**How Relative Marginal Tax Rates Affect Establishment Entry at State Borders**

**July 2021**

Yulong Chen, Central University of Finance and Economics [chenyulong0118@gmail.com]

Kevin Duncan, Federal Housing Finance Agency[[kdduncan@iastate.edu](mailto:kdduncan@iastate.edu)]

Liyuan Ma, Iowa State University [liyuanm@iastate.edu]

Peter F. Orazem, Iowa State University [pfo@iastate.edu]

This paper studies the impact of marginal capital income, property, sales, and income tax rates on establishment entry. We apply border discontinuity analysis and test relative establishment entry rates in the same industry on either side of state borders. Establishments are significantly more likely to enter on the side of the border with the lower marginal tax rates with property taxes being the most important. Results are used to identify the largest border differences in start-ups due to tax structure and to rank the most distortionary tax structures overall. The greatest distortion in start-ups due to tax rates is at the Wyoming-Idaho with 8.6% lower probability of start-ups on the Idaho side due to tax disadvantages relative to Wyoming. The most distortionary tax structure is Rhode Island’s at 14.2% lower probability of entry, but it is not as heavily disadvantaged at the border because its neighbor, Connecticut, has the third most distortionary tax structure.

**Keywords**: Marginal tax rates, Firm entry, Border, Property tax, Sales tax, Income tax, Corporate tax

**JEL**: H25; M13; R12

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Corresponding author: Peter F. Orazem, University Professor of Economics and Director, Program for the Study of Midwest Markets and Entrepreneurship, 267 Heady Hall, Iowa State University, 518 Farm House Lane, Ames, Iowa 50011-1054 (515) 294-8656 [pfo@iastate.edu](mailto:pfo@iastate.edu).

[pfo@iastate.edu](mailto:pfo@iastate.edu).

We are grateful for partial research support under USDA-NIFA grant 2018-68006-27639 and a grant from the Charles Koch Foundation.

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**1. Introduction**

Concerns regarding the potential effect of taxes on industrial location are almost as old as taxation itself. Krauthoff (1918) dates the first effort to create uniform state tax laws in 1881, an effort that was nationalized by the American Bar Association in 1889. As he concludes (p. 144) “There should be no competition among states and no incentive for a corporation to form in one state because of the taxation problem.” Studies have disagreed on the effects of taxes on establishment location ever since. Garwood (1952) concluded that state and local taxes were of little importance to industry location, while Campbell (1958) argued that taxes contributed to the out migration of industry from New Jersey, New York and Connecticut. Bartik (1991) summarized the early literature as finding a small or modest negative effect of state and local taxes on economic growth. More recent surveys of studies using more sophisticated econometric methods and better data have not resulted in a firm consensus (Mazerov, 2013; Huang and Frentz, 2014; Rickman and Wang, 2020). Fajgelbaum et al. (2019) found the heterogeneity in state tax rates lead to aggregate welfare losses as worker and firm location respond to changes in state taxes.

Among the studies focusing on firm location, Bartik (1985) used a conditional logit model to evaluate the impacts of taxes on the choice of plant location for a new manufacturing firm. He found that property tax, unemployment tax, and corporate tax significantly deterred potential manufacturing entry. Papke (1991) found that high marginal tax rates on capital slow the arrival rate of firms. Gentry and Hubbard (2000) found that both the effective tax rate and the rate of tax progressivity could significantly discourage firm entry. Coughlin and Segev (2000) found that higher taxes discourage the siting of foreign-owned manufacturing plants. Bruce and Mohsin (2006) added many types of taxes and found that most taxes have a significant but small negative effect on self-employment. Conroy et al. (2016) also found significant but small tax effects on firm relocation.

However, the tax rates could be endogenously determined (Romer and Romer, 2010; Mertens and Ravn, 2013, 2014) and the potential endogeneity issue cannot be fully addressed by using more explanatory variables or adding lag values. As noted by Rickman (2010), estimated lagged relationships only reflect the co-movement of the fiscal and outcome variables over time. The estimates do not necessarily reflect causal relationships obtained from exogenous variation in fiscal variables. There could be some other underlying process that produces the lagged time-series relationship between fiscal variables and the outcome variables.

Several studies have examined the effect of taxes at state borders. These studies rely on the regression discontinuity of the tax rate at the border to control for potentially endogenous fiscal policies. Chirinko and Wilson (2008) found that county manufacturing establishment counts are higher on the side of the border with the lower taxes, but the effect is economically small. Duranton et al. (2011) found that local taxation has a negative impact on employment growth but no effect on entry among English firms. Ljungqvist and Smolyansky (2014) found that increases in corporate tax rates lead to significant reductions in employment and wage income. Peltzman (2016) found that the negative consequences of higher taxes extend in diminished form to counties in the interior of the state. Rohlin et al. (2014) added controls for reciprocal tax agreements that require workers to pay income tax to their state of residence as opposed to their state of employment, and found the impact of taxes was greatest in states with reciprocal agreements in force, although higher personal income tax had a positive effect on firm start-ups. Thompson and Rohlin (2012) found sales taxes had negative effects on employment, especially in retail sales.

Our study builds on the border discontinuity approach but makes several contributions. First, we apply the Duranton et al. (2011) aggregate Probit model to U.S. data and show that marginal tax rates affect firm’s entry at state borders. Second, four types of taxes on sales, property, wage income, and capital income could depress the establishment entry, but we find that establishment entry is particularly adversely affected by local property taxes but not sales, income, or corporate taxes. Logically, start-ups that have little initial income or sales still face taxes on property, and so it is the property tax that is most salient for new entrepreneurs at state borders. Third, we include controls for variables that could potentially bias the impact of taxes on business activity. In particular, Brülhart et al. (2012) showed that the sensitivity of firm location to tax differentials depends on the extent of local agglomeration.

This paper is organized as follows. Section 2 discusses the methodology including the empirical specifications and the implementation of robustness checks. Section 3 introduces the data and the imputed measures of local agglomerations. Section 4 details the main results and heterogeneous tests. Section 5 presents conclusions.

**2. Empirical Strategy**

**2.1 Fixed-effect Poisson regression**

We begin by proposing an empirical strategy guided by the presumption that the after-tax return on capital investments must equalize across adjacent properties. Let be the expected after tax return on investment in county *c* of state *a* and industry *j* at time *t.* is new investment in sector *j,* and is a vector of state marginal taxes that apply to the gross returns on those investments. Investments in each market are subject to positive but diminishing expected returns on investment so that and . Higher marginal tax rates reduce net returns, and so Spatial equilibrium on adjacent markets on either side of the borders of states *a* and *a’* insure that . If marginal tax rates in *a* exceed those in *a’* ( , then it must be that for equilibrium to obtain. In the context of new firm entry, there will me more entry in county *c* of state *a’* than in its neighbor in state *a.*

Past studies have used the conditional logit model to study firm entry. The count of entering establishments is modeled as a Poisson distributed random variable. The likelihood of observing a count of births in year *t,* county *c,* state *a,* and industry *j* is

(1)

Although each county is associated with a state, we use the *a* subscript as a reminder that we are evaluating policies that vary across states.

