

# Supplemental Appendix

TABLE A1—PRINCIPAL DIAGNOSES IN MAIN ANALYSIS

3-digit Principal Diagnosis	ICD-9 Category (1)	Weekend Rate of Admission (2)	Observations (3)
038 Septicemia	All Other	0.265	31,206
162 Malignant neoplasm of trachea, bronchus, and lung	All Other	0.269	3,728
197 Secondary malignant neoplasm of respiratory and digestive systems	All Other	0.269	2,656
410 Acute myocardial infarction	Circulatory	0.270	33,111
431 Intracerebral hemorrhage	Circulatory	0.282	6,287
433 Occlusion and stenosis of precerebral arteries	Circulatory	0.264	3,904
434 Occlusion of cerebral arteries	Circulatory	0.274	31,836
435 Transient cerebral ischemia	Circulatory	0.274	12,320
482 Other bacterial pneumonia	Respiratory	0.269	4,098
486 Pneumonia, organism unspecified	Respiratory	0.272	41,034
507 Pneumonitis due to solids and liquids	Respiratory	0.278	11,383
518 Other diseases of lung	Respiratory	0.272	17,501
530 Diseases of esophagus	Digestive	0.268	4,105
531 Gastric ulcer	Digestive	0.265	4,533
532 Duodenal ulcer	Digestive	0.280	3,175
557 Vascular insufficiency of intestine	Digestive	0.279	2,603
558 Other and unspecified noninfectious gastroenteritis and colitis	Digestive	0.282	3,038
560 Intestinal obstruction without mention of hernia	Digestive	0.277	8,075
599 Other disorders of urethra and urinary tract	All Other	0.265	21,748
728 Disorders of muscle, ligament, and fascia	All Other	0.257	2,558
780 General symptoms	All Other	0.286	35,277
807 Fracture of rib(s), sternum, larynx, and trachea	Injury	0.276	2,254
808 Fracture of pelvis	Injury	0.264	6,056
820 Fracture of neck of femur	Injury	0.267	50,790
823 Fracture of tibia and fibula	Injury	0.264	2,054
824 Fracture of ankle	Injury	0.266	4,358
959 Injury, other and unspecified	Injury	0.257	756
965 Poisoning by analgesics, antipyretics, and antirheumatics	Injury	0.265	635
969 Poisoning by psychotropic agents	Injury	0.283	622

Note: 29 principal diagnoses were chosen as diagnoses that had a weekend admission rate that was as close or closer to 2/7 as hip fracture in the full inpatient Medicare data. Weekend admission rates reported here are those in the main analysis sample, which is limited to ambulance transfers. Results are nearly identical when the broader category of "General symptoms" are excluded from the analysis.

Source: 2002-2010 Medicare Part A Claims Data

TABLE A2—SUMMARY STATISTICS: AMBULANCE SAMPLE

	ER Admissions:			ER Admissions:			Analysis Sample		
	Nondeferrable Sample			Nondeferrable Sample			Analysis Sample		
	Mean	Std. Dev.		Mean	Std. Dev.		Mean	Std. Dev.	
Hospital Cost from ER Admission	8.809	0.858		8.925	0.831		8.937	0.839	
Mean Hospital log(Spending) from ER Admissions	8.809	0.218		8.925	0.218		8.937	0.222	
1-Year Mortality	0.328	0.469		0.357	0.479		0.365	0.481	
Age	80.89	7.769		81.405	7.778		81.366	7.799	
Male	0.382	0.486		0.379	0.485		0.379	0.485	
Race: White	0.879	0.326		0.888	0.315		0.884	0.32	
Race: Black	0.084	0.277		0.075	0.264		0.078	0.267	
Ambulance Payment	308.251	122.084		308.886	121.914		308.383	121.141	
Ambulance Distance	7.199	8.205		7.125	8.121		6.871	8.007	
Advanced Life Support	0.66	0.474		0.668	0.471		0.664	0.472	
Ambulance: Emergency Transport	0.865	0.341		0.867	0.34		0.867	0.34	
Ambulance: Outpatient Claim	0.06	0.237		0.06	0.238		0.06	0.238	
Observations	964,562	964,562		451,039	451,039		351,701	351,701	

*Note:* The nondeferrable sample includes diagnoses most likely to require immediate medical care, as described in the text. The ambulance sample includes measures of ambulance inputs, some of which are only available for data from the Centers for Medicare and Medicaid's Carrier file, as opposed to outpatient reimbursement. The analysis sample excludes observations that are not linked to a hospital service area (HSA), patients who were treated more than 50 miles from the ZIP code of their mailing address, patients with missing cost information, and a minimum of 10 observations in the analysis sample for each ZIP code, hospital, and ambulance company.

