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Noah J. Trudeau
West Virginia University

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Abstract

Occupational licensing has been shown to have many pervasive economic effects. Licensing restricts competition, which causes wage premiums, potentially induces rent seeking, and ultimately results in consumers having to pay high prices through both channels of reduced supply and producers passing on increased cost of doing business.

Licensing laws are passed at the state level; and thus, there can be considerable variation across states. Should there be much economic activity at state borders, this would be inconsequential. Yet, the existence of metropolitan areas spanning state borders begs the question of what effects can restricting competition be when competitive substitutes are easily available.

This theory is tested using major MSAs that cross state borders and data from the American Community Survey to show how the differing licensing schemes affect the incomes of practicing massage therapists. Ultimately, it appears that the effect of easily available substitutes of massage therapists in the border state mutes the effect of the wage premium that would be caused by a more restrictive licensure scheme. Not only do wage premiums not appear in geographically adjacent states, it is especially missing in border MSAs.

1 Introduction

Whether or not an occupation is licensed often has a large effect on the decisions made by those who practice that occupation or those who are deciding on pursuing that occupation. More often than not occupational licensing schemes are decided at the state level. This leads to differing licensing schemes that can cause major effects on licensed industries between states.

This paper discusses how state-level occupational licensing has effects on metropolitan statistical areas that cross state borders. Specifically looking at the New York–Newark–Jersey City MSA. New York and New Jersey differ in their licensing schemes of massage therapists and this could have effects on the incomes of practicing massage therapists in either state. The difference in income could be through multiple channels. First, licensure is a barrier to entry, and restricting entry reduces the supply of massage therapists and causes an increase in price. Licensing can also be a signal of quality to consumers, and they may have increased demand for a service with higher perceived quality, increasing the price.

Figure 1 shows the U.S. MSAs with a 2019 population greater than one million people. There are 14 total, half of which are on the East coast. However, there are additional ones that span state borders through the Midwest and one in the Pacific Northwest.

Figure 1: U.S. MSAs with a 2019 Population Greater than 1 Million People

Theoretically, there could be two possible outcomes from the differing licensure schemes on the incomes of massage therapists within an MSA. On one hand, the licensure could cause the a wage premium by

increasing barriers to entry. This would result in noticeable differences in practitioner incomes across states. On the other hand, competition from across the state border, but still within the MSA, could mute these effects. In this case, incomes should be relatively the same on either side of the state border, despite the differences in licensing.

This piece expands on the work done on occupational licensing by Kleiner (2006), and Thornton and Timmons (2013); as well as the work done by Murphy (2016) on economic freedom at state borders. As most of the economic activity done at state borders is driven by MSAs this paper may explain more thoroughly the results presented by Murphy (2016). Additionally, while some work has been done to understand the effects of border labor markets in the occupational licensing literature, no work has shown a model of how the effect may take place. I add to the literature by modeling the local labor market as a circular city with firms facing higher marginal cost on one side of a border and lower marginal costs on the other side.

Section 2 discusses the pertinent literature on the topics of occupational licensing as well as literature of state regulations and economic freedom at state borders, section 3 models a labor market at a state border, section 4 discusses the data collected from the American Community Survey, section 5 discusses the design and results, and section6 concludes.

2 Occupational Licensing and Interstate Effects

The economic justification for occupational licensing stems from a problem of asymmetric information (Shapiro, 1986; Kleiner, 2006). The provider of a good or service has knowledge of the quality of the product while those who are consuming have no knowledge, pre-consumption, of product quality. This market failure justifies licensure. Licensure insures some level of quality has been met, at least at the time the licensure is earned.

Occupational licensing does act as a barrier to entry and ultimately has wage effects (Kleiner, 2006) (Kleiner and Krueger, 2013) Blair and Chung (2019)). However, Kleiner and Krueger (2013) find that governmental certification has a much smaller effect on pay. This could stem from the voluntary nature of certification as opposed to the coercive nature of licensure. Specifically, in the case of massage therapists, Thornton and Timmons (2013) find that wage premiums may be as high as 16.2% in states that license.

