Voting with Their Feet: Regulatory Competition and Firm Sorting at State Borders*

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Abstract

Does interjurisdictional competition discipline government regulatory policy? We provide the first well-identified test of whether firms "vote with their feet" in response to regulatory accumulation by exploiting discontinuous changes in regulatory stringency at U.S. state borders. Using a spatial regression discontinuity design with nearly 5 million establishments across 89 border pairs and 77 industries, we find that establishment density is approximately 8 percent higher on the low-regulation side of state boundaries, with establishments also being 3.6 percent larger. Regulatory sorting operates primarily through the extensive margin of firms' discrete location choices rather than the intensive margin of establishment size, consistent with regulations imposing fixed entry costs. Crucially, spatial sorting patterns vary systematically with industry tradability: moderately tradable industries exhibit the strongest border effects, while the least and most tradable industries show weaker responses. Extensive robustness checks and randomization inference tests confirm these patterns, providing compelling evidence that regulatory federalism generates competitive pressure on state policy. While competitive federalism effectively disciplines state regulatory policy near borders and for tradable industries, the effect attenuates beyond 50-75 kilometers and proves weakest for non-tradable services, delineating the practical bounds of interjurisdictional competition.

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1 Introduction

Do firms vote with their feet to escape burdensome regulations? The accumulation of regulations can raise the cost of doing business. The extent of exit options will change how regulatory costs influence the decisions of entrepreneurs about whether to start a firm, where to locate a firm, and the size of the firm. We are the first to study whether the accumulation of state-level regulations influences the location and size decisions of firms at U.S. state borders. Using a spatial regression discontinuity design with nearly 5 million establishment observations, we find that firms systematically choose to locate in jurisdictions with lower regulatory burdens, and that establishments on the low-regulation side of borders are both more numerous and larger on average.

Regulation can have profound effects on economic outcomes. Regulatory barriers to entry and regulatory accumulation slow economic growth (Djankov et al. 2006; Dawson and Seater 2013; Coffey et al. 2020), exacerbating poverty (Djankov et al. 2018) and increasing income inequality (Chambers et al. 2019; Chambers et al. 2022). Many of these broad economic effects can be tied back to how regulations can protect incumbents at the expense of new entrants, reducing entrepreneurship and economic dynamism (Djankov 2009; Chambers et al. 2023).

A fruitful way to study the relationship between regulation and the decisions of entrepreneurs is to study the location decisions of firms near borders. This approach has the virtue of a cleaner identification strategy than many of the aforementioned cross-country and industry-level panel studies that link regulation to economic outcomes and entrepreneurship.

Various state-level policies influence firms' decisions about where to locate. Tax policy (Rohlin et al. 2014) and whether states have a right-to-work law influence the geographic distribution of firms (Holmes 1998). Several specific types of regulation have been shown to influence location decisions. The minimum wage (Rohlin 2011; Kong et al. 2021; Crum and Gohmann 2016) and occupational licensing (Plemmons 2022; Blair and Chung 2019) have received considerable attention. Plemmons (2022) studies the effect of occupational licensing on firms' decisions about where to locate using a geographic regression discontinuity design, making her study the most similar to our own.

However, to our knowledge, there are no studies of how the accumulation of regulation, rather than specific regulations, influences where firms choose to locate. This is a notable gap in the literature given the extensive work showing how the accumulation of regulation influences a range

of economic activity (Dawson and Seater 2013; Coffey et al. 2020).

Our results show that firms vote with their feet. The accumulation of regulation at the state level systematically influences firms' decisions about where to locate and how large to grow. We find that establishment density is approximately 8 percent higher on the low-regulation side of state borders, with establishments also being roughly 3.6 percent larger on average. The fact that sorting effects are substantially larger on the extensive margin (establishment location) than the intensive margin (establishment size) suggests that regulatory accumulation primarily imposes fixed costs of entry and compliance rather than variable costs that scale with firm operations. Our heterogeneity analysis reveals that spatial sorting patterns vary systematically with industry tradability, with the strongest effects concentrated among moderately tradable industries that can serve regional markets while maintaining border proximity. These findings survive numerous robustness checks and randomization inference tests, providing strong evidence that interjurisdictional regulatory competition shapes economic geography.