*Source:* 2002-2010 Medicare Part A Claims Data

TABLE A3—BALANCE: DISCHARGE CONDITION ICD-9 CODE

	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
038 Septicemia	0.093	0.092	0.082	0.088
162 Malignant neoplasm of trachea, bronchus, and lung	0.011	0.011	0.010	0.011
197 Secondary malignant neoplasm of respiratory and digestive systems	0.008	0.008	0.007	0.007
410 Acute myocardial infarction	0.099	0.101	0.089	0.088 **
431 Intracerebral hemorrhage	0.019	0.020	0.017	0.017 **
433 Occlusion and stenosis of precerebral arteries	0.011	0.011	0.011	0.011
434 Occlusion of cerebral arteries	0.089	0.096	0.090	0.087
435 Transient cerebral ischemia	0.032	0.035	0.037	0.035
482 Other bacterial pneumonia	0.012	0.011	0.012	0.012
486 Pneumonia, organism unspecified	0.115	0.113	0.119	0.120
507 Pneumonitis due to solids and liquids	0.036	0.030	0.030	0.034
518 Other diseases of lung	0.051	0.052	0.048	0.048
530 Diseases of esophagus	0.012	0.012	0.011	0.012
531 Gastric ulcer	0.013	0.014	0.012	0.013
532 Duodenal ulcer	0.009	0.009	0.009	0.009
557 Vascular insufficiency of intestine	0.008	0.007	0.007	0.007
558 Other and unspecified noninfectious gastroenteritis and colitis	0.008	0.008	0.009	0.009
560 Intestinal obstruction without mention of hernia	0.023	0.022	0.023	0.023
599 Other disorders of urethra and urinary tract	0.062	0.058	0.062	0.066
728 Disorders of muscle, ligament, and fascia	0.006	0.008	0.008	0.007
780 General symptoms	0.095	0.100	0.104	0.103
807 Fracture of rib(s), sternum, larynx, and trachea	0.006	0.007	0.006	0.006
808 Fracture of pelvis	0.017	0.018	0.017	0.017
820 Fracture of neck of femur	0.144	0.134	0.153	0.146 **
823 Fracture of tibia and fibula	0.006	0.006	0.006	0.006
824 Fracture of ankle	0.012	0.012	0.013	0.012
959 Injury, other and unspecified	0.002	0.002	0.002	0.002
965 Poisoning by analgesics, antipyretics, and antirheumatics	0.002	0.002	0.002	0.002
969 Poisoning by psychotropic agents	0.002	0.002	0.002	0.002

Note: N=351,701. The last column reports significance test for difference between 1st and 4th Quartile means (\*  $p < 0.05$ ; \*\*  $p < 0.01$ )  
Source: 2002-2010 Medicare Part A Claims Data

FIGURE A1. DISCHARGE SOURCE BY AMBULANCE INSTRUMENT PERCENTILE

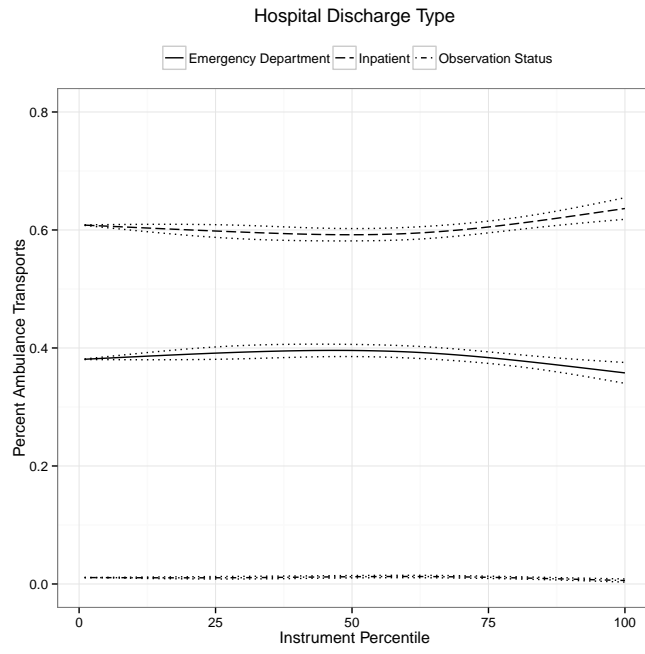


TABLE A4—DECOMPOSITION OF SPENDING

Dependent Variable: 1-Year Mortality	Inpatient Facility	Doctor (Carrier)	IME	Outlier	Outpatient
Avg. log(Hospital Spending)	-0.056 (0.051)	-0.142 (0.040)**	-0.002 (0.001)	-0.282 (0.072)**	0.022 (0.007)**
Observations	351,701	351,701	351,701	351,701	351,701
Outcome Mean	.364	.364	.364	.364	.364
Demographic Controls	Yes	Yes	Yes	Yes	Yes
Diagnosis Controls	Yes	Yes	Yes	Yes	Yes
Ambulance Controls	Yes	Yes	Yes	Yes	Yes
Comorbidity Controls	Yes	Yes	Yes	Yes	Yes
ZIP Code Fixed Effects	Yes	Yes	Yes	Yes	Yes

