2)	(3)	(4)	(5)	(6)
	SNF/ Rehab.	30-day readmission	30-day outpatient visits	SNF/ Rehab.	30-day readmission	30-day outpatient visits
Panel A. ED analysis						
Shared work experience	-0.007	0.001	-0.009	-0.007	0.004	0.030
	(0.002)	(0.002)	(0.009)	(0.010)	(0.009)	(0.032)
Full control	Y	Y	Y	Y	Y	Y
Mean dep. var.	0.10	0.14	1.98	0.36	0.15	1.68
S.D. dep. var.	0.30	0.35	1.51	0.48	0.36	1.42
Observations	72,975	71,100	71,100	12,930	12,453	12,453
Panel B. Two-way fixed effects model						
Shared work experience	-0.003	-0.004	-0.011	-0.011	0.001	0.031
	(0.003)	(0.003)	(0.013)	(0.005)	(0.005)	(0.019)
Full control	Y	Y	Y	Y	Y	Y
Mean dep. var.	0.09	0.14	1.92	0.29	0.13	1.72
S.D. dep. var.	0.29	0.35	1.49	0.45	0.34	1.42
Observations	88,022	85,437	85,437	46,884	45,772	45,772

Notes: This table reports results from regressing patient post-discharge medical resource use outcomes on shared work experience. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). Shared work experience is scaled in units of standard deviations. The dependent variables in Columns 1-3 are, respectively, whether the patient is discharged to skilled nursing or rehabilitation facilities, whether the patient is rehospitalized within 30 days after the discharge, and the number of physician office and ED visits in the 30 days after the discharge. Columns 4-6 repeat the same set of outcome variables. To observe a full length of 30 days, Columns 2-3 and 5-6 restrict the sample to patients who are alive until 30 days after the discharge, resulting in relatively smaller samples than those of Columns 1 and 4. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A19: Substitution between Individual and Shared Work Experience

	PCI			CABG		
	(1) Baseline	(2) Linear spline	(3) Cubic spline	(4) Baseline	(5) Linear spline	(6) Cubic spline
Panel A. Heterogeneity by proceduralists' individual work experience						
Shared work experience×proceduralist experience	0.272	0.107	0.125	0.128	0.137	0.145
	(0.051)	(0.068)	(0.066)	(0.224)	(0.246)	(0.246)
Full control	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.09	5.09	5.09	5.85	5.85	5.85
S.D. dep. var.	21.97	21.97	21.97	23.47	23.47	23.47
Observations	91,847	91,847	91,847	49,699	49,699	49,699
Panel B. Heterogeneity by physicians' individual work experience						
Shared work experience×physician experience	0.113	0.080	0.082	0.107	0.153	0.156
	(0.028)	(0.031)	(0.030)	(0.062)	(0.084)	(0.080)
Full control	Y	Y	Y	Y	Y	Y
Mean dep. var.	5.09	5.09	5.09	5.85	5.85	5.85
S.D. dep. var.	21.97	21.97	21.97	23.47	23.47	23.47
Observations	91,847	91,847	91,847	49,699	49,699	49,699

Notes: This table reports heterogeneity in the effect of shared work experience on 30-day mortality by doctors' individual work experience. Columns 1 and 4 repeat the results in Table 6. Columns 2 and 5 control for shared work experience as linear splines. Columns 3 and 6 control for shared work experience as restricted cubic splines. Shared work experience is scaled in units of standard deviations. Individual work experience is demeaned and scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A20: Heterogeneity in Effect of Shared Work Experience

	PCI		CABG	
	Coefficient	% Effect	Coefficient	% Effect
Panel A. Patient age in top quartile				
Yes	-0.872	-11.31	-1.212	-14.17
	(0.301)		(0.373)	
No	-0.414	-9.82	-0.661	-13.05
	(0.210)		(0.257)	
Panel B. Patient predicted mortality in top quartile				
Yes	-0.898	-10.49	-0.883	-7.94
	(0.278)		(0.351)	
No	-0.390	-9.93	-0.713	-17.36
	(0.209)		(0.263)	
Panel C. Patient with uncommon comorbidities				
Yes	-0.667	-10.26	-0.829	-11.20
	(0.254)		(0.323)	
No	-0.397	-9.58	-0.728	-14.17
	(0.211)		(0.258)	
Panel D. Proceduralist/Physician different practices				
Yes	-1.044	-16.93	-0.791	-13.25
	(0.231)		(0.267)	
No	0.018	0.68	-0.528	-10.77
	(0.193)		(0.379)	

Notes: This table reports heterogeneity in the effect of shared work experience on patient 30-day mortality. Each panel of Columns 1 and 3 represents a separate regression for PCI and CABG, respectively. Columns 1 and 3 report α_1 and α_2 from the following specification:

$$y_i = \alpha_1 E_i \times 1(g_i = 1) + \alpha_2 E_i \times 1(g_i = 0) + \alpha_3 g_i + \theta_{d(i)} + \bar{\mathbf{H}}_{j(i)}\lambda + \mathbf{T}_i\eta + \mathbf{F}_i\gamma + \mathbf{X}_i\beta + \varepsilon_i,$$

where g_i is a dummy that takes a value of one for patients with age in the top quartile, with predicted mortality in the top quartile, with uncommon comorbidities, and treated by a proceduralist and physicians from different practices in Panels A, B, C, and D, respectively. Columns 2 and 4 report percentage effects by dividing the coefficient by the mean 30-day mortality rate of each group. Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A21: Patients with High Probability of Undergoing PCI and CABG

	(1) PCI	(2) CABG
Panel A. ED analysis		
Shared work experience	-0.942	-1.438
	(0.335)	(1.610)
Full control	Y	Y
Mean dep. var.	8.53	5.05
S.D. dep. var.	27.93	21.91
Observations	20,575	2,791
Panel B. Two-way fixed effects model		
Shared work experience	-0.589	-0.767
	(0.569)	(0.440)
Full control	Y	Y
Mean dep. var.	6.75	2.18
S.D. dep. var.	25.09	14.60
Observations	15,165	9,638

Notes: This table reports the effect of shared work experience on 30-day mortality based on patients with high probabilities of undergoing PCI and CABG in Columns 1 and 2, respectively (see details in Appendix Section C). Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). The sample size in Panel B, Column 1 is smaller than that in Panel A, Column 1. This is because Panel B further controls for main physician fixed effects and thus drops patients treated by main physicians with only one observed patient in the sample. Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

Table A22: Non-Linear Returns to Shared Work Experience

	(1) PCI	(2) CABG
Panel A. ED analysis		
Shared work experience	-0.977	-1.431
	(0.165)	(0.937)
[Shared work experience]^2	0.051	0.034
	(0.011)	(0.139)
Full control	Y	Y
Mean dep. var.	5.95	9.06
S.D. dep. var.	23.66	28.71
Observations	75,931	14,122
Panel B. Two-way fixed effects model		
Shared work experience	-1.316	-1.078
	(0.239)	(0.345)
[Shared work experience]^2	0.089	0.049
	(0.017)	(0.026)
Full control	Y	Y
Mean dep. var.	5.09	5.85
S.D. dep. var.	21.97	23.47
Observations	91,847	49,699

Notes: This table examines non-linear effects of shared work experience on patient 30-day mortality by adding a quadratic term of shared work experience to the estimation. Panel A reports estimates based on empirical strategy I (i.e., the ED analysis). Panel B reports estimates based on empirical strategy II (i.e., the two-way fixed effects model). Shared work experience is scaled in units of standard deviations. Standard errors clustered at the proceduralist level are reported in parentheses.

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