Blair and Chung (2019) find that licensing causes an average of 17%-27% reduction in labor supply. Adams et al. (2002) test to see whether the wage premiums stem more from the supply-side through restriction of entry or the demand-side through supposed increase in quality.

Because licensing is done at the state level, there is often much heterogeneity in occupational licensing requirements between states (Kleiner and Vorotnikov, 2017). State-run occupational licensing boards set requirements and issue licenses. Unfortunately, these boards are often composed of individuals who already have licenses issued by the boards themselves and thus have incentive to restrict competition further (Kleiner, 2006; Allensworth, 2017). Per Allensworth (2017), this would be considered a major anti-trust issue in the private sector.

There is some evidence that licensing at state borders is also important in the scope of practice literature. Markowitz and Adams (2020) finds that increases in Advance Practice Registered Nurse scope of practice leads to a higher likelihood of APRNs being self employed and specifically state, "There is also some evidence that outside options are important with APRNs who live on the border of less restrictive states being more likely to cross a state border for work."

Regulation may also cause other market inefficiencies. Cramer and Krueger (2016) find that rideshare drivers, such as Uber and Lyft, spend a "significantly higher fraction of their time, and drive a substantially higher share of miles" with passengers as compared to taxi drivers and they attribute this in part to inefficient taxi regulations.

It is possible that the wage premiums from licensing may reduced at or near state borders where competition is higher from unlicensed or less-strictly licensed providers of the same good or service. Murphy (2016) using the Economic Freedom of North America index finds that differing levels of economic freedom can have effects on income. It may be of note that New York ranks last of the states in the most recent edition of the ENFA with a score of 3.9 out of 10 while New Jersey ranks 35th with a score of 5.77 (EFNA).

In addition to licensing literature there is also precedent for this study in the tax literature. Rohlin et al. (2014) show that differing tax rates affect entrepreneurial activity and the decision of which side of the border to locate on. Regulation and taxation are similar in nature in that they add barriers to doing business.

Of note, this application is only possible in the instance that the good or service being purchased from the licensed occupation can be obtained across state borders. There are applications, such as plumbers, that this can not apply to. A plumber can only work in a home in a state in which they are licensed. One cannot take their house across the state border to have plumbing fixed. Essentially this analysis requires an individual to travel to the licensed occupation, not hire the licensee to come to them.

3 Modeling Competition at State Borders

To model competition at a state border I use a modified version of the model presented in Vogel (2008). Specifically, I simplify Vogel (2008) by assuming that while there are many firms, there are only two differing marginal costs and that marginal cost difference is driven by the difference in state licensure requirements. Thus, locating on one side of the border comes with a lower marginal cost. This model assumes that the additional licensing affects the marginal cost of production. If licensing means that firms are constantly trying to maintain a minimum quality, this is possible. If licensing is simply a fixed cost, then a simple Cournot model with different fixed costs of entry explains supply restriction.

The market is represented by a circular city model with a unit circumference. Locations along the circumference of the circle are indexed by $z \in [0, 1)$. There is a mass of $L > 0$ consumers that are uniformly distributed around the city. Each customer demands either 1 or 0 units of output inelasitcally.

The utility a consumer gets from consuming a unit of output from firm i located at point z is represented by the utility function:

$$u(z, i) = v - p_i - t \times D(z, i)$$

Where v is the common valuation of output, p_i is price, $D(z, i)$ is the shortest arc length separating z firm i and t is the transport cost per unit of distance.

The consumer is assumed to buy from the firm with the lowest location-adjusted price.

$$p_i + tD(z, i)$$

A consumer who chooses not to buy gets utility of zero.

Ultimately, consumer z in a market with a finite set of N producers buys one good from $i \in N$ only if

$$i \in \text{argmin}_{j \in N}\{p_j + D(z,j)\} \text{ and } p_i + tD(z,i) \leq v$$

Assume $n \geq 2$ firms. Each firm has a constant marginal cost of production $k_i \geq 0$ and $\bar{k}$ denotes the average marginal cost of production in the market. For simplicity we will assume $k_i \in \{k_H, k_L\}$ where H represents a highly licensed and therefore high marginal cost state and L represents a low licensed and therefore low marginal cost state.