*Note:* N=351,701. Each cell represents a separate model analogous to those estimated in Table 3. Each column reports model results based on various measures of spending that, when summed across types, equal our total spending measure: total hospital average log(Hospital Spending) for facility payments, physician reimbursement, graduate medical education (IME), outlier spending, and any outpatient facility use (including observation status). All models include full controls. Standard errors in parentheses, clustered at the HSA level. \* significant at 5%; \*\* significant at 1%.

*Source:* 2002-2010 Medicare Part A Claims Data

TABLE A5—PATIENT CHARACTERISTICS ACROSS BORDERS (BLOCK GROUPS)

Sample:	Census Block Groups within 1- mile of a Border		Census Block Groups within 2- miles of a Border		Census Block Groups within 5- miles of a Border	
	Low Cost Side	High Cost Side	Low Cost Side	High Cost Side	Low Cost Side	High Cost Side
Comorbidity: Acute Myocardial Infarction	0.060	0.062	0.059	0.062*	0.057	0.061**
Comorbidity: Congestive Heart Failure	0.171	0.165*	0.171	0.166*	0.173	0.170
Comorbidity: Peripheral Vascular Disease	0.036	0.035	0.035	0.034	0.034	0.034
Comorbidity: Cerebrovascular Disease	0.082	0.085	0.082	0.085*	0.083	0.085
Comorbidity: Dementia	0.042	0.043	0.041	0.042	0.040	0.042
Comorbidity: Chronic Obstructive Pulmonary Disease	0.194	0.191	0.196	0.193	0.193	0.194
Comorbidity: Rheumatoid Disease	0.020	0.019	0.020	0.018*	0.019	0.017
Comorbidity: Peptic Ulcer	0.014	0.013	0.014	0.014	0.015	0.014
Comorbidity: Mild Liver Disease	0.004	0.004	0.004	0.004	0.004	0.004
Comorbidity: Diabetes	0.195	0.197	0.196	0.201	0.200	0.204
Comorbidity: Diabetes with Complications	0.019	0.020	0.019	0.020	0.019	0.020
Comorbidity: Hemiplegia or Paraplegia	0.031	0.033	0.031	0.032	0.031	0.032
Comorbidity: Renal Disease	0.020	0.020	0.020	0.021	0.020	0.021
Comorbidity: Cancer	0.036	0.036	0.036	0.036	0.036	0.036
Comorbidity: Moderate or Severe Liver Disease	0.002	0.002	0.002	0.002	0.002	0.003
Comorbidity: Metastatic Cancer	0.031	0.033*	0.031	0.033*	0.031	0.032
Comorbidity: AIDS	0.001	0.001	0.001	0.001	0.001	0.001
Number of Cross-border Pairs	336		482		583	

Areas represented are distances from US Census Block Group centroids to an ambulance service-area boundary.

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\* significant at 5%, \*\* significant at 1%

TABLE A6—NYS BORDER STRATEGY: FIRST STAGE, OLS & 2SLS- NONELDERLY (AGE 18-64)

	A. Dependent Variable: Mean Hospital log(Spending)			B. Dependent Variable: 1-year Mortality		
	1 mile	2 miles	5 miles	1 mile	2 miles	5 miles
Ambulance Dispatch Area:						
Mean Hospital log(Spending)	0.727 (0.150)**	0.713 (0.151)**	0.73 (0.154)**	0.712 (0.150)**	0.662 (0.139)**	0.644 (0.137)**
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Controls	No	Yes	No	Yes	No	Yes
Diagnosis and Comorbidity Controls	No	Yes	No	Yes	No	Yes
Observations	114648	114648	175161	175161	233616	233616
Mean of Dep. Var.	8.460	8.460	8.457	8.457	8.463	8.463
	1 mile OLS			2 miles OLS		
Mean Hospital log(Spending)	(1) 0.006 (0.004)	(2) -0.008 (0.005)	(3) 0.010 (0.003)**	(4) -0.005 (0.004)	(5) 0.013 (0.004)	(6) -0.003 (0.003)
	2SLS			2SLS		
Mean Hospital log(Spending)	0.004 (0.008)	-0.019 (0.013)	0.007 (0.011)	-0.011 (0.013)	0.012 (0.013)	-0.010 (0.012)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Controls	No	Yes	No	Yes	No	Yes
Diagnosis and Comorbidity Controls	No	Yes	No	Yes	No	Yes
Observations	114648	114648	175161	175161	233616	233616
Mean of Dep. Var.	0.053	0.053	0.054	0.054	0.055	0.055

