Skilled Workers' Mobility and Attrition: The Case of Florida Emergency Medicine Physicians

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Abstract

Emergency medicine (EM) physicians constitute the front line of healthcare providers. They work swiftly to address critical situations, diagnose illnesses, and stabilize patients. Amidst a growing need and shortage of EM physicians, this longitudinal descriptive study captures EM physicians' preferences for practice locations by studying Florida EM physicians' relocation patterns between 2006 and 2020. Estimates from a Cox Proportional-Hazards model and fixed effects logistic regressions suggest that wage amenities are not a strong determinant of relocation over time. Physician attrition and relocation are instead more saliently affected by high work volumes within the EM physician's primary work location.

Keywords: Emergency medicine, Relocation, Physician burnout, Attrition, private equity acquisition

1. Introduction

Disparities in access to public services in the United States are often explained by the fact that some areas lack skilled workers (Brooks, Mueller, and Thiede, 2021). Especially in the health sector, some geographic areas struggle to attract physicians or even retain them, which in turn affects health disparities and health equity. Rural and/or low income areas have the greatest trouble retaining physicians. Less than 10% (AHRQ, 2012) of all physicians practice in rural areas, where roughly 20% (Michael Ratcliffe and Fields, 2016) of the U.S population lives. Even within cities, some hospitals experience higher turnover rates. When hospitals struggle to attract and retain physicians, the health of their patient populations may suffer. Understanding how to influence physicians' choices of work location is therefore an essential policy issue.

This study aims to understand what hospital-specific characteristics more saliently determine physicians' choice of practice locations. I analyze reloca-

tion patterns of Florida Emergency Medicine (EM) physicians between 2006 and 2020 in order to quantify their preferences for wage and non-wage job amenities. I gather physician, hospital, and neighborhood characteristics from three different sources: the Florida Medical Licensing database, the Florida Hospital Uniform Reporting System, and the 2010 Decennial Census. First I investigate physician attrition using survival analysis. I use a Cox Proportional-Hazards model to estimate Florida EM Physicians' probability of leaving practice in Florida t years after their first year of practice in Florida. Next, I analyze deterministic factors associated with EM physician relocation within Florida over time. I use a logistic regression model with experience fixed-effects. Results of the analysis suggest that wage amenities are not a key determinant of physician relocation or attrition. Rather, physicians are more likely to leave high-volume EDs, EDs with fewer staff members, and EDs located in low-income neighborhoods.

This research project is closely related to Falcettoni (2018), in which Falcettoni explores the impact of policies such as loan forgiveness and salary incentives on the geographical distribution of physicians in a model of physicians' location choices. Falcettoni primarily collects micro-level data on physicians' medical school, residency, and first-job choices from CMS directories and she uses the hospital referral region (as defined by the Health Resources and Services Administration) as the geographical unit of study. The main finding is that physicians are only marginally responsive to monetary incentives to practice in a rural location. On the other hand, physicians that complete their residencies in rural areas have a 70% probability of remaining in rural locations. While Falcettoni explores physicians' choice of first practice location after residency, this study follows relocation patterns after that choice has been made, focusing on emergency medicine physicians. Results are therefore complementary, and corroborate Falcettoni's findings that physicians only marginally respond to monetary incentives.

2. Literature review

This paper contributes to the literature on physician practice location and geographical distribution. It also extends the labor literature on location choice of skilled workers. Previous empirical work by Cooper et al. (1975) and G. Leonardson (1985), for example, has shown that there is an uneven spatial distribution of physicians per capita in the United States. Specifically, physicians are more highly concentrated in high-income areas and in urban areas compared to low-income, rural areas (Steele and Rimlinger, 1965). These spatial inequalities in access to physicians are projected

to increase in the coming years. Skinner et al. (2019) use a forecast model to project the number of U.S physicians in rural versus non-rural areas through 2030. They argue that the large existing disparities in physician supply will widen through 2030, despite rural residents being older, poorer, and in worse health than city dwellers.

Adequate access to care is not only determined by the total number of physicians available in an area, but by the number of specialists available and their effectiveness in treating patients. Lee (2010) finds that part of the urban wage premium is driven by tastes for consumption amenities, which attract high skill - hence high wage - workers. An outcome of Lee (2010) is that large-city doctors are more likely to be high-skill specialists from top medical schools. Similarly, Aboagye, Kaiser, and Hayanga (2014) find a significantly higher density of gastroenterologists, general surgeons, and radiation oncologists per 100,000 people living in urban vs rural counties. Given that early detection of conditions like colorectal cancer (diagnosed by gastroenterologists) can significantly improve outcomes, rural residents' lack of proximity to specialists can be fatal.

The uneven distribution of physicians across the country led the U.S. Department of Health and Human Services to designate Health Professional Shortage Areas (HPSA) in 1978.[1] HPSAs are defined using several criteria; for example, an area becomes a HPSA if it has fewer than 1 primary care physician for every 3,500 residents. Moreover, HPSA designations can change over time as areas gain or lose physicians. As of September 2022, 97 million Americans live in primary care-designated HPSAs, 65% of which are in rural areas.[2] Liu (2007) uses the West Virginia Health Care Survey to show that people who live in HPSAs have worse general health status, poorer physical health, and less access to medical services. Insofar as uneven healthcare access is exacerbated by physicians' practice location choices, there is a need to understand how physicians make decisions about where to locate at different points in their careers.