In the next section, we discuss the theoretical mechanisms and other relevant literature. Section III introduces the data on state-level regulation and firm location. The geographic (or spatial) regression discontinuity design and the corresponding identifying assumptions are discussed in Section IV. Section V presents our main results on establishment density and size discontinuities at state borders, along with robustness checks. Section VI examines heterogeneity by industry tradability. We close with a conclusion and discussion of the implications.

2 Literature Review

Regulation may be enacted in the public interest but have the unintended consequence of raising the cost of doing business. Alternatively, the tollbooth theory of regulation holds that bureaucrats impose regulations to extract rents from firms (Shleifer and Vishny 1993). Stigler (1971) argues that incumbent firms can capture regulators to erect barriers to entry that create rents for the incumbent.

Regardless of how the regulations were formed, they can impose costs on firms. Particularly if they are imposed at the behest of incumbents, regulations may raise the fixed costs of entering an industry. These higher fixed costs will be a barrier to entry protecting incumbents at the expense of new entrants. Larger established firms may be able to spread high fixed costs over greater scale,

whereas smaller firms may not. Instead, regulations implemented in the public interest or to extract rents for bureaucrats may raise the variable cost and, as they accumulate, also raise the fixed costs of compliance. Regulations that only raise the variable costs of firms may inhibit firm growth, rather than entry.

Competition between jurisdictions may be a check on the extent of both the tollbooth and capture theories of regulation. If firms have an exit option, they can avoid the most burdensome regulation by voting with their feet and moving to another jurisdiction (Tiebout 1956). Much of the sub-national literature has focused on tax and fiscal competition between sub-national jurisdictions (see Agrawal et al. 2015 for a review). Rohlin et al. (2014) study state reciprocal tax agreements to test whether state level taxes affect an entrepreneur's decision about where to locate a new establishment. They find that entrepreneurs choose to locate in jurisdictions with lower tax costs.

Similar to taxes, the cost of complying with regulation raises the cost of doing business. Jurisdictional competition also matters for regulation (Carruthers and Lamoreaux 2016). Experimental evidence shows that state level regulation influences firms decisions about where to locate (Malone et al. 2019). Studies have used differences across state boundaries to identify the effects of specific regulations on location decisions. The minimum wage has received the most attention. Using a border discontinuity approach Rohlin (2011) finds that increases in the minimum wage deter new establishments from locating in the area. Kong et al. (2021) find similar evidence that minimum wage deters entrepreneurship using contiguous county-pairs in China. Though, Jardim et al. (2024) cautions about the use of the boundary discontinuity method in cases like a minimum wage where the effect may spillover to other jurisdictions.

Occupational licensing also influences entrepreneurship (Dove 2020; Dove and Trudeau 2024; Zapletal 2019). Plemmons (2022) uses geographic boundary discontinuity design to show that higher licensing costs reduce the likelihood that a firm locates on the side of the state border with higher costs. She also finds that higher licensing costs are associated with lower firm employment. Similarly, (Blair and Chung 2019) use boundary discontinuity design to estimate the effect on labor supply of requiring an occupational license. They find the licensure reduces labor supply by 17 to 27 percent. Taken together, the literature has established that individual regulations or types of regulation can influence the decision of entrepreneurs of where to locate.

A related but distinct question is whether the accumulation of regulation influences firm location

decisions. By regulatory accumulation, we mean the total number of regulations that an industry or firm must comply with. One regulation may impose such a trivial cost on a firm that it has no effect on behavior. However, the accumulations of hundreds of regulatory rules can amount to a substantial cost that does influence business decisions such as where to locate and whether to expand. We are the first to study whether the accumulation of state level regulations affects firms' decisions about where to locate.