The Poisson regression is equivalent to the conditional logit regression under certain modest assumptions presented in the appendix. The expectation of , , is parameterized by , where is a vector of location and industry attributes and is a vector of state *a* marginal taxes on sales, property, income, and property value at time *t*. , , and represent the fixed effect of county, industry, and time, respectively and is a time-varying county-industry-specific shock. and are parameter vectors to be estimated. The log likelihood of this specification is

(2)

The resulting estimates are robust with respect to distributional misspecification. Gourieroux et al. (1984) have shown that the parameters *β* and are consistently estimated provided the conditional mean,, is correctly specified. To allow for locational heterogeneity, we use a “within” estimator controlling the county, industry, and time fixed effects in the Poisson estimation. Although our panel has a large *N* and relatively small *T*, there is no incidental parameters problem in estimating and (Cameron and Trivedi, 2005). However, the may yet cause problems if tax policies vary with the unobserved local market factors, a possibility we will address using our border discontinuity estimation discussed below.

Current literature on the firm location and tax structure focus on four types of tax rates on property, sales, income, and capital income (Giroud and Rauh, 2019; Coomes and Hoyt, 2008; Ojede and Yamarik, 2012). In our study, we also use these four types of tax rates. Particularly, we include both corporate income tax and income tax rates as both tax forms of capital income depending on whether the business is an S-corporation, a C-corporation, or a partnership. In addition to testing whether the individual tax rates matter for establishment entry, we test two hypotheses:

H1)

H2) ,

where are the coefficients attached to the tax rates on sales, wage income, property, and capital income, respectively. The first of these hypotheses is the test that a simultaneous percentage point increase in each of the four tax rates has no effect on establishment entry. The second hypothesis is the joint test that each of the effects of the tax rates is equal to zero. In our first estimates, we apply this strategy to a sample composed of all counties in the continental U.S. from 1999-2015.

**2.2 Border discontinuity regression**

While we control for unobservable county, industry and yearly fixed effects, time-varying factors may affect establishment entry and tax policy simultaneously. For example, the local government may decrease the tax rates to encourage the establishment entry in an economic downturn.

To correct for this possibility, we use a border discontinuity regression similar to Peltzman (2016), Rohlin et al. (2014), and Curtis and Decker (2018). The difference in location-specific attributes on either side of the border approaches zero as the location choice of establishment entrants approaches a state border. Thus, an advantage of the border design is that these location-specific factors are differenced away in a specification that considers the difference in expected profits on either side of the border. Furthermore, the state borders will differ in the number of adjacent counties at the border, leading to overweighting of long borders or borders with small counties. To prevent problems of double counting, counties with multiple neighbors and of overweighting of borders with more counties, the standard errors are clustered at the state borders and so each border has the same weight.

We operationalize the border estimation strategy using Duranton, Gobillion, and Overman’s (2011) spatial discontinuity approach. We apply a weighted aggregate logit model where weights are set by the number of establishments. Suppose an establishment *i* in sector *j* considers two contiguous locations *c*1 and *c*2, and the jurisdiction that sets the tax for the establishment is indexed by *a*1and *a*2. *c*1 is located in jurisdiction *a*1 and *c*2 in *a*2. The profit function is:

(3) ,

where is a vector of location and industry attributes that determine the before tax return on capital; is a vector of state *a* marginal tax rates, is an establishment fixed effect, is an industry-wide fixed effect, is time fixed effect, is the unobservable time-variant site-specific effect and is an establishment site-specific shock. Because the establishment is considering multiple sites but the values of are common across all sites, their effects are differenced away. In our previous specification, we did not have a means of controlling for the unobserved time-varying local effects, Because the two bordering counties are contiguous, we assume they share the same unobserved market factors, meaning that . Establishment *i* will choose the site that gives the higher expected after-tax profit. When the shocks have standard Type-I extreme value distributions, the probability of choosing site *c*1 is given by (suppressing subscripts *i* and *j*):

(4)

which is a linear logistic probability function. The parameters can be estimated with an aggregate logit regression weighted by the number of establishments. Using the regression discontinuity argument, the changes in tax rates at the border can be treated as locally exogenous factors influencing establishment entry (Peltzman, 2016; Rohlin et al., 2014; Curtis and Decker, 2018).

**2.3 Large tax differentials**

Giroud and Rauh (2019) found that the firm location choice is sensitive to large tax changes. We therefore change the specification to allow the impact to differ by the magnitude of the tax rate. Three indicators are constructed to distinguish the magnitudes of tax rates. Specifically, we define three binary variables for each type of tax:

Where is the mean of tax differentials and is the standard deviation of tax differentials[[1]](#footnote-1). Then, the interactions between each tax rate and the binary variables are included when estimating (3). To interpret the marginal effect of the interaction term in the nonlinear regression, we follow the method from Karaca-Mandic et al. (2012). It allows us to calculate the probability of establishment entry under different sizes of tax rates.

**3. Data**

**3.1 Establishment entry**

Our data on new establishment entrants by industry and county were obtained from the U.S. Bureau of the Census *Statistics of U.S. Businesses* (SUSB). SUSB is an annual series collected the week containing March 12 that provides national and subnational data for all U.S business establishments by geography, industry and enterprise size between 1999 and 2015. It covers most of the country’s economic activity, excluding the data of non-employer businesses, private households, railroads, agricultural producers and most government entities. We also remove establishments in mining because these establishments cannot move freely across locations as their entry decisions are affected by site-specific land and resource availability. SUSB are reported by two-digit North American Industry Classification System (NAICS) codes. We have up to 17 industries per county.

**3.2 Taxes**

The returns to business will depend on tax rates, which vary by state. Compared to average tax rates, marginal tax rates more closely measure the cost wedges that distort consumer and producer decisions. In addition, average tax rates will be affected by the production and investment responses to the marginal tax rates and will suffer from greater endogeneity issues.

Our state income tax rates are provided by the National Bureau of Economic Research. The procedures underlying these estimates are described in Feenberg and Coutts (1993). We use the highest marginal tax rate, noting that the highest income tax rate will reflect the marginal tax rate on earnings from the capital in small businesses and S corporations. The income tax is potentially more important for start-ups. C-corporations are less numerous but larger, representing 18% of all businesses with employees but employing 55% of employees, while partnerships and S corporations represent 82% of businesses with employees but just 45% of employees (Keightley and Hughes, 2018).

Corporate and sales tax rates are reported by The Council of State Governments *Book of States.* Our marginal corporate tax rate is the highest reported state tax rate on business corporations. In states that report a different corporate rate for banks or financial businesses, we use the broader tax rate imposed on nonbank corporations. Our sales tax measure is the highest reported sales tax on general merchandise and not an average that incorporates various exemptions for food, clothing and medicine.[[2]](#footnote-2)

Unlike our other taxes, the property tax is primarily a local and not a state tax. However, allowable local property tax rates are governed by state law. The Government of the District of Columbia, Department of Finance and Revenue has compiled a consistent series of relative property tax rates in the 50 states. It represents the effective property tax rate on residential properties reflecting the range of housing values at various household incomes in the largest city in each state. The effective rate applies the percentage of assessed value that is incorporated into the tax computation.[[3]](#footnote-3)

**3.3 Agglomeration Measures**

Our vector of observable local factors affecting establishment profitability, , includes measures of agglomeration economies that alter local cost of production or anticipated revenue (Brülhart et al., 2012). We generate three agglomeration measures that are industry-location-specific, local industry *j* establishment clusters ( in county *c* and time *t*,the density of upstream suppliers in the county (), and the density of downstream customers in the county (). We also add a measure of industry concentration ( which is a county-specific Herfindahl Index. We define these measures using information at the start of period *t* when the firms are considering entry, and so they will reflect the incumbent firms as of period *t-1.* In that way, our measures will not be influenced by the firm’s entry decision.

The industry cluster, , is measured as the industry *j* share of total establishment in county and year relative to the industry share in the nation as a whole.

Denser industry clusters would suggest a locational comparative advantage in sector *j* production. However, it also should allow greater sharing of specifically skilled workers and better information transfers between establishments.