For aspiring physicians, a typical educational journey takes approximately 12 years, with some specialities requiring additional years of training. At each step of their training, prospective physicians make personal career choices that ultimately impact the geographical distribution of - and access to - healthcare services country-wide. Physicians start their career journey

[1] Health Care Shortage Areas: Problems Remain with Primary Care Shortage Area Designation System, (GAO-07-84, Sept. 2006

[2] Fourth Quarter of Fiscal Year 2022 Designated HPSA Quarterly Summary

by first earning an undergraduate degree, followed by four years of medical school. After medical school, physicians complete their residency training, which typically takes three years. A number of studies have focused on how residency program locations impact physicians' choices of future practice locations. Connor, Hillson, and Kralewski (1994) show that rural hospitals with a residency program are more likely to attract and retain physicians than rural hospitals without residency programs. Seifer, Vranizan, and Grumbach (1995) find that 51% of physicians are practicing in the same state in which they obtained their graduate medical education. In a more recent study, Fagan et al. (2015) show that 54.8% of family physicians practice within 100 miles of their residency program. Falcettoni (2018) specifically explores physicians' choice of first practice location after residency, and finds that physicians who complete their residencies in rural places are more likely to continue to practice in rural locations after residency. Other studies have looked at the impact of residency programs' characteristics on physician practice location. For example, the Title VII, Section 747 (Title VII) legislation is a grant program aimed at improving care for under-served and vulnerable populations, among other outcomes. Rittenhouse et al. (2008) , Fryer et al. (2002) and Krist et al. (2005) all find a positive effect of Title VII-funded residency programs on the probability that physicians practice in rural, low income, and under-served areas.

Beyond residency, Pathman et al. (2004) find that job retention for general physicians is only minimally different in rural HPSAs vs. rural non-HPSAs. In other words, the principal dynamic by which rural shortages emerge is simply that too few physicians are recruited. Xierali, Nivet, and Rayburn (2017) examine the relocation patterns of 37,385 obstetrician-gynecologists between 2005 and 2015 and find that ob-gyns move to either more urban or less poor counties. In a similar descriptive longitudinal study, Rayburn, Perez, and Xierali (2018) find that maternal-fetal medicine (MFM) specialists mostly relocated between urban counties - from one urban county to another, with physicians in independent group practices being more prone to relocate. A number of studies in the labor literature discuss the reasons for the divergences in the location choices of high and low skilled workers. Of course, physicians across all specialties are considered high skill workers. Diamond (2016) identifies local productivity changes as the main mechanism for such trends.

Both the geographical location and the nature of physicians' residencies influence their choices of practice location upon completion of their training. Studies on relocation patterns have also shown that physicians often gravitate toward more urban areas. However, these studies have mostly

focused on non-emergency healthcare providers such as primary care physicians. This paper concerns itself with emergency medicine (EM) physicians and their practice locations choices, in a context where the need for EM practitioners is more acute than ever before[3]. Beyond looking at physician demographics and location characteristics, I use data on EM physicians' relocation patterns to also quantify their preferences for job amenities.

In the context of physician shortages, studying emergency medicine is particularly interesting. First, there is a growing need for EM physicians, especially in the wake of the COVID-19 pandemic. EM physicians have a history of working with a diverse array of patients and conditions. They work swiftly to address critical situations, diagnose illnesses, and stabilize patients. In short, they constitute the front line of healthcare providers. The high demand for EM physicians is well documented in the literature, notably through a series of papers addressing EM departments' chronic overcrowding issue (Schneider et al., 2001) (Han et al., 2007). The number of patient visits to the emergency department has increased dramatically over the last 20 years, especially in Florida. At the same time, recent studies such as Petrino, Riesgo, and Yilmaz (2022) report evidence of significant physical and mental burnout among EM physicians as a result of the COVID-19 pandemic. Such evidence highlights the shortage and need for EM physicians. Second, EM physicians tend to treat patients that are usually located in the vicinity of the emergency department. Their impact is thus very localized; when they leave an ED, they leave the patients residing near that ED. As such, their absence is consequential, especially for patients without regular access to a primary care provider (Richardson and Hwang, 2001). Last, there have been substantial changes in the market for EM physicians, largely driven that private equity acquisitions of EM physician practices. Zhu, Hua, and Polsky (2020), Kirsh and Kapoor (2021) and Braun et al. (2021) examined private acquisitions of physician practices, and they point towards the need to track this rapidly growing trend. Zhu, Hua, and Polsky (2020) specifically reports that emergency medicine practices make up 15.8% of all physician practices acquired by private equity firms between the 2013-2016 period, second only to anesthesiology practices (33.1%). PE acquisitions have the potential to reshape the quantity and quality of jobs available to EM physicians, and hence affect their decisions related to practice location.

[3]New AAMC Report Confirms Growing Physician Shortage https://www.aamc.org/news-insights/press-releases/new-aamc-report-confirms-growing-physician-shortage

3. Data

Starting from their license origination dates, this study follows emergency medicine physicians in Florida over time and across hospitals. There are 2,289 "newly licensed" emergency medicine physicians that begin working in Florida between 2006-2019. The physicians worked in a total of 296 Florida emergency departments (EDs). Each of the 14,185 observations represents a physician i in year t. Information on physicians and their practice locations is sourced from Florida Physicians' licensing data, which indicates, among other variables, each physician's license origination date. Physicians enter the sample in cohorts, hence the panel data is not balanced (see Table 1). Physicians entering the workforce earlier are observed over a longer time period unless they relocate out of Florida.