Additionally we will assume shipping costs are zero as consumers travel to and then consume a service from the business. Vogel (2008) shows how this model can expand to include shipping costs, τ. Therefore, i's cost of producing a good is simply k_H or k_L.

The game consists of $n \geq 2$ firms competing in 2 stages. In the first stage, firms decide on location simultaneously and in the second stage firms decide on price simultaneously. In the location stage, firms choose from locations on the circle $z_i \in [0,1)$, where $\mathbf{z} \equiv (z_0, ..., z_{n-1})$. In the price state firms observe locations and then simultaneously choose prices, $p_i \in [0, \infty)$, where $\mathbf{p} \equiv (p_0, ..., p_{n-1})$. A pure strategy for the game is a location choice and the mapping of locations, $\mathbf{z}$, to prices.

Ultimately, Vogel (2008) shows that certain PSNE exist along equilibrium path and the solution for price, market share, and profit are as follows:

$$p_i^* = \tfrac{t}{n} + \tfrac{2}{3}\bar{k} + \tfrac{1}{3}k_i,$$
$$x_i^* = \tfrac{1}{n} + \tfrac{2}{3t}(\bar{k} - k_i),$$
$$\pi_i^* = Lt(x_i^*)^2.$$

This is a simplified version of the Vogel (2008) result in considering that there is no delivery cost for firms.

In equilibrium firms that produce at a lower marginal cost are rewarded by being more isolated. Thus, if we consider that firms on either side of the border will be producing a good of the same quality, then the firms on the lower cost side of the border will be more isolated and take up more market share. Theory predicts that the firms on either side will locate equidistantly according to the market share formula, and that firms in the low cost state will have customers that will be on the other side of the border. An interesting consequence of this theory is that low marginal cost of production is actually associated with fewer firms, not more, as firms that can produce at low location adjusted prices serve larger and larger market share.

For simplicity, imagine a market of two firms. They would locate at opposite sides of the circle, one firm would produce at a lower marginal cost, offer a lower price, and equivalently have a market share of more than half. As the number of firms gets larger, we see that price is mostly affected by $\bar{k}$ and then maritally affected by it's own marginal cost, a ratio of 2 to 1. In short, the price a firm charges depends more on the average marginal cost in the market than individual firm marginal cost. If price is driven more by average marginal cost, it would make sense that we would see less of an occupational licensing premium in markets at borders.

For a market with two firms with marginal costs, k_L and k_H there would be:

$$p_L^* = \frac{t}{2} + \frac{2}{3}\bar{k} + \frac{1}{3}k_L < p_H^* = \frac{t}{2} + \frac{2}{3}\bar{k} + \frac{1}{3}k_H$$

$$x_L^* = \frac{1}{2} + \frac{2}{3t}(\bar{k} - k_L) > x_L^* = \frac{1}{2} + \frac{2}{3t}(\bar{k} - k_H), \text{ and}$$

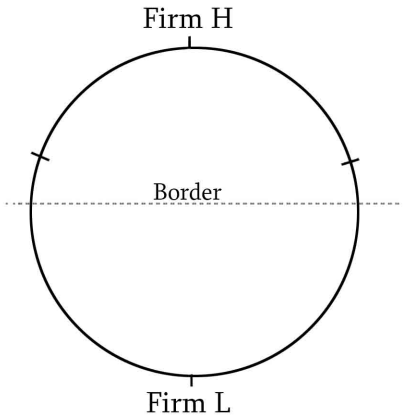
$$\pi_L^* = Lt(x_L^*)^> \pi_H^* = Lt(x_H^*)^2$$

If one was to take a market that located exclusively within one state and was therefore governed by one set of licensing laws, $\bar{k}$ would be equal to k_i and firms prices would include a competition and travel cost component, $p_i = \frac{t}{n} + k_i$. It is possible that to see an occupational wage premium accurately would be to have two separate markets from two states with diff erring licensing laws. At the border, if there is sufficient market activity, there will be spillovers in price, market share, and profit. This model also implies that one might see a gradient of occupational licensing wage premium as the distance from the state border increases, depending on how large you model the market and the cost of travel. Also, The distribution of the market over the border will play a role in what fraction of the firms are high cost versus low cost and thus change $\bar{k}$. A change in the average marginal cost, $\bar{k}$, should not change the wage premium of the local market, $p_H^* - p_L^*$.