Access to upstream ( or downstream () establishments, respectively, measures the relative availability of suppliers and customers in industry in county in year . Both measures make use of the input-output tables from 1997 Standard Use Table of Bureau of Economic Analysis. Let be the national share of all sector *j* inputs that come from sector *m.* represents the number of establishments in sector in county and year .Across *M* sectors, Then the local establishments devoted to providing inputs to sector *j* in county *c* can be approximated by

Because counties vary in size, we standardize these values between zero and one by dividing by the total number of establishments in county in year , . To make the measure comparable to others in the country, we divide by the average value of the ratio across all counties in the country, (). The resulting index of upstream industry supply in each county is

.

Values of imply a greater than average supply of inputs to sector *j* in county *c.*

Using the same strategy, we define the share of all sector *j* demand coming from industry *m* by where The number of establishments devoted to sector purchasing output from sector *j* in county *c* is

and the downstream demand equivalent to upstream measure is

.

The data used to calculate Herfindahl-Hirschman index is based on the Upjohn Institute’s *WholeData Establishment and Employment* database. The series includes county employment by industry from 1998 to 2015. While greater detail is provided, we had to collapse values down to 9 sectors to avoid missing data. Define the employment share of industry in county and year *t-1* by. The Herfindahl-Hirschman index in year and county is

The index ranges in values from 0 to 1, where values closer to one indicate greater industrial concentration.

Our other agglomeration measures include county labor quality and real income per capita. Aggregations of human capital have been shown to foster growth, and aggregations of customer incomes improve the local demand for goods and services. The measure of labor quality was from 2000 Census which reported the proportion of residents over age 25 with high school above. The information on real per capita personal income in each county is from the Bureau of Economic Analysis. Table 1 reports the summary statistics on all the key variables. The unit of observation is the number of establishment entry on county-industry level. There are 828,906 observations from 1999 to 2015. On average, 14 establishments in a county are born per year in each industry.

**4. Empirical results**

**4.1 Poisson regression for all U.S. counties**

Table 2 reports the results of establishment entry with Poisson regression. We control for county, industry, and year fixed effects, and so the source of variation is from time varying factors within industries within counties. Time-invariant county factors and common cyclical factors across counties and industries will be differenced away.

In the first column of Table 2, the observation unit is at the industry level within a county, using all 3,053 counties in 48 contiguous states. The industry fixed effect is also controlled in this regression. The sales tax and property tax significantly deter establishment entry while the income tax encourages start-ups. The joint impact of the four taxes is measured as the effect of raising all taxes by 1 percentage point. The effect of a simultaneous increase in all four marginal tax rates is to lower establishment entry by 3.0%, an estimate that is statistically significant.

The remaining columns of Table 2 analyze tax effects in eight sectors, selected because they offer a sufficient number of start-ups in large and small counties to generate meaningful results. The joint impact of the four taxes is always negative, but not always precisely estimated. A one percentage point increase in the four taxes lowers the count of establishment entry by 6.1% in transportation, 5.3% in health care services, 5.2% in construction, and 4.4% in manufacturing. The negative tax effects are attributable mainly to the sales and property tax rates. The income and corporate income tax rates have small effects and often have positive signs in the presence of the other taxes, a finding similar to the results reported by Rohlin et al (2014). However, their small positive effects are swamped by the larger negative effects of the other taxes.

Our estimates also control for several sources of local agglomeration economies whose impacts are surprisingly mixed across the industries. These puzzles are partially resolved in our next set of estimates that control for unobserved local market factors at state borders.

The results in Table 2 do not control for unobserved time varying factors that could be correlated with taxes. The taxes themselves could be set endogenously to influence establishment entry overall or for certain targeted sectors. For example, local governments could raise the taxes in an economic boom to fund public goods and/or reduce taxes in a recession to protect vulnerable establishments. Either of these problems would bias the estimated coefficients on tax rates and agglomeration measures. Here we use the border discontinuity regression to address this problem. As described in the theory section, we focus on paired counties on either side of a state border that have potentially large variation in tax rates while sharing the same unobserved time-variant market factors. By exploiting this variation in taxes across state borders, we can identify the impact of taxes on establishment entry.

**4.2 Border discontinuity regression**

Table 3 reports the results of establishment entry with an aggregate logit model weighted by the number of start-ups on either side of a state border. The data set includes 1,212 counties sharing 107 pairwise state borders. We add controls for state tax reciprocity agreements and state minimum wages that have been incorporated into past studies of economic differences at state borders.[[4]](#footnote-4) Standard errors are clustered at the state border.

The overall effect is reported in the first column. Every tax discourages establishment entry but only the property tax has a significant individual impact. Unlike Table 2, the sales tax and income tax effects become insignificant in all cases. However, the joint impact of a simultaneous unit increase in all four tax rates is nearly identical to that in Table 2 at -3.2% and it is statistically significant. It is plausible that the property tax is particularly important for start-ups in that new businesses may not generate sales or income at first, but they do face property tax liability even without sales.

We also test the heterogeneity in taxes’ impacts among the various industries. Construction, manufacturing and health care services are most affected by property tax, and the joint impact of taxes is significant in these industries. However, the sectoral joint tax effects are smaller than those estimated in Table 2, ranging from no effect to a 3.3% decrease in the establishment entry rate.

The effects of the agglomeration measures stabilize when we apply the border discontinuity design. Where significant, local per capita income, the minimum wage, the portion of population with at least a high school degree, greater sectoral concentration and better upstream supply increase the pace of establishment entry. Tax reciprocity agreements do not affect the location of the start-up. Curiously, greater downstream demand lowers the rate of establishment entry, although many of these sectors will have customers outside the county..

**4.3 Ranking the tax effects**

4.3.1 Ranking the tax effects at state borders

With the results in Table 3, we rank the state borders by the taxes’ distortions on establishment entry. Table 4 lists the largest and smallest distortions due to tax differentials at state borders. It reports the comparative static estimated difference in the probability of entering the border county with the lower state tax rates (advantaged side) compared to entering the neighboring county with the higher tax rates (disadvantaged side). The greatest cross-border difference due to marginal tax rates is the 8.6 percent advantage Wyoming has over Idaho and Nevada at respective borders. Wyoming’s advantage is related to its ability to use taxes on its natural resource extraction to keep its marginal tax rates low. Maryland-Pennsylvania, Oklahoma-Kansas, and West Virginia-Kentucky have the smallest border differences in establishment entry rates related to marginal tax rate differences[[5]](#footnote-5).

4.3.2 Ranking the states by their overall distortionary tax effects on firm entry

A state may have a relatively distortionary tax structure but not face disadvantages at the borders if it is blessed with neighbors with high marginal tax rates. Because the border discontinuity identifies the marginal effect of each tax on establishment entry, the comparative static tax effects reported in Table 3 can be applied to each state’s tax rates to compute an aggregated state distortionary tax effect, where is the *i*th tax rate in state *S*,is the tax effect for the *i*th tax rate estimated in column 1 of Table 3, and is the estimated change in establishment entry for state *S*  attributable to its tax structure. Table 5 ranks the states by their tax structures’ cost on establishment entry, . Rhode Island has the most distortionary tax structure by this metric with taxes that lower its establishment entry rate by 14.4%. Interestingly, neighboring Connecticut has the 3rd most distortionary tax structure with an aggregated effect of -13.8%, and so there is only a modest border effect between those two states. The probability of establishment entry in Rhode Island is reduced by 14.4 percent because of its tax structure, followed by New Jersey (-13.9%), Connecticut (-13.8%) and Wisconsin (-13.2%). Wyoming (-2.9%) has the smallest reduction in establishment entry attributable to its tax structure, with the next least distortionary tax structures in Washington (-4.5%) and South Dakota (-4.7%). Note that Idaho’s tax structure is the 11th most distortionary, but it has a larger disadvantage than Rhode Island because it has Idaho and Washington on its borders.