An extended debate about how the accumulation of federal regulation effects entrepreneurship has recently been played out in the literature. Bailey and Thomas (2017) found that regulation reduces firm births in a panel of US industries, and small firms appear to be hit harder than large firms (Chambers et al. 2022). By contrast, Goldschlag and Tabarrok (2018) find no such effect using similar data. Chambers et al. (2023) reconciles the differences between these two studies, showing that how the dependent variable is calculated is responsible for the different results. Despite the attention to how the accumulation of regulation affects entrepreneurship little is known about how it affects firm location decisions.

In the United States a significant proportion of regulation, and regulatory accumulation, occurs at the state level. Studies show a negative correlation between state regulation and entrepreneurship Chambers and O'Reilly (2025), but the evidence is not well identified. Absent from the literature are well identified studies of how the accumulation of state level regulation influences entrepreneurship, including decisions about where to form a firm and firm size. Our study contributes by providing the first well identified evidence of the effect of state level regulatory accumulation on firm behavior.

3 Data and Empirical Strategy

3.1 Data

To isolate the causal effect of regulatory accumulation on establishment locations, we combine a geocoded database of business establishments in the United States, the Your Economy Time Series (YTS) database, with state-by-industry measures of regulation derived from State RegData (McLaughlin et al. 2021).

Developed by the Mercatus Center at George Mason University, State RegData employs machine learning and natural language processing techniques to measure regulatory stringency across all 50 U.S. states. The database quantifies regulation by analyzing each state's administrative code

and counting instances of restrictive terms that impose legal obligations or prohibitions. Specifically, the algorithm identifies occurrences of "shall," "must," "may not," "prohibited," "required," and "mandatory," with each occurrence representing one regulatory restriction. To link these restrictions to specific economic sectors, machine learning classifiers trained on industry-specific documents assign relevance scores to each restriction based on 2007 NAICS codes at the 3-digit level. When a single restriction applies to multiple industries, it is allocated proportionally across those industries according to estimated relevance probabilities. This approach avoids inflating restriction counts through double-counting while capturing the full scope of regulatory burdens facing each industry.

State RegData provides the measure r_{ij}: the total number of probability-weighted regulatory restrictions facing industry j in state i. For the 2022 edition, which we use in our analysis, regulatory restriction counts range from approximately 28,000 restrictions (South Dakota) to over 305,000 restrictions (California) when summed across all private-sector industries. At the industry-state level, variation is substantial: some state-industry combinations face fewer than 100 restrictions, while others face over 35,000 restrictions.

[Figure 1 here]

Figure 1 illustrates the substantial heterogeneity in regulatory stringency across states and industries in our sample. The heatmap displays r_{ij} for each state-industry combination in 2022, with darker red cells indicating higher regulatory burdens and lighter yellow cells indicating lower burdens. Gray cells represent state-industry pairs excluded from our analysis because regulatory data for that industry are unavailable in at least one bordering state. Several patterns emerge from the figure. First, regulatory intensity varies considerably across industries. Certain sectors face particularly high regulatory burdens across most states, including professional, scientific, and technical services (NAICS 541), administrative and support services (NAICS 561), ambulatory healthcare services (NAICS 621), hospitals (NAICS 622), and nursing and residential care facilities (NAICS 623). These industries commonly exhibit restriction counts exceeding 20,000–30,000 in many states, as indicated by the darker orange and red cells in their respective columns.

Second, substantial within-industry variation exists across states: for any given industry, restriction counts can differ by a factor of three or more between the most and least regulated states.

Third, certain states, most notably Texas, New Jersey, and California, display notably elevated regulatory burdens across multiple industries, as evidenced by the greater prevalence of orange and red cells in their rows. This cross-sectional variation in state-industry regulatory stringency forms the foundation for our border discontinuity analysis, allowing us to examine how establishments sort geographically in response to regulatory differences.