Table 1: Summary statistics: Florida Emergency Medicine Physicians, 2006-2020

Year	Total	Work volume	Practice EDs	Relocations	Observed
2006	115	2623	1.8	2.0	12.8
2007	116	2568	2.3	2.1	12.2
2008	104	2409	2.2	1.8	11.5
2009	109	2574	2.1	1.8	10.0
2010	104	2272	2.0	1.6	9.5
2011	139	2420	2.3	1.9	8.9
2012	154	2570	2.4	1.6	8.2
2013	155	2371	2.1	1.3	7.1
2014	182	2427	2.4	1.1	6.3
2015	173	2453	2.5	1.0	5.4
2016	195	2350	2.5	0.9	4.5
2017	169	2332	2.7	0.6	3.6
2018	199	2221	2.6	0.4	2.8
2019	180	2161	2.6	0.2	1.9
2020	195	1949	3.0	0	1
Total	2289	2357	2.4	1.1	6.3

Work volume, Number of practice EDs, number relocations, and number of years of observations are provided in terms of cohort Averages

Depending on the nature of their employment contract, physicians often work in multiple locations. Physicians in the sample work in an average of 2.4 EDs in any given year, and the average number of practice EDs varies over time. Appendix figure 7.3 illustrates this change. About 50% of the physicians in the sample in 2013 practiced in only one location. This percentage decreased to 30% by 2019, with more than 10% of physicians practicing in 4 locations or more EDs. This is consistent with the considerable growth in the number of free-standing emergency departments in Florida over the time period. For the purposes of this study, I focus on the physician's primary practice location, which is the ED j where physician i registers the

highest volume of work in a given year t.

The second data set is a panel of Florida hospitals' financial information. I obtain the data through the Florida Hospital Uniform Reporting System, which requires all Florida hospitals to report annual information on their assets, liabilities, equity, daily services, and all other revenue and cost centers. Hospital groups are identified by a unique license number, which allows me to link physicians' primary EDs to variables describing the hospitals that own those EDs. Then I identify the locations of all hospitals in the sample using their addresses, and match them to neighborhood demographic characteristics at the tract-level using the 2010 Decennial Census. Practice location variables are summarized in table 2.

Table 2: Summary statistics: Florida Emergency Departments, 2006-2020

	(1) Full sample	
	mean	sd
Main		
Average number of patients per day (EM)	11.82	10.3
Private equity contract	0.32	0.5
Approved program EM Health Ed. program	0.27	0.4
Staff in numbers		
Total No. of employees	286.25	377.5
Total No. of admin staff	36.08	50.8
Total Number of physicians	164.07	133.4
Number of EM physicians	10.30	7.8
Financial standing		
Hospital net Revenue ($M)	11.34	15.4
Salary expense per FTE - EM. S. ($k)	64.42	8.7
Salaries expense per FTE - Total ($k)	190.99	193.5
Salaries expense per FTE - H. Admin. ($k)	101.70	148.6
Tract Level		
Estimate Total population per tract ($k)	5.83	3.9
Zip Code Prevailing medical wage median ($k)	147.65	60.7
Poverty rate in tract	0.26	0.1
Median house value in tract ($k)	208.33	125.9
Hospital located in non_metro area	0.17	0.4
Observations	296	

4. Methods

A Florida EM physician i who is unsatisfied with amenities at their primary practice location j in year t faces the following choices: remain in the current practice ED, move to another emergency department in Florida, or relocate outside of Florida. Such a decision involves a trade-off between the wage at period t and the prospective wage at period $t+1$. It also

involves a trade-off between the non-wage amenities at the primary ED in period t and the potential non-wage amenities at another ED in period $t+1$. Therefore, physicians' relocation patterns reveal their preferences for wage and non-wage job amenities.

I. Physician Attrition: Survival analysis

Building upon the previous assumptions, I conduct a survival analysis followed by logistic regressions with experience fixed-effects to quantify physician preferences for job amenities. I first examine overall EM physician attrition as a function of baseline hospital characteristics, using the entire sample of physicians. I use a panel data set where each observation represents a physician i at practice location j in year t. In this survival analysis setup, "failure" represents leaving full-time ED practice in Florida. Hence I fit a Cox Proportional-Hazards model where the outcome variable is 1 if the physician's primary practice location in year $t+1$ is out of Florida and 0 otherwise. I refer to (Hee Jin Kim, 2022) to describe the model used in this part of the estimation. The hazard function at time t is characterized as

$$h(t) = \lim_{dt \to 0} \frac{P\{t \leq T \leq t + dt \mid T \geq t\}}{dt}.$$

In this analysis, the Cox regression specifies the hazard function of physician i with covariates $\boldsymbol{x}_i$ as follows:

$$h_i(t) = h\left(t \mid \boldsymbol{x}_i\right) = h_0(t) \exp\left(\sum_{k=1}^{p} \beta_j x_{ij}\right)$$

The regression coefficients $\boldsymbol{\beta} = (\beta_1, \beta_2, \cdots, \beta_p)$ are chosen to maximize the partial likelihood given by

$$PL(\boldsymbol{\beta}) = \prod_{i=1}^{n} \left[\frac{\exp\left(\boldsymbol{\beta}' \boldsymbol{x}_l\right)}{\sum_{l \in R(t_i)} \exp\left(\boldsymbol{\beta}' \boldsymbol{x}_l\right)} \right]^{\delta_i}$$

I identify 16 variables that can potentially affect physician relocation over time. These explanatory variables can be classified into four groups. The first set of variables pertains to the physician's work volume. These are the average patient volume per EM physician at their primary ED, their total yearly patient volume, and the number of Emergency departments they work at in a given year. I also include a variable to indicate whether the primary ED has a contract with a private equity-owned EM physician group because such contracts can have significant impacts on a physician's work structure and volume. The second set of variables captures hospital staffing

numbers, such as the total number of employees in the physician's primary ED. A third group of variables reports the hospital's salary expenses on administrative staff. Finally, the last set of variables depicts Census tract-level demographics such as the urban/rural status and poverty rate.