With two firms the market would look like Figure 2, with low cost firm Firm L and high cost firm Firm H. Note that the firms locate on opposite sides of the circle and Firm L captures slightly more market share. This solution is similar as an even number of high and low costs firms are in the market. Low costs firms are spaced out more as they capture more market share. Therefore the model predicts less low cost firms than high cost firms.

One might be concerned with local licensing laws at the city level in this case as well. If a city at the border has local level licensing this should only raise the average marginal cost for all firms in the market

Figure 2: Two firms with Market Share



not just on one side of the border. This would result in a higher $\bar{k}$ and higher prices compared to other markets in the area. The same would go for any other local market increases in marginal cost like high prices of leasing a business in a city. As long as they are effecting all firms in the market there should be no price change internally.

4 Evidence from US MSAs

The primary data used is a pooled cross-section of the 2005-2019 ACS 1% samples. The data is collected by the US Census Bureau and was retrieved using the IPUMS database (IPUMS). Specifically, all massage therapists recorded over the 8 year period.

The primary variable of interest is total earned income, *lnHourlyWage*. I use this as opposed to income from wages and income from all sources because massage therapists classified as self-employed don't receive wages. Using earned income also excludes income from capital gains of losses. *lln(HourlyWage)* is computed by taking the total pre-tax personal income or losses from all sources, *Income*, dividing by usual hours worked per week *HoursWorked* times fifty-two. Other variables collected are age, as a proxy for work experience, *Age*; the class of the worker, *SelfEmployed*; and indicator variables for PoWPUMA state, educational attainment, race, and sex.

To understand the interaction of the differing licensure within the MSA and how it compares to across

Table 1: Multi-State MSA's Population > 1 million

MSA	States	Population	Difference in Licensing
New York City-Newark-Jersey City	NY-NJ-PA	19,216,182	NY requires $27 less fees but 500 more hours of experience required
Chicago-Naperville-Elgin*	IL-IN-WI	9,458,539	3 states
Washington-Arlington-Alexandria*	DC-VA-MD-WV	6,280,487	4 states
Philadelphia-Camden-Wilmington*	PA-NJ-DE-MD	6,102,434	4 states
Boston-Cambridge-Newton*	MA-NH	4,873,019	Too few observations in NH
Minneapolis-St. Paul-Bloomington*	MN-WI	3,654,908	Too few observations in WI
St. Louis	MO-IL	2,803,228	Illinois requires $5.20 more in fees and 100 more hours of experience
Charlotte-Concord-Gastonia	NC-SC	2,636,883	NC requires $20 more in fees
Portland-Vancouver-Hillsboro	OR-WA	2,492,412	Oregon: $49 more in fees, 125 more hours of experience, one less exam
Cincinnati*	OH-KY-IN	2,221,208	3 states
Kansas City	MO-KS	2,157,990	MO licenses KS does not, MO requires $169.80 in fees and 500 hours of experience
Virginia Beach-Norfolk-Newport News	VA-NC	1,768,901	NC requires $40 more in fees
Providence-Warwick	RI-MA	1,624,578	MA requires $160 more in fees and 150 more hours of experience
Memphis*	TN-MS-AR	1,346,045	3 states

*MSA cannot be used in model, see column 4

states I apply the following two panel models to the two states in which the MSA is part of:

$$log(HourlyWage)_{it} = \beta_0 + \beta_1 Dstate1_{it} + \Gamma\chi_{it} + \alpha_t \tag{1}$$

$$log(HourlyWage)_{it} = \beta_0 + \beta_1 Dstate1NotMSA_{it} + Dstate2NotMSA + Dstate1inMSA + \Gamma\chi_{it} + \alpha_t \tag{2}$$

Where χ is a set of indicator variables for gender, race, education, and employment status and α_t is a year fixed effect.