**4.4 Large tax differentials**

Table 6 reports the predicted marginal effects of taxes on establishment entry at state borders for different sizes of taxes. Establishment entry was significantly deterred by extremely high marginal tax rates on property value and corporate income. When the property or corporate tax rates are beyond three standard deviations away from the average, a one percentage increase in the tax rate significantly reduced the probability of establishment entry by 2.8 and 1.3 percent, respectively. There is no such pattern for the sales tax and income tax. The implication is that it is large differences in marginal tax rates that matter for firm entry. Small differences in tax rates have relatively innocuous effects.

**5. Conclusion**

Assuming that after-tax returns on capital should equalize at state borders, we would expect relative firm entry would favor the locations on the side of the border with lower marginal tax rates. Results show that a unit increase in tax rates on sales, personal income, corporate income, and property results in a 3.2% reduction in the probability of establishment entry. The most distortionary tax with respect to start-ups is the property tax. It seems plausible that property taxes have the most important negative effect on start-ups. Fledgling firms with low sales and income would not pay taxes on personal or corporate income or on sales, but they would still have to pay property tax. Hence, the property tax should have the greatest salience for entrepreneurs.

The study found that entrepreneurial activities are the most sensitive to the largest tax differentials when they consider different locations for their business. While taxes matter on the margin, the effects are not large compared to the magnitude of the influence of local strength of market. Measured agglomeration effects matter more for the business location than do marginal tax rates. However, the largest differences in marginal tax rates can generate differences in start-up rates of up to 8.6% at the Wyoming-Idaho border. We can also use our results to rank state tax rate distortions on start-up incentives. The worst state (Rhode Island) does not pay as large a penalty in lost potential start-ups because it has neighbors with distortionary taxes. Hence, the cost of distortionary tax policy is mitigated partially by having neighbors with distortionary tax policies.

**References**

Bartik, Timothy J. 1985. "Business location decisions in the United States: Estimates of the effects of unionization, taxes, and other characteristics of states." *Journal of Business & Economic Statistics* 3(1): 14-22.

Bartik, Timothy J. 1999. "Who benefits from state and local economic development policies?."

Bruce, Donald, and Mohammed Mohsin. 2006. "Tax policy and entrepreneurship: New time series evidence." *Small business economics* 26(5): 409-425.

Brülhart, Marius, Mario Jametti, and Kurt Schmidheiny. 2012. "Do agglomeration economies reduce the sensitivity of firm location to tax differentials?." *The Economic Journal* 122(563): 1069-1093.

Cameron, A. C., & Trivedi, P. K. 2005. *Microeconometrics: methods and applications*. Cambridge university press.

Campbell, Alan K. 1958. "Taxes and industrial location in the New York metropolitan region." *National Tax Journal* 11(3): 195-218.

Chirinko, Robert S., and Daniel J. Wilson. 2008. "State investment tax incentives: A zero-sum game?." *Journal of Public Economics* 92(12): 2362-2384.

Conroy, Tessa, Steven Deller, and Alexandra Tsvetkova. 2016. "Regional business climate and interstate manufacturing relocation decisions." *Regional Science and Urban Economics* *60*: 155-168.

Coomes, Paul A., and William H. Hoyt. 2008. "Income taxes and the destination of movers to multistate MSAs." *Journal of Urban Economics* 63(3): 920-937.

Coughlin, Cletus C., and Eran Segev. 2000. "Location determinants of new foreign‐owned manufacturing plants." *Journal of Regional Science* 40(2): 323-351.

Curtis, E. Mark, and Ryan Decker. 2018. "Entrepreneurship and state taxation.".

Duranton, Gilles, Laurent Gobillon, and Henry G. Overman. 2011. "Assessing the effects of local taxation using microgeographic data." *The Economic Journal* 121(555): 1017-1046.

Fajgelbaum, Pablo D., Eduardo Morales, Juan Carlos Suárez Serrato, and Owen Zidar. 2019. "State taxes and spatial misallocation." *The Review of Economic Studies* 86(1): 333-376.

Feenberg, Daniel, and Elisabeth Coutts. 1993. "An introduction to the TAXSIM model." *Journal of Policy Analysis and management*12(1): 189-194.

Garwood, John D. 1952. "Taxes and industrial location." *National Tax Journal* 5(4): 365-369.

Gentry, William M., and R. Glenn Hubbard. 2000. "Tax policy and entrepreneurial entry." *American Economic Review* 90(2): 283-287.

Giroud, Xavier, and Joshua Rauh. 2019. "State taxation and the reallocation of business activity: Evidence from establishment-level data." *Journal of Political Economy* 127(3): 1262-1316.

Gourieroux, Christian, Alain Monfort, and Alain Trognon. 1984. "Pseudo maximum likelihood methods: Applications to Poisson models." *Econometrica:* *Journal of the Econometric Society*: 701-720.

Guimaraes, Paulo, Octávio Figueirdo, and Douglas Woodward. 2003. "A tractable approach to the firm location decision problem." *The Review of Economics and Statistics* 85(1): 201-204.

Huang, Chye-Ching, and Nathaniel Frentz. 2014. "What really is the evidence on taxes and growth." *Washington, DC: Center on Budget and Policy Priorities*: 12.

Keightley, Mark P. and Joseph S. Hughes. 2018. "Pass-Throughs, Corporations, and Small Businesses: A Look at Firm Size." Congressional Research Service Report 44086, March 15.

Karaca‐Mandic, Pinar, Edward C. Norton, and Bryan Dowd. 2012. "Interaction terms in nonlinear models." *Health services research* 47(1pt1): 255-274.

Krauthoff, Edwin A. 1918. “The National Conference of Commissioners on Uniform State Laws—Its history, its aims, and what it has accomplished.” *The Bulletin of the National Tax Association* 3(6): 142-144.

Ljungqvist, Alexander, and Michael Smolyansky. 2014. *To cut or not to cut? On the impact of corporate taxes on employment and income*. No. w20753. National Bureau of Economic Research.

Mazerov, Michael. 2013. "Academic research lacks consensus on the impact of state tax cuts on economic growth." *Center on Budget and Policy Priorities, June 17*.

Mertens, Karel, and Morten O. Ravn. 2013. "The dynamic effects of personal and corporate income tax changes in the United States." *American economic review* 103(4): 1212-47.

Mertens, Karel RSM, and Morten O. Ravn. 2014. "Fiscal policy in an expectations-driven liquidity trap." *The Review of Economic Studies* 81(4): 1637-1667.

Ojede, Andrew, and Steven Yamarik. 2012. "Tax policy and state economic growth: The long-run and short-run of it." *Economics Letters* 116(2): 161-165.

Papke, Leslie E. 1991. "Interstate business tax differentials and new firm location: Evidence from panel data." *Journal of Public Economics* 45(1): 47-68.

Peltzman, Sam. 2016. "State and local fiscal policy and growth at the border." *Journal of Urban Economics* 95: 1-15.

Rork, Jonathan C., and Gary A. Wagner. 2012. "Is there a connection between reciprocity and tax competition?." *Public Finance Review* 40(1): 86-115.

Rickman, Dan S. 2010. "Modern macroeconomics and regional economic modeling." *Journal of Regional Science* 50(1): 23-41.