II. Physician relocation: Logistic regression with fixed-effects

In the second stage of my analysis, I condition the sample on physicians still working in Florida and predict which physicians move to other hospitals within Florida. This allows me to assess whether hospitals with certain characteristics lose physicians both out-of-state and within the state. Relocation is defined as the change in the EM physician's primary practice location in year $t+1$ compared to year t. The dependent variable is therefore 1 if the physician relocates the following year and 0 otherwise. Accordingly, explanatory variables are estimated at year t, and the analysis does not use the last year of observation (i.e., 2020). The logistic regression model therefore shows which characteristics at the hospital or neighborhood level predict physician relocation the following year. I expand the list of variables of interest to include variables that proxy for the hospital's financial standing and resources. These include hospital net revenues, salary expenses on research, and non-physician expenses on emergency services. I estimate odd ratios and transform all explanatory variables to binary variables for a more intuitive interpretation. A table with variables in their original format can be found in the appendix.

5. Results

A total of 1,347 (58,8%) of the 2,289 EM physicians relocated at least once over the observation period. A physician relocates on average 1.15 times, and the probability of relocating decreases with experience (Figure 1). Estimates of experience fixed-effects on the odds of switching EDs suggest the same trend (Figure 7). The survival analysis reduces the sample to a single-failure-per-subject data set of 2,094 physicians, of which 394 (19%) move out of Florida.

Results of the Cox proportional-hazards estimation (table 3) indicate that high work volume at the ED level is the key determinant of physician attrition. An emergency medicine physician who treats more than 30 patients per day at her primary ED j in year t has a significantly higher probability of moving out of Florida the following year. These effects are, however, not strong around the mean of work volume, as shown in table 4, suggesting that physicians only leave very high volume EDs. The direction of impact on leaving the facility is as expected for most other variables.

For example, hospital salary expenses do not have any significant impact on attrition, while higher staffing at the primary ED significantly decreases the probability of leaving Florida. Estimates also suggest that physicians are more likely to leave Florida when their primary practice location is in a Census tract where more than 40% of the population is in poverty. These results are consistent with the findings of Xierali, Nivet, and Rayburn (2017), except I do not find that physicians who practice in rural EDs in Florida are more likely to leave Florida than their urban-working counterparts.

Physician relocation logit estimates (table 7) suggest that the odds of relocating out of high-volume workplaces are high. High work volumes negatively and statistically significantly impact both relocation and attrition. Physicians with over 30 patients per day experience a probability to relocate that is 6.8% points higher than that of their counterparts who treat fewer than 30 patients per day (table 8). Physician income in year t and the hospital's average salary expense in year t are not deterministic factors of relocation. These results suggest that physicians may not relocate for monetary reasons. Wage amenities are not a strong determinant of physician relocation over time. The odds of relocating when there is an approved Allied Health Emergency Medicine Education Program are lower. This is consistent with the idea that higher ED staffing reduces physician burnout. Finally, a one-unit increase in the rural-Urban continuum code (to a more rural tract) is associated with higher odds of relocating, a trend that was not highlighted by attrition results, but is consistent with the literature.

6. Discussion

Results from the analysis broadly suggest that wage amenities are not a key determinant of physician relocation or attrition. Rather, physicians experience more burnout in high-volume EDs, EDs with fewer staff members, and EDs located in poorer areas. Estimates are also consistent with findings that physicians experience higher odds of relocating out of rural areas. Another deterministic factor of physician relocation hints at some weaknesses of the study design. Physicians who work at multiple EDs in a given year are more likely to relocate the following year, but they are less likely to exit Florida. This inconsistency highlights the fact that physicians in the sample shift primary EDs within the pool of EDs that they work at. The focus on the physician's primary ED may therefore not be sufficient for understanding the mechanisms behind relocation. Another lurking puzzle is the effect of physicians' self-reported yearly work volume on attrition and relocation. Results from the survival analysis suggest that physicians with

higher overall work volumes are less likely to relocate or leave Florida (tables 3, 7), while higher volumes at the primary ED-level have the opposite effect. A possible explanation for this may lie in how physicians' overall yearly work volume gets reported. Physicians with very high numbers of patients treated presumably do not attend to each patient individually, but are rather responsible for teams of nurses and physician assistants who are directly involved in patient care. Despite these caveats, this study holds policy relevance. Results point towards the ascendance of non-wage amenities in determining Emergency Medicine physicians' choices of practice location. Therefore, authorities at the hospital-level may try to emphasize non-monetary incentives in their efforts to attract this quintessential segment of the workforce.