Each cell represents a separate model analogous to those estimated in Table 8. All models include boundary fixed effects. Demographic controls include indicators for age, race, sex, miles from the hospital to the block-group centroid, and US Census block-group characteristics. Diagnosis controls include the patient's three-digit principal diagnosis code. Comorbidities included are those listed in Table A5 aggregated into 4 categories by diagnosis type. Standard errors in parentheses, clustered at the ambulance service-area level.

\* significant at 5%; \*\* significant at 1%  
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TABLE A7—NYS BORDER STRATEGY: FIRST STAGE, OLS & 2SLS- NEAR-ELDERLY (AGE 50-64)

	1 mile			2 miles			5 miles		
	(1)	(2)	(3)	(4)	(5)	(6)			
<b>A. Dependent Variable: Mean Hospital log(Spending)</b>									
Ambulance Dispatch Area:									
Mean Hospital log(Spending)	0.645 (0.179)**	0.645 (0.174)**	0.603 (0.179)**	0.602 (0.170)**	0.55 (0.160)**	0.549 (0.153)**			
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes			
Demographic Controls	No	Yes	No	Yes	No	Yes			
Diagnosis and Comorbidity Controls	No	Yes	No	Yes	No	Yes			
Observations	56788	56788	86884	86884	115955	115955			
Mean of Dep. Var.	8.588	8.588	8.587	8.587	8.595	8.595			
<b>B. Dependent Variable: 1-year Mortality</b>									
	1 mile			2 miles			5 miles		
	OLS			OLS			OLS		
Mean Hospital log(Spending)	(1) 0.005 (0.005)	(2) -0.009 (0.005)	(3) 0.008 (0.004)	(4) -0.006 (0.005)	(5) 0.012 (0.005)	(6) -0.004 (0.004)			
	2SLS			2SLS			2SLS		
Mean Hospital log(Spending)	(1) -0.015 (0.023)	(2) -0.012 (0.022)	(3) -0.008 (0.025)	(4) -0.013 (0.020)	(5) -0.003 (0.029)	(6) -0.018 (0.021)			
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes			
Demographic Controls	No	Yes	No	Yes	No	Yes			
Diagnosis and Comorbidity Controls	No	Yes	No	Yes	No	Yes			
Observations	56788	56788	86884	86884	115955	115955			
Mean of Dep. Var.	0.081	0.081	0.082	0.082	0.083	0.083			

Each cell represents a separate model analogous to those estimated in Table 8. All models include boundary fixed effects. Demographic controls include indicators for age, race, sex, miles from the hospital to the block-group centroid, and US Census block-group characteristics. Diagnosis controls include the patient's three-digit principal diagnosis code. Comorbidities included are those listed in Table A5 aggregated into 4 categories by diagnosis type. Standard errors in parentheses, clustered at the ambulance service-area level. \* significant at 5%; \*\* significant at 1%

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TABLE A8—NYS BORDER STRATEGY: 2SLS RESULTS FOR SUBGROUPS

Dependent Variable: 1-Year Mortality	Coefficient	S.E.	Obs.	Mean 1-year Mortality
	(1)	(2)	(3)	(4)
<b>Sample: Census block-groups within 5-miles of border</b>				
By Diagnosis Category				
Circulatory	-0.061 *	(0.028)	80,153	0.236
Respiratory	-0.1118**	(0.041)	57,894	0.323
Digestive	0.041	(0.038)	29,829	0.147
Injury	-0.097*	(0.040)	35,093	0.157
Other	-0.008	(0.025)	78,067	0.243
By Diagnosis Mortality Rate Quartile				
Bottom Quartile	-0.011	(0.030)	70,335	0.088
2nd	-0.069	(0.036)	37,651	0.168
3rd	-0.058*	(0.027)	131,573	0.243
Top Quartile	-0.092	(0.054)	41,477	0.527

Each cell represents a separate model. All models include full controls. Standard errors in parentheses clustered at the service-area level.

\* significant at 5%, \*\* significant at 1%  
2000-2006 SPARCS Inpatient Data