Equation 1 would be the naive test to see if the two states exhibit an occupational licensing wage premium. This requires the two states have significant differences in occupational licensing laws. It is also preferable that the MSA's be large enough for there to be enough observations within on both sides of the border. It would also be preferable that the MSA is somewhat isolated from other state borders such that there aren't multiple regulatory influences. Table 1 contains a summary of the MSA's that cross state borders and have populations over 1 million people as of 2019.

5 Results

In looking at multiple MSAs in the US we see a few results. In the New York city MSA there is a sizable and statistically significant wage premium for massage therapists working in the MSA. Overall, massage therapists working in the MSA make more than those not, In the simple estimation for a wage premium between the states New york doesn't show a wage premium that is statistically significant. This could be because most of the economic activity of the state is being driven by the MSA. Roughly 64% of New York's population lives in the MSA. Thus, it may be better to use a more zoomed-in analysis for the model to make sense. The geographic footprint of the New York-Newark-Jersey City MSA is also large as well. It covers nearly half of the state of New Jersey. New Jersey is actually completely within one MSA or another. So if the theory predicts a gradiant of wage premiums from the different MSAs then it would be expected that New Jersey's wage would be getting pulled towards that of Pennsylvania as well as that of New York because of the Philadelphia MSA.

Missouri actually gives the optimal analysis with the St. Louis MSA. The St Louis MSA is split roughly half and half between Missouri and Illinois geographically. Missouri and Illinois have drastically differing licensing schemes as Missouri doesn not license massage therapists. It is isolated from the other MSA's in the area, and the other border MSA in Missori, Kansas City, is bordering with a state that also does not license massage therapists. When look at the state to state analysis, we can see a potential wage premium although it is statistically insignificant. It looks like Illinois has a 6 percent wage premium over Missouri. When breaking up that effect to see the breakdown in the MSA, Iliinois shows no premium.

Looking to other border spanning MSAs provides options for analysis as well. The difficulty comes in having states that border one another that have definitive differences in licensing and enough sample size on both sides of the border. For example the Minneapolis-St Paul MSA crosses the border of Minnesota and Wisconsin, but is only partially in Wisconsin and there is only 1 massage therapist in the sample that is in the MSA and in Wisconsin across the whole period. The Charlotte MSA spans the North and South Carolina border, but the only difference in licensing is $20 in licensing fees. Noth Carolina and Virginia have practically the same licensing requirements as well, a difference of $40 in fees, so that rules out the Virginia Beach-Norfolk-Newport News MSA. And as stated before, with the Kansas City MSA, neither Missouri or