Table 3: Hazard Ratios - Overall physician attrition out of Florida between 2006 and 2020
[Return to section 5]

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
Over 30 Patients per day	1.756**	1.625*	1.627**	1.634**	1.522*
	(0.329)	(0.307)	(0.307)	(0.309)	(0.288)
Less than 5 Patients per day	1.140	1.091	1.089	1.080	1.135
	(0.147)	(0.141)	(0.141)	(0.140)	(0.148)
Private equity contract	0.956	0.856	0.852	0.895	0.871
	(0.113)	(0.103)	(0.102)	(0.112)	(0.105)
Over 3500 Patients in year	0.089***	0.084***	0.085***	0.084***	0.083***
	(0.027)	(0.026)	(0.026)	(0.026)	(0.026)
Over 4 EDs at a time	0.402***	0.388***	0.384***	0.383***	0.392***
	(0.078)	(0.076)	(0.075)	(0.075)	(0.077)
Over 270 physicians in location - Health Ed.		0.582***	0.580***	0.593***	0.560***
		(0.079)	(0.079)	(0.081)	(0.077)
Approved program - EM (y/n)		0.817	0.814	0.787	0.793
		(0.111)	(0.110)	(0.109)	(0.108)
Over 110k per FTE in admin expenses			1.094		1.123
			(0.140)		(0.144)
Admin expenses over 11pct of total				1.191	
				(0.147)	
Over 40 percent poverty in tract					1.521***
					(0.173)
Hospital located in non_metro area					0.871
					(0.156)
$PseudoR^2$	0.034	0.037	0.037	0.037	0.040
N	12,092	12,075	12,075	12,075	12,075

Exponentiated coefficients; Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Hazard Ratios - Overall physician attrition out of Florida between 2006 and 2020
[Return to section 5]

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
Patients per day	1.002	1.001	1.001	1.001	1.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Private equity contract	1.100	1.021	1.026	1.014	1.047
	(0.129)	(0.122)	(0.123)	(0.122)	(0.127)
Work volume: Total number of patients (ks)	0.327***	0.330***	0.331***	0.330***	0.340***
	(0.018)	(0.019)	(0.019)	(0.019)	(0.019)
Number of EDs Physician works in	0.824***	0.823***	0.823***	0.823***	0.809***
	(0.041)	(0.042)	(0.042)	(0.042)	(0.043)
Total No. of physicians - Health Ed.		0.999*	0.999*	0.999*	0.999*
		(0.000)	(0.000)	(0.000)	(0.000)
Approved program - EM (y/n)		0.769	0.767	0.772	0.816
		(0.105)	(0.105)	(0.106)	(0.118)
Salaries expense per FTE - H. Admin. (ks)			1.000		1.000
			(0.001)		(0.001)
Share of Admin. expenses				0.997	
				(0.007)	
Poverty rate per tract					1.011**
					(0.003)
2003 Rural-Urban Continuum code					0.966
					(0.047)
$PseudoR^2$	0.125	0.127	0.127	0.127	0.130
N	12,076	12,075	12,072	12,075	11,463

Exponentiated coefficients; Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Odds Ratios - Physician Relocation: Florida ED physicians' relocation patterns between 2006 and 2020 *[Return to section 5]*

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
=1 if phys switches primary work location					
Over 30 Patients per day	1.662***	1.530***	1.365**	1.204	1.222
	(0.167)	(0.156)	(0.142)	(0.135)	(0.139)
Private equity contract	1.403***	1.331***	1.288***	1.299***	1.307***
	(0.079)	(0.076)	(0.076)	(0.082)	(0.084)
Work volume: Total number of patients (ks)	0.718***	0.719***	0.719***	0.718***	0.710***
	(0.014)	(0.014)	(0.015)	(0.015)	(0.016)
Number of EDs Physician works in	1.555***	1.538***	1.654***	1.635***	1.623***
	(0.024)	(0.024)	(0.029)	(0.030)	(0.031)
Hospital located in non_metro area	1.171	1.080	0.985	1.134	1.076
	(0.105)	(0.099)	(0.092)	(0.126)	(0.224)
Approved program - EM (y/n)	0.439***	0.437***	0.719***	0.712***	0.763**
	(0.031)	(0.031)	(0.061)	(0.063)	(0.072)
Total No. of physicians - Health Ed.		0.999***	0.999***	0.999***	0.999***
		(0.000)	(0.000)	(0.000)	(0.000)
Salaries expense per FTE - Total (ks)			0.998***	0.998***	0.998***
			(0.000)	(0.000)	(0.000)
Admin expenses over of total (10pct)			1.003	0.987	0.976
			(0.038)	(0.041)	(0.041)
Zip Code Prevailing wage median (ks)				1.001**	1.001**
				(0.000)	(0.000)
Estimate Total population per tract (ks)					1.003
					(0.009)
Over 40 percent poverty in tract					0.933
					(0.068)
Median house value per tract (ks)					1.000
					(0.000)
2003 Rural-Urban Continuum code					1.111*
					(0.057)
Experience Fixed-Effects	Yes	Yes	Yes	Yes	Yes
$PseudoR^2$	0.103	0.105	0.113	0.114	0.113
N	11,724	11,724	11,724	10,339	9,875