Rickman, Dan, and Hongbo Wang. 2020. "US state and local fiscal policy and economic activity: do we know more now?." *Journal of Economic Surveys* 34(2): 424-465.

Rohlin, Shawn, Stuart S. Rosenthal, and Amanda Ross. 2014. "Tax avoidance and business location in a state border model." *Journal of Urban Economics* 83: 34-49.

Romer, Christina D., and David H. Romer. 2010. "The macroeconomic effects of tax changes: estimates based on a new measure of fiscal shocks." *American Economic Review* 100(3): 763-801.

Thompson, Jeffrey P., and Shawn M. Rohlin. 2012. "The effect of sales taxes on employment: New evidence from cross-border panel data analysis." *National Tax Journal* 65(4): 1023.

Table 1 Summary Statistics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | N | Mean | S.D. | Min | Max |
| Establishment Entry | 779523 | 14.015 | 64.708 | 0 | 4073 |
| Income Tax | 779523 | 4.958 | 2.858 | 0 | 14.100 |
| Sales Tax | 779523 | 5.236 | 1.417 | 0 | 8.250 |
| Property Tax | 779523 | 1.657 | 0.667 | 0.470 | 4.590 |
| Corporate Tax | 779523 | 6.140 | 3.018 | 0 | 12 |
| Upstream | 779523 | 0.996 | 0.179 | 0 | 4.630 |
| Downstream | 779523 | 0.999 | 0.146 | 0 | 3.544 |
| Industry Cluster | 779523 | 1.143 | 1.290 | 0 | 106.473 |
| Herfindahl Index | 779523 | 0.788 | 0.058 | 0 | 0.873 |
| Population with High school (HS) above | 779523 | 79.074 | 9.273 | 31.600 | 98.800 |
| Real Minimum Wage | 779523 | 6.970 | 0.702 | 5.702 | 9.185 |
| Real Income per capita | 779523 | 31.598 | 8.520 | 10.541 | 179.876 |
| Year | 779523 | 2007.056 | 4.895 | 1999 | 2015 |
| Number of counties | 3053 | | | | |
| Number of new establishments | 10,924,876 | | | | |

Table 2 Estimates of taxes’ impacts on the establishment entry for all U.S. counties

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All | Construction | Manufacturing | Retail | Transport | FIRE | Professional | Health | Service |
| Income tax () | 0.007\*\* | 0.013\*\* | -0.002 | 0.008\*\* | 0.015\*\* | 0.015\*\* | 0.001 | -0.001 | 0.007\* |
|  | (0.003) | (0.004) | (0.006) | (0.003) | (0.006) | (0.006) | (0.005) | (0.004) | (0.004) |
| Sales tax () | -0.022\*\* | -0.034\*\* | -0.051\*\* | -0.017\*\* | -0.047\*\* | 0.011 | -0.016\* | -0.041\*\* | -0.018\*\* |
|  | (0.007) | (0.007) | (0.008) | (0.008) | (0.014) | (0.013) | (0.009) | (0.009) | (0.008) |
| Property tax () | -0.013\*\* | -0.026\*\* | 0.002 | -0.004 | -0.033\* | -0.021\*\* | 0.000 | -0.005 | -0.030\*\* |
|  | (0.005) | (0.007) | (0.008) | (0.005) | (0.019) | (0.010) | (0.008) | (0.008) | (0.006) |
| Corporate tax () | -0.002 | -0.004\* | 0.007\*\* | -0.002 | 0.003 | -0.016\*\* | 0.005\* | -0.006\*\* | -0.005 |
|  | (0.002) | (0.002) | (0.003) | (0.003) | (0.007) | (0.007) | (0.003) | (0.003) | (0.003) |
| Post-estimation test | |  |  |  |  |  |  |  |  |
|  | -0.030\*\* | -0.052\*\* | -0.044\*\* | -0.015 | -0.061\*\* | -0.011 | -0.009 | -0.053\*\* | -0.046\*\* |
|  | 0.000\*\* | 0.000\*\* | 0.000\*\* | 0.001\*\* | 0.000\*\* | 0.006\*\* | 0.141 | 0.000\*\* | 0.000\*\* |
| Upstream | 0.025 | -0.258\*\* | 0.535\*\* | -0.248\* | -0.238 | 0.608\*\* | 0.154 | -0.447\*\* | 0.379\* |
|  | (0.062) | (0.094) | (0.160) | (0.137) | (0.310) | (0.136) | (0.174) | (0.165) | (0.199) |
| Downstream | -0.278\*\* | -0.570\*\* | 0.133 | 0.093 | -0.808\*\* | -0.709\*\* | -0.808\*\* | 0.105 | -1.205\*\* |
|  | (0.042) | (0.243) | (0.157) | (0.069) | (0.164) | (0.357) | (0.298) | (0.145) | (0.175) |
| Industry Cluster | 0.365\*\* | 0.185\*\* | -0.183\*\* | -0.390\*\* | 0.081\*\* | 0.153 | 0.612\*\* | 0.731\*\* | -0.830\*\* |
|  | (0.060) | (0.032) | (0.054) | (0.092) | (0.031) | (0.099) | (0.083) | (0.261) | (0.054) |
| Herfindahl Index | -0.577\*\* | -0.611\*\* | 0.296 | -0.892\*\* | -0.889\*\* | -0.120 | 0.079 | -1.045\*\* | -0.159 |
|  | (0.231) | (0.192) | (0.209) | (0.309) | (0.248) | (0.322) | (0.287) | (0.371) | (0.231) |
| Population above HS | -0.005\*\* | -0.011\*\* | -0.009\*\* | -0.001 | -0.013\*\* | 0.001 | -0.001 | -0.003 | -0.006\*\* |
|  | (0.002) | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) | (0.002) | (0.006) | (0.002) |
| Real Minimum Wage | -0.019\*\* | -0.028\*\* | -0.039\*\* | -0.008\*\* | 0.026\*\* | -0.039\*\* | -0.018\*\* | -0.008 | -0.010\* |
|  | (0.004) | (0.005) | (0.007) | (0.004) | (0.010) | (0.012) | (0.006) | (0.007) | (0.005) |
| Real Income Per Capita | 0.003\*\* | 0.010\*\* | -0.003 | 0.001 | 0.009\*\* | 0.000 | 0.004\*\* | 0.001 | 0.006\*\* |
|  | (0.001) | (0.002) | (0.003) | (0.001) | (0.003) | (0.003) | (0.001) | (0.002) | (0.001) |
| Number of entries | 10924876 | 1380727 | 1380727 | 1528210 | 412189 | 794243 | 1486025 | 1030778 | 945787 |

Note: This table reports the Poisson estimation results of all sectors; construction; manufacturing; retail trade; transportation; finance and insurance; professional services; health care services, and other services. We control year fixed effect in all regressions and also control the sector fixed effect in the first column. We report the P-values of corresponding test,. Standard errors are reported in parentheses \*\* indicates that the estimated coefficient is significant at the 5% or 1% level, \* indicates that the estimated coefficient is significant at the 10% level

Table 3 Local taxes and establishment entry for contiguous counties on state borders