Table 2: Wage Premiums between States and Within MSAs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	New York City-Newark-Jersey City		St. Louis		Portland-Vancouver-Hillsboro		Kansas City		Providence-Warwick	
VARIABLES	NY-NJ Simple	NY-NJ MSA	IL-MO Simple	IL-MO MSA	OR-WA Simple	OR-WS MSA	MO-KS Simple	MO-KS MSA	MA-RI Simple	MA-RI MSA
State 1	0.00843		0.0286		0.114		0.0753		-0.218	
	(0.0894)		(0.0942)		(0.0805)		(0.144)		(0.297)	
State 1 in MSA		0.0641		0.00305		0.0390		-0.0687		
		(0.116)		(0.177)		(0.121)		(0.199)		
State 1 not MSA		-0.0513		0.0156		-0.133		0.165		-0.403
		(0.101)		(0.111)		(0.113)		(0.197)		(0.402)
State 2 not MSA		-0.0486		-0.0564		-0.197**		-0.0247		-0.241
		(0.121)		(0.131)		(0.0984)		(0.296)		(0.448)
Age	0.0363	0.0358	0.0271	0.0271	0.0363**	0.0390**	0.0113	0.00985	0.0412	0.0438
	(0.0225)	(0.0225)	(0.0180)	(0.0181)	(0.0155)	(0.0154)	(0.0288)	(0.0296)	(0.0552)	(0.0541)
Age^2	-0.000303	-0.000298	-0.000225	-0.000225	-0.000364**	-0.000392**	-3.32e-05	-1.31e-05	-0.000494	-0.000519
	(0.000268)	(0.000268)	(0.000212)	(0.000212)	(0.000171)	(0.000170)	(0.000334)	(0.000342)	(0.000618)	(0.000608)
Self Employed	-0.0578	-0.0464	-0.134*	-0.133*	-0.0190	-0.0185	0.000321	0.00573	0.117	0.126
	(0.0789)	(0.0812)	(0.0778)	(0.0782)	(0.0642)	(0.0644)	(0.143)	(0.143)	(0.270)	(0.273)
Bachelors	0.0804	0.0785	0.141*	0.141*	-0.0917	-0.0881	0.263*	0.258*	0.153	0.143
	(0.0794)	(0.0792)	(0.0801)	(0.0802)	(0.0710)	(0.0708)	(0.153)	(0.150)	(0.213)	(0.213)
Graduate Degree	0.199*	0.198*	0.310**	0.309**	0.107	0.100	1.069**	0.991*	-0.0569	-0.0767
	(0.104)	(0.104)	(0.129)	(0.129)	(0.0832)	(0.0839)	(0.509)	(0.547)	(0.305)	(0.309)
Female	0.0672	0.0717	-0.0154	-0.0184	-0.0116	-0.00379	-0.0506	-0.0703	-0.174	-0.141
	(0.0780)	(0.0779)	(0.0897)	(0.0900)	(0.0564)	(0.0561)	(0.148)	(0.147)	(0.236)	(0.246)
Black	0.159	0.157	-0.160	-0.160	-0.199	-0.195	-0.815*	-0.780*	0.136	0.140
	(0.0977)	(0.0980)	(0.147)	(0.147)	(0.171)	(0.167)	(0.426)	(0.445)	(0.603)	(0.607)
Asian	-0.383***	-0.383***	-0.590***	-0.592***	-0.0732	-0.0905	-0.274	-0.222	0.0989	0.0836
	(0.0921)	(0.0924)	(0.156)	(0.156)	(0.0968)	(0.0973)	(0.378)	(0.407)	(0.467)	(0.472)
Other Minority	-0.100	-0.100	-0.252	-0.254	0.0838	0.0892	-0.938	-0.981	0.105	0.122
	(0.159)	(0.159)	(0.249)	(0.250)	(0.113)	(0.112)	(0.821)	(0.814)	(0.284)	(0.293)
Hispanic	-0.0794	-0.0847	-0.0411	-0.0420	0.0842	0.0910	0.303	0.248	0.184	0.177
	(0.104)	(0.104)	(0.191)	(0.192)	(0.130)	(0.128)	(0.450)	(0.458)	(0.211)	(0.217)
County Median Income	2.69e-07*	1.57e-07	-1.30e-09	-2.47e-09	2.26e-07	1.38e-07	4.05e-07	6.22e-07	-1.76e-06	-1.71e-06
	(1.41e-07)	(1.83e-07)	(4.44e-08)	(4.59e-08)	(1.57e-07)	(1.68e-07)	(6.24e-07)	(7.32e-07)	(1.20e-06)	(1.19e-06)
County Population	-3.07e-09	-9.07e-10	-3.14e-07	-3.28e-07	6.32e-08	9.33e-08**	-3.74e-06	-5.58e-06	8.84e-07	8.61e-07
	(8.74e-09)	(8.66e-09)	(4.20e-07)	(4.26e-07)	(4.27e-08)	(4.54e-08)	(2.98e-06)	(4.08e-06)	(7.15e-07)	(7.06e-07)
Constant	1.156**	1.196***	1.592***	1.611***	1.742***	1.880***	1.972***	1.939***	1.953	2.033
	(0.452)	(0.454)	(0.374)	(0.379)	(0.342)	(0.345)	(0.608)	(0.661)	(1.260)	(1.293)
Observations	773	773	552	552	853	853	152	152	104	104
R-squared	0.071	0.073	0.079	0.079	0.047	0.053	0.219	0.226	0.111	0.113
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Kansas licence massage therapists. The Portland MSA spans the Oregon-Washington border, but there is no definitive way to say which state licences more strictly. Oregon requires higher fees and more experience but Washington requires an additional exam. The Providence-Warwick shows no statistically significant wage premium either.