Exponentiated coefficients; Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

7. Appendix

7.1. Appendix 1. Probability of switching EDs as a function of experience

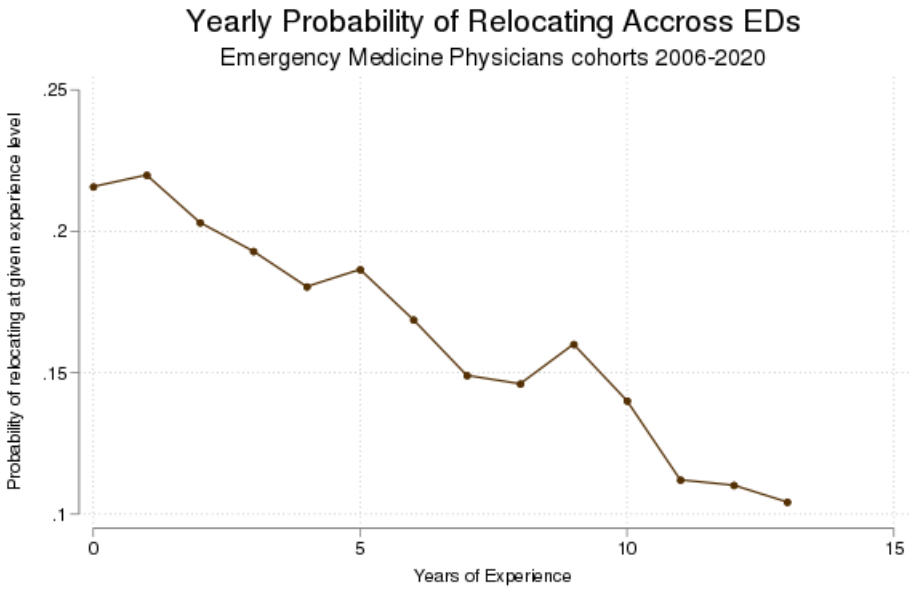

Figure 1: Yearly probability of relocating as experience increases. *[Return to section 5]*

7.2. Appendix 2. Probability of leaving FL as a function of experience year

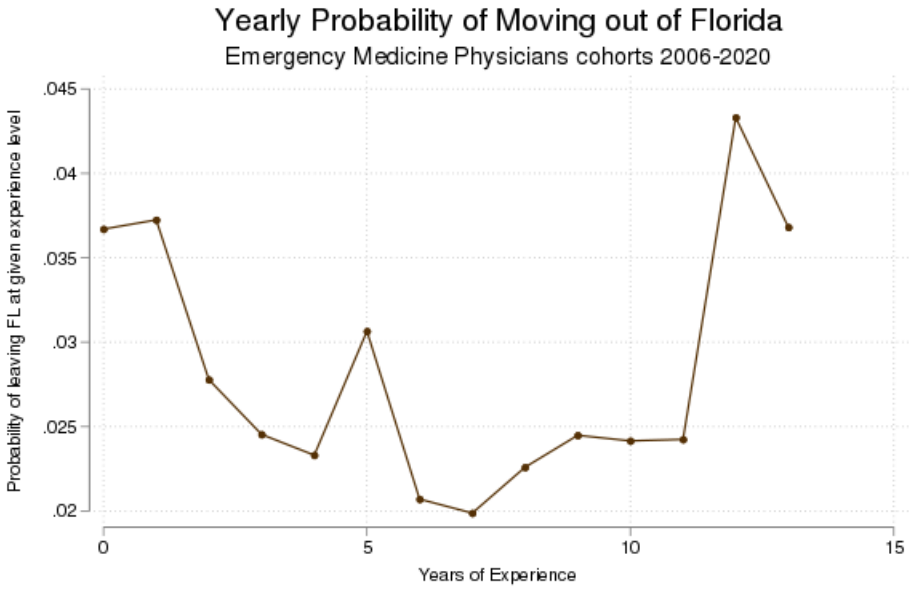

Figure 2: Yearly probability of moving out of Florida as experience increases. *[Return to section 5]*

7.3. Appendix 3. Practice location spread in 2013 Vs 2019

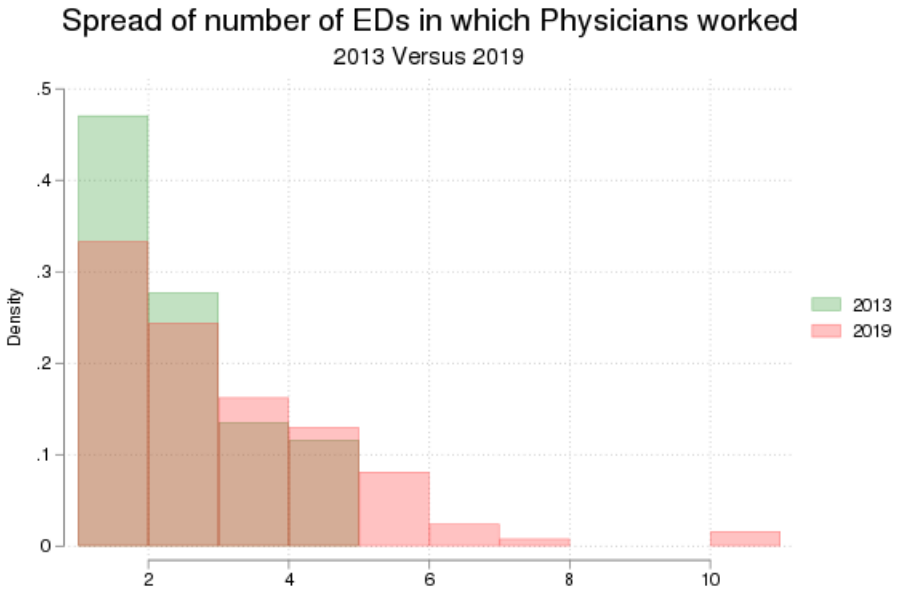

Figure 3: Practice location spread in 2013 Vs 2019. *[Return to section 3]*

7.4. Appendix 4. Summary Statistics - Physicians

Table 6: Summary statistics: Florida Emergency Medicine Physicians, 2006-2020 *[Return to section 3]*