To combine these state-industry regulatory measures with establishment data, we obtain information on business locations and industry classifications from the Your Economy Time Series (YTS) database. YTS represents a collaborative effort between Data Axle, a commercial marketing analytics provider, and the University of Wisconsin Business Dynamics Research Consortium (UWBDRC). Data Axle compiles comprehensive business intelligence for marketing applications, while UWBDRC processes these files to generate and distribute the YTS database for research purposes.

Initially released to the research community in 2016, YTS aims to document the near-universe of active business establishments throughout the United States. In this capacity, YTS functions as a privately-sourced alternative to the Census Bureau's restricted-access Longitudinal Business Database (LBD) (Miller et al. 2025).[1]

The database covers the period from 1997 through 2024, containing records for nearly 36 million distinct establishments. Key variables include annual employment levels, precise geographic coordinates (latitude and longitude), primary industry codes under both the North American Industrial Classification System (NAICS) and Standard Industrial Classification (SIC) frameworks, and establishment birth and death dates. The database also provides supplementary fields such as linkages to parent or headquarters organizations, Securities and Exchange Commission Central Index Key (CIK) and Committee on Uniform Securities Identification Procedures (CUSIP) identifiers for publicly traded entities, and designations for veteran- or minority-owned businesses.

Actual accessibility to state borders may differ substantially from straight-line distances due to geographic features, road network configurations, and infrastructure quality. To account for this, we identify all road crossings along state borders using OpenStreetMap data and calculate the driving time from each establishment to its nearest border crossing based on road network distances

[1] See Miller et al. (2025) for a detailed discussion of how the Your Economy Time Series database compares to official government databases such as County Business Patterns and the Quarterly Census of Employment and Wages.

and posted speed limits.

[Figure 2 here]

Figure 2 illustrates this approach using the Florida-Alabama border, which has 50 road crossings. For each establishment in Alabama and Florida operating in one of the 77 industries with available regulatory data, we calculate driving times to all border crossings and identify the minimum. We restrict our sample to establishments within a 75-minute drive of the nearest border crossing, yielding 81,643 Alabama establishments and 95,848 Florida establishments. Applying this procedure to all 89 border pairs with overlapping industry coverage from RegData produces a final sample of 4,895,822 establishments.

3.2 Spatial Regression Discontinuity Design

Our empirical strategy employs a spatial regression discontinuity design (SRDD) that compares establishment density in narrow geographic bands on opposite sides of state borders. The key idea is that locations just across the border from each other are similar in all relevant economic fundamentals, such as market access, labor pools, natural resources, transportation infrastructure, but face different state-level regulatory requirements. If regulations influence location decisions, we should observe discontinuous changes in establishment density at state borders, with more establishments locating on the low-regulation side.

This approach builds on a growing literature using subnational boundaries as quasi-experimental variation (Plemmons 2022; Rohlin 2011; Holmes 1998). The method has several attractive features. First, it exploits policy discontinuities at borders while controlling for smooth spatial trends in economic fundamentals. Second, it addresses concerns about endogenous policy-making by comparing jurisdictions that are geographically proximate and economically integrated. Third, it allows for flexible functional forms of spatial relationships without imposing strong parametric assumptions.

The validity of this design rests on several key assumptions, which we discuss and test below. The central identifying assumption is that, absent regulatory differences, establishment density would be continuous at state borders. In other words, we assume that state boundaries themselves do not directly determine business location decisions except through their role in delineating different regulatory regimes.

Our approach follows the multi-border framework developed by Grembi et al. (2016), which allows us to pool observations across multiple state borders while controlling for border-specific characteristics through fixed effects.

$$\begin{aligned}\ln(Y_{bijp}) = \alpha + \beta \cdot Low\ Regulations_{ip} + f(distance_{bijp}) \\ + \gamma \cdot Low\ Regulations_{ip} \times f(distance_{bijp}) \\ + \mathbf{X}'_{bijp}\delta + \theta_{pj} + \epsilon_{bijp} \end{aligned} \tag{1}$$

where Y_{bijp} is the outcome of interest in bin b, industry j, on side i of border pair p. The bins are defined based on driving time to the border, and we vary the bin widths as a robustness check.