Ultimately, there is no evidence of a wage premium in any of the MSAs included. Even in the most extreme licensing differences such as Missouri-Illinois and New York-New Jersey. At most it appears there is evidence of a MSA premium, which is consistent with economic theory. This leads me to believe that the theoretical model acts as an upper bound for potential wage premiums due to differences in licensing, at least in the case of massage therapists. It could also be possible that the differences in licensing, even at the most strict are not a significant barrier to entry.

Considering Demand Side Issues

So far this analysis had focused on only supply side characteristics. It is possible that these areas have different demand side effect and that is what is driving price, however I feel that is unlikely. If one area was such lacking in demand as to drive price down then I would expect firms to exit in equilibrium. If an area was in such high demand then I would expect firms to enter and drive down prices. Thus, only firm characteristics should be driving prices. I have no reason to suspect that any one portion of the nation has any more need for massage therapists than any other. Therefore demand should be relatively constant across the different locals.

Sample Size Issues

It is also possible that the results are driven by small sample sizes. In some instances there are 30 or less observations in the pool for within the MSA or outside of the MSA for certain samples.

Occupational Premiums in States that do not Border One Another

If we look at states that do not border one another the occupational wage premium shows up in the naive. For example New York vs Wyoming, Missouri, Minnesota, and Vermont the wage premium varies from 12% to 30% and the coefficient is always statistically significant at the 10% level at a minimum. This is the most extreme example as New York is the strictest when it comes to licensing and the other referenced states do not license but the wage premium still shows and it is not only statistically significant it is also economically

significant. But if it represents an upper bound for how much of an occupational wage premium is possible it is at most approximately 30%, which is quite a lot.

The wage premium existing between non-bordering states implies that when estimating how regulation effects wages by estimating the different aspects of a licence may not be the best way in which to discover the true wage premium experienced. The wages also depend on competition that different regulation applies to. Unlike Rohlin et al. (2014), there is no harm in terms of a decrease in revenue from choosing to locate on one side of the border, however there is more up front cost. However without full censuses of businesses located at the border it isn't possible to show that there is not a location decision being made although the model implies that the lower cost firms should be more isolated.

As a counterfactual we could perhaps compare states that have similar licensing to a state that borders. Consider Montana in place of New Jersey. Montana requires $5 more in licensing fees and the same amount of hours of experience, 500. Montana also requires the same amount of continuing education credits every two years. The estimated wage premium is again upwards of %32. Even when dropping all observations in the New York City Metro, the wage premium is still %26 and significant at the %5 level. The wage premium shows between states that do not border one another even when they have similar licensing.

6 Conclusion

Occupational licensing affects a significant portion of the US population and licensing is often handled at the state level. This leads to a variation in licensing laws between states and potential effects in labor markets that span state borders. This article looks at the competing occupational wage premiums between licensing schemes and the competition effects of local labor markets.

In modeling local competition as a circular city with different marginal costs for firms with differing licensing schemes the theoretical model predicts that the occupational licensing premium within a market that spans a border will only be one-third of what would be the case of fully separate markets. Thus, the competition effect of being geographically close to lower price substitutes has an effect on buyer behavior.

In testing the model on the US metropolitan areas that span state borders there doesn't appear to be any occupational wage premium within the metropolitan area. In looking state-to-state there doesn't appear to

be a wage premium in comparing states that border one another at all. The only premium that appears to exist is a premium for working inside of the MSA, which is consistent with economic theory. When looking at states that do not border one another, wage premiums are present. Understanding the geographic and spatial element of regulation is important.

If the competition effect outweighs the licensing effect as evidenced here then it is important for state legislators to know that licensing an occupation that provides a good or service that can be obtained out of state then there will be only losses in terms of employment in the home state. There will be no gain in terms of higher pay for those that obtain a more difficult license. This is especially important for states that have large population centers on the state border, such as Missouri, or states that have a relatively small geographic footprint such as Rhode Island.

This evidence may also be a reason that states engage in yardstick competition and that there are often geographic patterns in regulatory laws.

More specific geographic data would be necessary to understand if there is an entrepreneurial location decision being made as in Rohlin et al. (2014) and that is a logical extension of this study.

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