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | All | Construction | Manufacturing | Retail | Transport |
| Income tax () | -0.006 | -0.003 | -0.006 | -0.006 | -0.005 |
|  | (0.005) | (0.005) | (0.004) | (0.005) | (0.004) |
| Sales tax () | -0.004 | 0.007 | 0.004 | 0.004 | 0.001 |
|  | (0.008) | (0.006) | (0.006) | (0.007) | (0.006) |
| Property tax () | -0.021\* | -0.035\*\* | -0.020\*\* | -0.015 | -0.003 |
|  | (0.012) | (0.014) | (0.008) | (0.011) | (0.011) |
| Corporate tax () | -0.002 | -0.002 | 0.004 | 0.006 | 0.007\* |
|  | (0.006) | (0.006) | (0.005) | (0.004) | (0.004) |
| Post-estimation test |  |  |  |  |  |
|  | -0.032\*\* | -0.033\*\* | -0.018\*\* | -0.011 | -0.001 |
|  | 0.115 | 0.084\* | 0.103 | 0.319 | 0.514 |
| Upstream | 0.507\*\* | 0.176\* | 0.449\*\* | 0.777\*\* | 1.501\*\* |
|  | (0.067) | (0.094) | (0.065) | (0.146) | (0.136) |
| Downstream | -0.086\*\* | 0.753\*\* | -0.606\*\* | -0.169\*\* | -0.877\*\* |
|  | (0.029) | (0.236) | (0.102) | (0.044) | (0.115) |
| Industry Cluster | 0.114\*\* | 0.018 | 0.099\*\* | 0.074 | 0.068\*\* |
|  | (0.015) | (0.032) | (0.027) | (0.086) | (0.012) |
| Herfindahl Index | 2.647\*\* | 3.034\*\* | 2.188\*\* | 1.839\*\* | 1.733\*\* |
|  | (0.300) | (0.267) | (0.248) | (0.310) | (0.227) |
| Population above HS | 0.001 | 0.010\*\* | 0.003 | 0.001 | -0.001 |
|  | (0.002) | (0.003) | (0.002) | (0.002) | (0.001) |
| Real Minimum Wage | 0.029\* | 0.019 | 0.027\*\* | 0.032\*\* | 0.035\*\* |
|  | (0.016) | (0.017) | (0.013) | (0.014) | (0.014) |
| Real Income Per Capita | 0.003\*\* | 0.002 | 0.002\*\* | -0.001 | -0.003\*\* |
|  | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) |
| Tax reciprocity | -0.060 | -0.036 | -0.040 | -0.025 | -0.040 |
|  | (0.050) | (0.047) | (0.042) | (0.049) | (0.039) |
| Number of state pairs | 107 | 107 | 107 | 107 | 107 |
| Number of county pairs | 1212 | 1209 | 1199 | 1209 | 1210 |
| Number of entries | 7507875 | 985595 | 232270 | 1072750 | 299692 |

Note: This table reports the estimation results of aggregate logit regression for all sectors; construction; manufacturing; retail trade; transportation; finance and insurance; professional services; health care services, and other services. Marginal effects of the explanatory variables are reported. Standard errors are reported in parentheses. Errors are clustered at state borders. \*\* indicates that the estimated coefficient is significant at the 5% or 1% level, \* indicates that the estimated coefficient is significant at the 10% level.

Table 3 continued: Local taxes and establishment entry for contiguous counties on state borders

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | FIRE | Professional | Health | Service |
| Income tax () | -0.004 | -0.006 | -0.005 | -0.007 |
|  | (0.005) | (0.006) | (0.004) | (0.005) |
| Sales tax () | -0.004 | -0.000 | -0.008 | 0.008 |
|  | (0.005) | (0.006) | (0.006) | (0.007) |
| Property tax () | 0.002 | -0.010 | -0.017\* | -0.001 |
|  | (0.009) | (0.011) | (0.009) | (0.012) |
| Corporate tax () | 0.005 | 0.004 | -0.002 | 0.010\*\* |
|  | (0.004) | (0.005) | (0.004) | (0.004) |
| Post-estimation test |  |  |  |  |
|  | -0.001 | -0.012 | -0.032\*\* | 0.009 |
|  | 0.906 | 0.727 | 0.017\*\* | 0.125 |
| Upstream | 0.632\*\* | 0.871\*\* | 0.804\*\* | 1.368\*\* |
|  | (0.109) | (0.169) | (0.102) | (0.126) |
| Downstream | 0.504\*\* | -0.272 | 0.164 | -1.373\*\* |
|  | (0.139) | (0.227) | (0.133) | (0.137) |
| Industry Cluster | 0.312\*\* | 0.347\*\* | 0.492\*\* | -0.210\*\* |
|  | (0.058) | (0.108) | (0.059) | (0.062) |
| Herfindahl Index | 2.199\*\* | 2.552\*\* | 2.111\*\* | 2.298\*\* |
|  | (0.321) | (0.592) | (0.293) | (0.237) |
| Population above HS | -0.001 | 0.000 | 0.001 | -0.003 |
|  | (0.002) | (0.002) | (0.002) | (0.002) |
| Real Minimum Wage | 0.027\*\* | 0.030\*\* | 0.018 | 0.045\*\* |
|  | (0.011) | (0.014) | (0.014) | (0.016) |
| Real Income Per Capita | -0.000 | -0.000 | 0.003\*\* | -0.001 |
|  | (0.001) | (0.001) | (0.001) | (0.001) |
| Tax reciprocity | -0.041 | -0.023 | -0.032 | -0.058 |
|  | (0.047) | (0.062) | (0.041) | (0.047) |
| Number of state pairs | 107 | 107 | 107 | 107 |
| Number of county pairs | 1207 | 1205 | 1206 | 1209 |
| Number of entries | 551218 | 959044 | 696430 | 658176 |

Note: This table reports the estimation results of aggregate logit model for all sectors; construction; manufacturing; retail trade; transportation; finance and insurance; professional services; health care services, and other services. Marginal effects of the explanatory variables are reported. Standard errors are reported in parentheses. Errors are clustered at state borders. \*\* indicates that the estimated coefficient is significant at the 5% or 1% level, \* indicates that the estimated coefficient is significant at the 10% level.

Table 4 Border rank of taxes’ cost on establishment entry

|  |  |  |  |
| --- | --- | --- | --- |
| Advantage State | Disadvantage State | Reduced probability of entry | Rank |
| Largest border effect | | | |
| WY | ID | 0.0863 | 1 |
| WY | NE | 0.0850 | 2 |
| NV | CA | 0.0811 | 3 |
| SD | IA | 0.0753 | 4 |
| WA | ID | 0.0705 | 5 |
| SD | MN | 0.0694 | 6 |
| NH | VT | 0.0682 | 7 |
| NV | ID | 0.0669 | 8 |
| SD | NE | 0.0658 | 9 |
| WY | UT | 0.0616 | 10 |
| Smallest border effect | | | |
| MO | KS | 0.0054 | 98 |
| TX | LA | 0.0051 | 99 |
| NC | SC | 0.0048 | 100 |
| MA | NY | 0.0048 | 101 |
| OH | PA | 0.0041 | 102 |
| MS | AR | 0.0040 | 103 |
| OK | MO | 0.0040 | 104 |
| MD | PA | 0.0038 | 105 |
| OK | KS | 0.0035 | 106 |
| WV | KY | 0.0035 | 107 |

Note: This is the rank of state borders by taxes’ distortion on establishment entry. The number is the reduced probability of establishment entry on the disadvantage side of the state border. Here we list the largest and smallest distortion caused by tax differentials. The complete rank can be found in the appendix.