	(1) Full sample		(2) Relocated at least once		(3) Never Relocated	
	mean	sd	mean	sd	mean	sd
Average work volume per year	2.4	1.2	2.3	1.2	2.5	1.2
Average number of Practive EDs per year	2.5	1.4	2.6	1.4	2.3	1.5
Number of relocations	1.1	1.4	2.0	1.3	0.0	0.0
Number of years of observation	6.3	4.1	7.3	4.0	5.0	3.9
Observations	2289		1347		942	

Table 7: Odds Ratios - Experience Fixed effects - Physician work volume: Florida ED physicians' relocation patterns between 2006 and 2020 *[Return to section 5]*

	(1) Model 1
=1 if phys switches primary work location	
Years of Experience=0	1.000
	(.)
Years of Experience=1	1.028
	(0.083)
Years of Experience=2	0.989
	(0.084)
Years of Experience=3	0.925
	(0.082)
Years of Experience=4	0.879
	(0.083)
Years of Experience=5	0.885
	(0.088)
Years of Experience=6	0.857
	(0.092)
Years of Experience=7	0.726**
	(0.087)
Years of Experience=8	0.726*
	(0.096)
Years of Experience=9	0.829
	(0.117)
Years of Experience=10	0.676*
	(0.112)
Years of Experience=11	0.519**
	(0.107)
Years of Experience=12	0.461**
	(0.121)
Years of Experience=13	0.704
	(0.234)
$PseudoR^2$	0.004
N	11,872

Exponentiated coefficients; Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: Marginal effects - Experience Fixed effects: Florida ED physicians' relocation patterns between 2006 and 2020 *[Return to section 5]*

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
Over 30 Patients per day	0.068***	0.057***	0.041**	0.025	0.027
	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)
Private equity contract	0.046***	0.038***	0.034***	0.035***	0.036***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Work volume: Total number of patients (ks)	-0.045***	-0.044***	-0.044***	-0.044***	-0.046***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Number of EDs Physician works in	0.059***	0.058***	0.067***	0.065***	0.065***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Hospital located in non_metro area	0.021	0.010	-0.002	0.017	0.010
	(0.012)	(0.012)	(0.012)	(0.015)	(0.028)
Approved program - EM (y/n)	-0.111***	-0.111***	-0.044***	-0.045***	-0.036**
	(0.010)	(0.010)	(0.011)	(0.012)	(0.013)
Total No. of physicians - Health Ed.		-0.000***	-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)
Salaries expense per FTE - Total (ks)			-0.000***	-0.000***	-0.000***
			(0.000)	(0.000)	(0.000)
Admin expenses over of total (10pct)			0.000	-0.002	-0.003
			(0.005)	(0.005)	(0.006)
Zip Code Prevailing wage median (ks)				0.000**	0.000**
				(0.000)	(0.000)
Estimate Total population per tract (ks)					0.000
					(0.001)
Over 40 percent poverty in tract					-0.009
					(0.010)
Median house value per tract (ks)					-0.000
					(0.000)
2003 Rural-Urban Continuum code					0.014*
					(0.007)
Experience Fixed-Effects	Yes	Yes	Yes	Yes	Yes
$PseudoR^2$					
N	11,724	11,724	11,724	10,339	9,875

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

References

Aboagye, Jonathan K., Heather E. Kaiser, and Awori J. Hayanga. 2014. "Rural-Urban Differences in Access to Specialist Providers of Colorectal Cancer Care in the United States: A Physician Workforce Issue." *JAMA Surgery* 149 (6): 537–543. URL https://doi.org/10.1001/jamasurg.2013.5062.

AHRQ. 2012. "Primary Care Workforce Facts and Stats, no. 3: The Distribution of the U.S. Primary Care Workforce." Report No: AHRQ Pub. No. 12-P001-4-EF. Rockville, MD: Agency for Healthcare Research and Quality.

Braun, Robert Tyler, Amelia M. Bond, Yuting Qian, Manyao Zhang, and Lawrence P. Casalino. 2021. "Private Equity In Dermatology: Effect On Price, Utilization, And Spending: Study examines the prevalence of private equity acquisitions and their impact on dermatology prices, spending, use, and volume of patients." *Health Affairs* 40 (5): 727–735.

Brooks, Matthew M., J. Tom Mueller, and Brian C. Thiede. 2021. "Rural-Urban Differences in the Labor-Force Impacts of COVID-19 in the United States." *Socius* 7: 23780231211022094.

Connor, Robert A., Steven D. Hillson, and John E. Kralewski. 1994. "Association between rural hospitals' residencies and recruitment and retention of physicians." *Academic Medicine: Journal of the Association of American Medical Colleges* 69 (6): 483—488. URL https://doi.org/10.1097/00001888-199406000-00016.

Cooper, James K., Karen Heald, Michael Samuels, and Sinclair Coleman. 1975. "Rural or Urban Practice: Factors Influencing the Location Decision of Primary Care Physicians." *Inquiry* 12 (1): 1825.

Diamond, Rebecca. 2016. "The Determinants and Welfare Implications of US Workers' Diverging Location Choices by Skill: 1980-2000." *American Economic Review* 106 (3): 479–524.

Fagan, Ernest Blake, Claire Gibbons, Sean C. Finnegan, Stephen Petterson, Lars E. Peterson, Robert L. Phillips, Jr., and Andrew W. Bazemore. 2015. "Family Medicine Graduate Proximity to their Site of Training: Policy Options for improving the Distribution of Primary Care Access." *Family Medicine* 47 (2): 124–130.

