

Online Appendix A - Regression Results - Physician-Quarter Level Analysis

Table 1: Regression Results - Effectiveness Model - Individual Physician

<i>Dependent variable: DEA Effectiveness Score</i>	
DEA Efficiency Score	0.2142*** (0.1014)
<i>Patient Characteristics</i>	
ESI Level 1 & 2 Patients	1.3746 (2.0121)
Patients Over 65 Years of Age (%)	1.3216 (1.8152)
Female Patients (%)	-0.2214 (1.8214)
White Patients (%)	-1.4982 (2.9821)
<i>Physician Characteristics</i>	
Physician Tenure	-0.0048* (0.0021)
Physician Contact-to-Disposition	-0.0011* (0.0005)
Avg MRI Count per Patient Visit	3.6921 (2.6821)
Avg IV Count per Patient Visit	-0.0019 (0.1031)
Avg CT Scan Count per Patient Visit	-0.1982* (0.2991)

Note: $N = 415$. Observations are at the physician-quarter level.

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 2: Regression Results - Efficiency Model - Individual Physician

Dependent variable: DEA Efficiency Score

<i>Patient Characteristics</i>	
ESI Level 1 & 2 Patients	-2.1022 (1.9281)
Patients Over 65 Years of Age (%)	1.5021 (1.8921)
Female Patients (%)	-1.4162 (1.5102)
White Patients (%)	2.1982 (3.4921)
<i>Physician Characteristics</i>	
Experience	0.0022* (0.0019)
Avg IV order Count	-0.0293 (0.1023)
Avg Radiology order Count	0.6102 (0.3321)
Avg MRI Order Count	-5.5930* (2.4201)

Note: $N = 415$. Observations are at the physician-quarter level.

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 3: Regression Results - Effectiveness Model - Peer Physician

Dependent variable: DEA Effectiveness Score

<i>Peer Characteristics</i>	
More Efficient Peer	0.0049 (0.1982)
More Effective Peer	-0.0119* (0.0318)
Different-Degree Peer	0.0022 (0.3392)
Opposite-Gender Peer	-0.0075 (0.1762)

Note: $N = 8,915$. Observations are at the physician-quarter level.

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 4: Regression Results - Efficiency Model - Peer Physician

Dependent variable: DEA Efficiency Score

<i>Peer Characteristics</i>	
More Efficient Peer	-0.0048* (0.0068)
More Effective Peer	-0.0281 (0.0075)
Different-Degree Peer	0.01922 (0.0079)
Opposite-Gender Peer	-0.0102 (0.0110)

Note: $N = 8,915$. Observations are at the physician-quarter level.

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Online Appendix B - Variable Importance Graphs

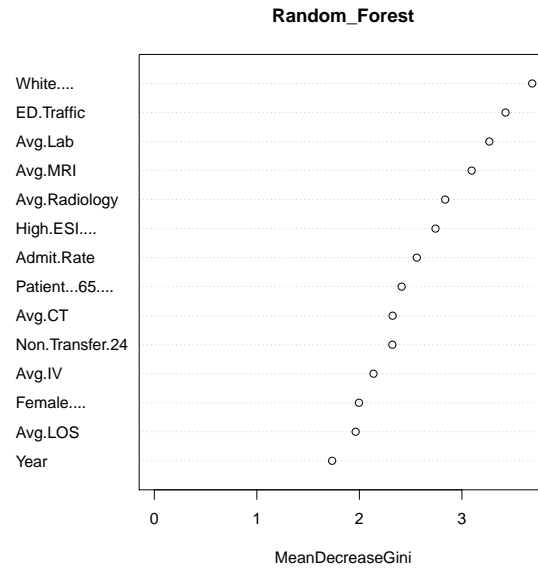


Figure 1: Variable Importance Graph - RF Effectiveness Model

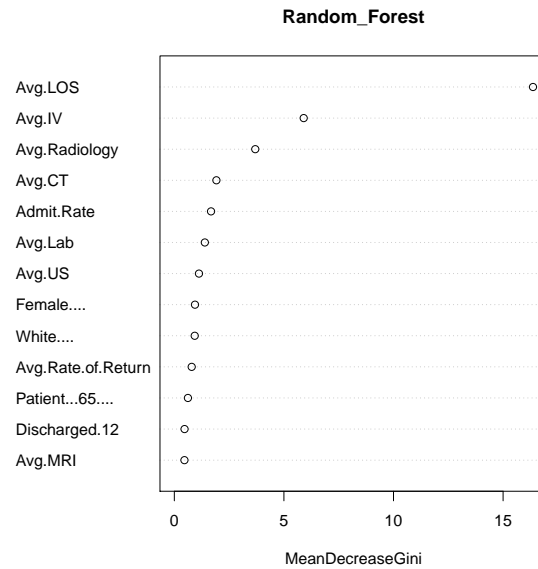


Figure 2: Variable Importance Graph - RF Efficiency Model

Online Appendix C - Alternative DEA Models - Regression Results

Table 1: Regression Results - Effectiveness Model - Individual Physician

<i>Dependent variable: DEA Effectiveness Score</i>	
DEA Efficiency Score	0.3618*** (0.1567)
<i>Patient Characteristics</i>	
ESI Level 1 & 2 Patients	2.3798 (2.1063)
Patients Over 65 Years of Age (%)	1.6429 (1.9013)
Female Patients (%)	-0.4475 (2.3294)
White Patients (%)	-1.5158 (3.5544)
<i>Physician Characteristics</i>	
Physician Tenure	-0.0057* (0.0025)
Physician Contact-to-Disposition	-0.0016* (0.0007)
Avg MRI Count per Patient Visit	4.0121 (3.1387)
Avg IV Count per Patient Visit	-0.0026 (0.1163)
Avg CT Scan Count per Patient Visit	-0.2445* (0.3874)
Avg Total ED Patients per Shift	-0.0024 (0.0018)

Note: $N = 106$. Observations are at the physician-year level.