Table 5 State rank of taxes’ cost on establishment entry

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| State | Rank | Tax burden | State | Rank | Tax burden |
| RI | 1 | -0.1439 | WV | 25 | -0.0952 |
| NJ | 2 | -0.1391 | MA | 26 | -0.0950 |
| CT | 3 | -0.1377 | NM | 27 | -0.0944 |
| WI | 4 | -0.1316 | KS | 28 | -0.0921 |
| CA | 5 | -0.1299 | MO | 29 | -0.0916 |
| VT | 6 | -0.1273 | UT | 30 | -0.0915 |
| IA | 7 | -0.1237 | NY | 31 | -0.0881 |
| ME | 8 | -0.1235 | AZ | 32 | -0.0865 |
| IN | 9 | -0.1190 | OK | 33 | -0.0862 |
| MN | 10 | -0.1161 | LA | 34 | -0.0856 |
| ID | 11 | -0.1157 | MT | 35 | -0.0851 |
| PA | 12 | -0.1140 | DE | 36 | -0.0825 |
| NE | 13 | -0.1132 | IL | 37 | -0.0822 |
| MD | 14 | -0.1107 | VA | 38 | -0.0820 |
| OH | 15 | -0.1100 | TX | 39 | -0.0769 |
| ND | 16 | -0.1051 | TN | 40 | -0.0753 |
| AR | 17 | -0.1044 | FL | 41 | -0.0720 |
| NC | 18 | -0.1022 | NH | 42 | -0.0649 |
| SC | 19 | -0.1018 | AL | 43 | -0.0608 |
| MI | 20 | -0.1008 | CO | 44 | -0.0588 |
| MS | 21 | -0.1004 | NV | 45 | -0.0487 |
| GA | 22 | -0.0975 | SD | 46 | -0.0466 |
| KY | 23 | -0.0975 | WA | 47 | -0.0452 |
| OR | 24 | -0.0955 | WY | 48 | -0.0293 |

Note: This is the rank of State by taxes’ impacts on establishment entry (Ranked by the median value of reduced entering probability caused by the taxes in each state between 1999 and 2015).

Table 6 The predicted marginal impacts of taxes at state borders by different sizes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) |
|  | Income tax | Sales tax | Property tax | Corporate tax |
|  | -0.004 | -0.001 | -0.001 | 0.020\* |
|  | (0.007) | (0.016) | (0.026) | (0.010) |
|  | -0.001 | -0.011 | -0.014 | -0.003 |
|  | (0.006) | (0.009) | (0.019) | (0.007) |
|  | -0.003 | -0.006 | -0.028\*\* | -0.013\*\* |
|  | (0.005) | (0.008) | (0.014) | (0.006) |
| Number of entries | 7507875 | 7507875 | 7507875 | 7507875 |

Note: This table reports the estimation results of aggregate logit model for all sectors. Marginal effects of the explanatory variables are reported. Standard errors are reported in parentheses. Errors are clustered at state borders. \*\* indicates that the estimated coefficient is significant at the 5% or 1% level, \* indicates that the estimated coefficient is significant at the 10% level.

**Appendix A. Equating Conditional Logit with Poisson Regression**

Consider N investors, each of whom choose their business location from C spatially differentiated choices, . The profit of the establishment from industry *k* entering in year at area is given by

Where is a vector of explanatory variables including area-specific, industry-specific attributes, and entrepreneur’s characteristics. Without loss of generality, we focus on one industry and subtract the subscript *k* in profit function. The profit function will be:

(A1)

Establishment will choose the site that gives the highest expected profit. When the shocks have standard Type I extreme value distributions, the probability of choosing site , is given by

(A2)

From Guimaraes et al. (2003), the conditional logit model is equivalent to Poisson regression in two situations.

1. , the conditional logit model is equivalent to Poisson regression model (Guimaraes et al., 2003). This is a strong assumption assuming individual choice is exclusively determined by a set of choice-specific variables common to all decision-makers. This assumption can be relaxed by assuming the choice-specific variables are common to groups of individuals.

2. **,** with .

where is the number of different groups of investors. There could be107 groups of investors as that is the number of pairs of states that share a border. Or we could specify 1212 groups of investors, that is the number of paired counties who border one another on either side of a state line.

Let in the case investor picks choice at time , and otherwise. Then we can write the log likelihood of the conditional logit model as

(A3)

Where is the number of establishments from group that select location at time . Alternatively, we can let be independently Poisson-distributed with

Where is the vector of parameters to be estimated and is a vector of group’s dummy variables, each one assuming the value 1 if the observation that locates in *c* at time *t* belongs to group *g*. Consequently, the log likelihood for the Poisson model is

(A4)

From the first-order conditions with respect to the , we obtain

(A5)

And so, . We can substitute in (A4) to get

(A6)

Where measures the number of establishments of group in the sample, and , represents the total number of establishments in the sample. Compare this with the likelihood function of the conditional logit model

(A7)

Comparing (A7) and (A3), it is apparent that the solutions to are identical because the two probability functions are identical except that the Poisson probability function has a constant term, . Hence, the conditional logit is equivalent to the Poisson model under these simplifying assumptions.

Appendix

Table A1 Border rank of taxes’ cost on establishment entry

|  |  |  |  |
| --- | --- | --- | --- |
| Advantage State | Disadvantage State | Reduced probability of entry | Rank |
| WY | ID | 0.0863 | 1 |
| WY | NE | 0.0850 | 2 |
| NV | CA | 0.0811 | 3 |
| SD | IA | 0.0753 | 4 |
| WA | ID | 0.0705 | 5 |
| SD | MN | 0.0694 | 6 |
| NH | VT | 0.0682 | 7 |
| NV | ID | 0.0669 | 8 |
| SD | NE | 0.0658 | 9 |
| WY | UT | 0.0616 | 10 |
| NH | ME | 0.0605 | 11 |
| DE | NJ | 0.0563 | 12 |
| WY | MT | 0.0550 | 13 |
| IL | WI | 0.0542 | 14 |
| SD | ND | 0.0535 | 15 |
| CO | NE | 0.0523 | 16 |
| IL | IA | 0.0484 | 17 |
| NY | CT | 0.0484 | 18 |
| WA | OR | 0.0482 | 19 |
| NY | NJ | 0.0481 | 20 |
| NV | OR | 0.0480 | 21 |
| MA | RI | 0.0470 | 22 |
| AZ | CA | 0.0461 | 23 |
| NV | UT | 0.0435 | 24 |
| MA | CT | 0.0426 | 25 |
| AL | MS | 0.0399 | 26 |
| IL | IN | 0.0388 | 27 |
| NV | AZ | 0.0375 | 28 |
| SD | MT | 0.0369 | 29 |
| NY | VT | 0.0367 | 30 |
| AL | GA | 0.0367 | 31 |
| CO | NM | 0.0356 | 32 |
| OR | CA | 0.0347 | 33 |
| MO | IA | 0.0345 | 34 |
| CO | KS | 0.0340 | 35 |

Appendix Table A1 continued

|  |  |  |  |
| --- | --- | --- | --- |
| Advantage State | Disadvantage State | Reduced probability of entry | Rank |
| MI | WI | 0.0320 | 36 |
| MA | VT | 0.0319 | 37 |
| DE | PA | 0.0315 | 38 |
| WY | CO | 0.0307 | 39 |
| MT | ID | 0.0302 | 40 |
| DE | MD | 0.0295 | 41 |
| VA | MD | 0.0292 | 42 |
| CO | UT | 0.0290 | 43 |
| TN | AR | 0.0284 | 44 |
| TN | KY | 0.0282 | 45 |
| TX | AR | 0.0281 | 46 |
| CO | AZ | 0.0277 | 47 |
| TN | NC | 0.0272 | 48 |
| CO | OK | 0.0263 | 49 |
| NH | MA | 0.0262 | 50 |
| UT | ID | 0.0257 | 51 |
| FL | GA | 0.0251 | 52 |
| PA | NJ | 0.0248 | 53 |
| MT | ND | 0.0241 | 54 |
| NY | PA | 0.0239 | 55 |
| TN | MS | 0.0237 | 56 |
| LA | AR | 0.0237 | 57 |
| KS | NE | 0.0226 | 58 |
| TN | GA | 0.0209 | 59 |
| MO | NE | 0.0208 | 60 |
| MI | OH | 0.0204 | 61 |
| VA | NC | 0.0199 | 62 |
| OR | ID | 0.0195 | 63 |
| LA | MS | 0.0192 | 64 |
| WV | PA | 0.0188 | 65 |
| TX | NM | 0.0181 | 66 |
| WY | SD | 0.0170 | 67 |
| WV | OH | 0.0163 | 68 |
| IN | OH | 0.0162 | 69 |
| VA | KY | 0.0160 | 70 |