Falcettoni, Elena. 2018. "The Determinants of Physicians' Location Choice: Understanding the Rural Shortage." .

Fryer, George, David Meyers, David Krol, Robert Phillips, Larry Green, Susan Dovey, and Thomas Miyoshi. 2002. "The association of Title VII funding to departments of family Medicine with Choice of Physician Specialty and Practice Location." *Family Medicine* 34: 436–40.

G. Leonardson, D. Hollingsworth, R. Lapierre. 1985. "Factors Predictive of Physician Location." *Journal of Medical Education* 60 (1): 37–43.

Han, Jin H., Chuan Zhou, Daniel J. France, Sheng Zhong, Ian Jones, Alan B. Storrow, and Dominik Aronsky. 2007. "The Effect of Emergency Department Expansion on Emergency Department Overcrowding." *Academic Emergency Medicine* 14 (4): 338–343. URL https://onlinelibrary.wiley.com/doi/abs/10.1197/j.aem.2006.12.005.

Hee Jin Kim, Eunjee Lee et al., SungHun Kim. 2022. "Cox Proportional Hazards Regression for Interval Censored Data with an Application to College Entrance and Parental Job Loss." *Research Square* (PREPRINT (Version 1) available at [https://doi.org/10.21203/rs.3.rs-1611050/v1]).

Kirsh, Gary M. and Deepak A. Kapoor. 2021. "Private Equity and Urology: An Emerging Model for Independent Practice." *Urologic Clinics of North America* 48 (2): 233–244. URL https://www.sciencedirect.com/science/article/pii/S0094014320301075.

Krist, Alex H., Robert E. Johnson, David Callahan, Steven H. Woolf, and David Marsland. 2005. "Title VII Funding and Physician Practice in Rural or Low-Income Areas." *Journal of Rural Health* 21 (1): 3–11.

Lee, Sanghoon. 2010. "Ability sorting and Consumer City." *Journal of Urban Economics* 68 (1): 20–33. URL https://www.sciencedirect.com/science/article/pii/S0094119010000136.

Liu, Jiexin (Jason). 2007. "Health Professional Shortage and Health Status and Health Care Access." *Journal of Health Care for the Poor and Underserved* 18 (3): 590–598.

Michael Ratcliffe, Kelly Holder, Charlynn Burd and Alison Fields. 2016. "Defining Rural at the U.S. Census Bureau." *U.S. Census Bureau, Washington, DC* ACSGEO-1.

Pathman, Donald E., Thomas R. Konrad, Rebekkah Dann, and Gary Koch. 2004. "Retention of Primary Care Physicians in Rural Health Professional Shortage Areas." *American Journal of Public Health* 94 (10): 1723–1729. URL https://doi.org/10.2105/AJPH.94.10.1723. PMID: 15451741.

Petrino, R., Luis Riesgo, and Basak Yilmaz. 2022. "Burnout in Emergency Medicine Professionals after 2 Years of the COVID-19 Pandemic: a Threat to the Healthcare System?" *European Journal of Emergency Medicine* Publish Ahead of Print.

Rayburn, William, Jose Perez, and Imam Xierali. 2018. "Relocation of Maternal–Fetal Medicine Specialists in the United States." *American Journal of Perinatology* 36.

Richardson, Lynne D. and Ula Hwang. 2001. "Access to Care A Review of the Emergency Medicine Literature." *Academic Emergency Medicine* 8 (11): 1030–1036. URL https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1553-2712.2001.tb01111.x.

Rittenhouse, Diane R., George E. Fryer, Robert L. Phillips, Thomas Miyoshi, Christine Nielsen, David C. Goodman, and Kevin Grumbach. 2008. "Impact of Title VII Training Programs on Community Health Center Staffing and National Health Service Corps Participation." *Annals of Family Medicine* 6 (5): 397–405.

Schneider, Sandra, Frank Zwemer, Andrew Doniger, Robbin Dick, Tim Czapranski, and Eric Davis. 2001. "Rochester, New York: A Decade of Emergency Department Overcrowding." *Academic Emergency Medicine* 8 (11): 1044–1050. URL https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1553-2712.2001.tb01113.x.

Seifer, S. D., K. Vranizan, and K. Grumbach. 1995. "Graduate Medical Education and Physician Practice Location. Implications for Physician Workforce Policy." *Journal of the American Medical Association* 274 (9): 685—691. URL https://doi.org/10.1001/jama.1995.03530090017015.

Skinner, Lucy, Douglas O. Staiger, David I. Auerbach, and Peter I. Buerhaus. 2019. "Implications of an Aging Rural Physician Workforce." *New England Journal of Medicine* 381 (4): 299–301.

Steele, Henry B. and Gaston V. Rimlinger. 1965. "Income Opportunities and Physician Location Trends in the United States." *Economic Inquiry* 3 (2): 182.

Xierali, Imam, Marc Nivet, and William Rayburn. 2017. "Relocation of Obstetrician-Gynecologists in the United States, 2005-2015." *Obstetrics and Gynecology* 129.

Zhu, Jane M., Lynn M. Hua, and Daniel Polsky. 2020. "Private Equity Acquisitions of Physician Medical Groups Across Specialties, 2013-2016." *Journal of the American Medical Association* 323 (7): 663–665. URL https://doi.org/10.1001/jama.2019.21844.