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 2: Regression Results - Efficiency Model - Individual Physician

Dependent variable: DEA Efficiency Score

<i>Patient Characteristics</i>	
ESI Level 1 & 2 Patients	-2.5637 (2.3786)
Patients Over 65 Years of Age (%)	1.8061 (2.1200)
Female Patients (%)	-1.7110 (2.1270)
White Patients (%)	3.2178 (4.6979)
<i>Physician Characteristics</i>	
Experience	0.0035* (0.0033)
Avg IV order Count	-0.0343 (0.1185)
Avg Radiology order Count	0.7178 (0.4133)
Avg MRI Order Count	-6.9205* (3.5250)
Avg Total ED Patients per Shift	-0.0020 (0.0032)

Note: $N = 106$. Observations are at the physician-year level.

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 3: Regression Results - Effectiveness Model - Peer Physician

Dependent variable: DEA Effectiveness Score

<i>Peer Characteristics</i>	
More Efficient Peer	0.0069 (0.2535)
More Effective Peer	-0.0126* (0.0411)
Different-Degree Peer	0.0041 (0.5593)
Opposite-Gender Peer	-0.0098 (0.2118)

Note: $N = 2,268$. Observations are at the physician-year level.

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 4: Regression Results - Efficiency Model - Peer Physician

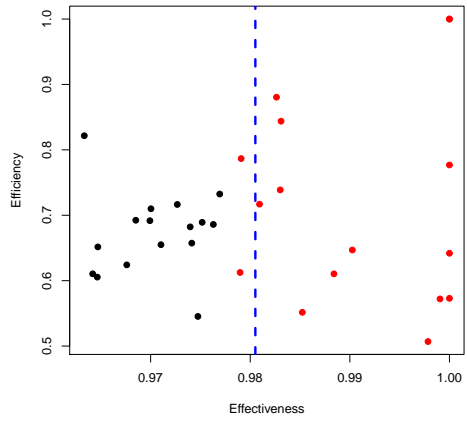
Dependent variable: DEA Efficiency Score

<i>Peer Characteristics</i>	
More Efficient Peer	-0.0059* (0.0081)
More Effective Peer	-0.0234 (0.0082)
Different-Degree Peer	0.0232 (0.0093)
Opposite-Gender Peer	-0.0105 (0.0105)

Note: $N = 2,268$. Observations are at the physician-year level.

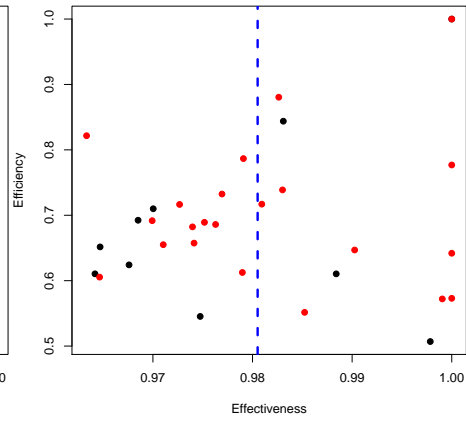
Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Online Appendix D - Alternative ML Models



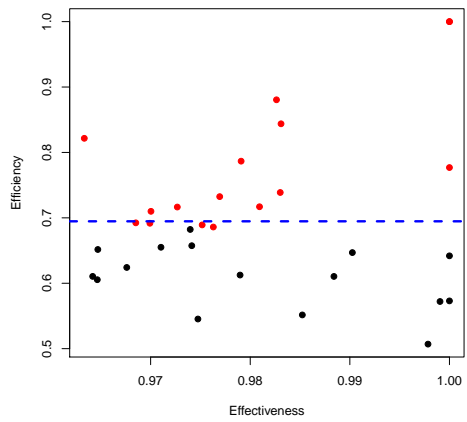
Note: The dotted blue line denotes the average effectiveness score.

Figure 1: DEA Model - Effectiveness Classification



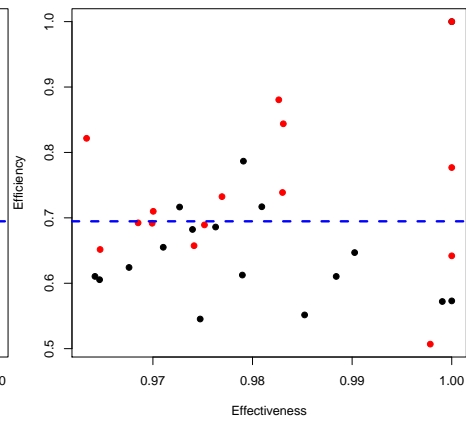
Note: The dotted blue line denotes the average effectiveness score.

Figure 2: ML Model (RF) - Effectiveness Classification



Note: The dotted blue line denotes the average efficiency score.

Figure 3: DEA Model - Efficiency Classification



Note: The dotted blue line denotes the average efficiency score.

Figure 4: ML Model (RF) - Efficiency Classification