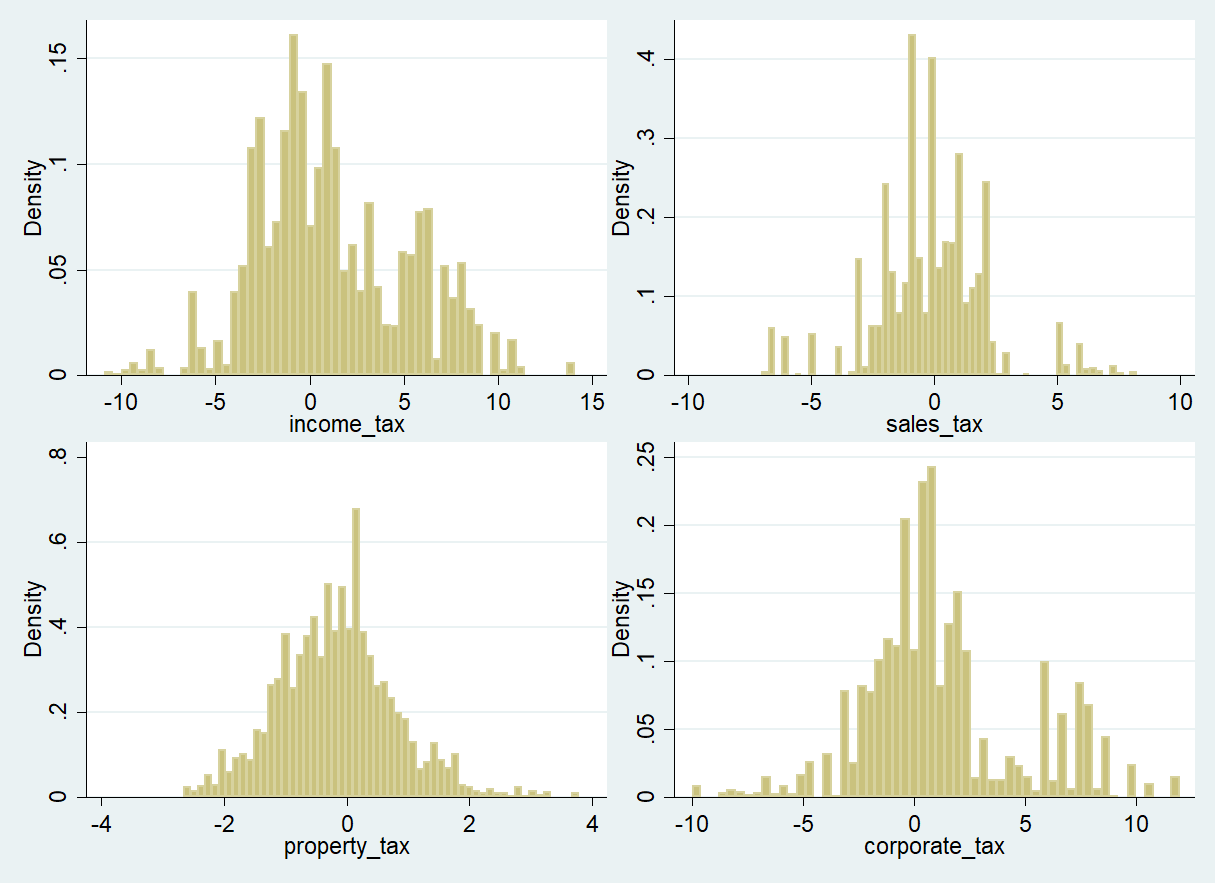
Appendix Table A1 continued

|  |  |  |  |
| --- | --- | --- | --- |
| Advantage State | Disadvantage State | Reduced probability of entry | Rank |
| TN | MO | 0.0157 | 71 |
| RI | CT | 0.0156 | 72 |
| WV | MD | 0.0153 | 73 |
| OK | AR | 0.0151 | 74 |
| IL | KY | 0.0149 | 75 |
| MN | WI | 0.0146 | 76 |
| IN | KY | 0.0145 | 77 |
| AL | TN | 0.0143 | 78 |
| VA | WV | 0.0127 | 79 |
| MI | IN | 0.0124 | 80 |
| MO | AR | 0.0121 | 81 |
| UT | NM | 0.0118 | 82 |
| AL | FL | 0.0112 | 83 |
| NE | IA | 0.0111 | 84 |
| KY | OH | 0.0106 | 85 |
| MO | KY | 0.0095 | 86 |
| OK | NM | 0.0093 | 87 |
| ND | MN | 0.0089 | 88 |
| TX | OK | 0.0085 | 89 |
| IL | MO | 0.0082 | 90 |
| AZ | NM | 0.0079 | 91 |
| UT | AZ | 0.0076 | 92 |
| IA | WI | 0.0076 | 93 |
| SC | GA | 0.0068 | 94 |
| TN | VA | 0.0067 | 95 |
| MN | IA | 0.0061 | 96 |
| GA | NC | 0.0054 | 97 |
| MO | KS | 0.0054 | 98 |
| TX | LA | 0.0051 | 99 |
| NC | SC | 0.0048 | 100 |
| MA | NY | 0.0048 | 101 |
| OH | PA | 0.0041 | 102 |
| MS | AR | 0.0040 | 103 |
| OK | MO | 0.0040 | 104 |
| MD | PA | 0.0038 | 105 |
| OK | KS | 0.0035 | 106 |
| WV | KY | 0.0035 | 107 |

Table A2 More information on the tax rates and , , and .

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) |
|  | Mean | DV |  |  |  |
| Income tax | 1.207 | 4.034 | 0.658 | 0.308 | 0.034 |
| Sales tax | -0.202 | 2.259 | 0.819 | 0.092 | 0.089 |
| Property tax | -0.152 | 0.942 | 0.709 | 0.240 | 0.051 |
| Corporate tax | 1.241 | 3.540 | 0.719 | 0.226 | 0.055 |

Figure A1 Distributions of the tax rate differentials for border discontinuity regression



1. More information about the defined variables and are reported in Table A2 in the appendix. The distributions of tax rates for border regression are shown in figure A1 [↑](#footnote-ref-1)
2. We do not add local tax rates. We could add average local taxes per capita but that would be inconsistent with our use of marginal tax rates. [↑](#footnote-ref-2)
3. For example, a city with a 50% assessment level and a $4/100 nominal property tax rate would have the same effective rate as a city with a 100% assessment level and a $2/100 property tax rate. [↑](#footnote-ref-3)
4. Data on tax reciprocity was taken from Rork and Wagner (2012) supplemented by information summarized by TaxAct, Inc. <https://www.taxact.com/support/category/300042/download-help-tax-support-taxact>. Data on minimum wages was compile by the U.S. Department of Labor <https://www.dol.gov/agencies/whd/state/minimum-wage/history> [↑](#footnote-ref-4)
5. The full list is in the appendix. [↑](#footnote-ref-5)