Since the YTS database includes establishment-level employment, we are able to explore how state regulations affect both the extensive and intensive margins of establishment activity. For each state-industry bin, we examine the total number of establishments (extensive margin) and the average number of employees per establishment (intensive margin). Distinguishing between these two margins is important for understanding the mechanisms through which regulations influence economic activity and for assessing the welfare implications of regulatory competition.

The extensive margin captures entrepreneurs' discrete choices about whether and where to locate new establishments. If regulations primarily impose fixed costs of entry or compliance—as suggested by capture theory—we would expect to observe spatial sorting at borders, with fewer establishments locating in high-regulation jurisdictions. This reflects firms voting with their feet to avoid regulatory burdens entirely. By contrast, the intensive margin captures how regulations affect the scale of operations for establishments that do locate in a jurisdiction. If regulations primarily raise variable costs that scale with firm size, we might observe establishments in high-regulation areas remaining smaller to minimize compliance burdens. Alternatively, if regulations protect incumbents by raising barriers to entry, surviving establishments in high-regulation jurisdictions might actually be larger due to reduced competition.

These distinct margins have different policy implications. Extensive margin effects, or firms sorting across jurisdictions, suggest that regulatory federalism allows entrepreneurs to avoid unfavorable regulatory environments, consistent with Tiebout's (1956) model of interjurisdictional competition. This spatial reallocation may improve allocative efficiency if firms match with juris-

dictions that better suit their needs, though it may also reflect welfare-reducing regulatory arbitrage. Intensive margin effects, or constrained firm growth, could indicate more distortionary impacts, as regulations prevent establishments from reaching efficient scale. By examining both margins, we can better characterize how regulatory accumulation shapes entrepreneurial decisions and assess whether the primary effect operates through location choices or operational constraints.

The key explanatory variable, $Low\ regulations_{ip}$, is an indicator equal to 1 if side i of border pair p is the low-regulation side of the border. The coefficient of interest is β, which measures the discontinuous jump in log establishment density at the border. A positive and significant β indicates that more establishments locate on the low-regulation side, consistent with firms "voting with their feet" to escape burdensome regulations.

$distance_{bijp}$ is the drive time (in minutes) from bin b to the border (negative on one side, positive on the other). $f(distance_{bijp})$ is a polynomial function of distance, allowing flexible spatial trends, $\mathbf{X}_{bijp}$ is a vector of location-specific control variables, θ_{pj} are border-pair $\times$ industry fixed effects, and ϵ_{bijp} is an error term.

The border-pair $\times$ industry fixed effects (θ_{pj}) are important for identification. These fixed effects absorb all time-invariant differences in average establishment density for each industry along each specific border. For instance, they control for overall economic conditions along each border segment, industry-specific agglomeration patterns, regional productivity differences, border-specific infrastructure quality, and any other unobserved factors that vary by border-industry combination.

By including these fixed effects, we identify the regulatory effect purely from within-border comparisons of the high-regulation versus low-regulation side for each industry. We are not comparing California's overall establishment density to Nevada's; rather, we are comparing the density of establishments in specific industries on the California side of the California–Nevada border to density on the Nevada side, controlling for average differences along that border.

We consider both linear and quadratic specifications for the distance function. The linear specification uses:

$$f(distance_{bijp}) = \lambda_1 \cdot distance_{bijp} \tag{2}$$

This imposes that establishment density declines linearly with distance from the border, with potentially different slopes on each side of the border (captured by the interaction term).

The quadratic specification uses:

$$f(distance_{bijp}) = \lambda_1 \cdot distance_{bijp} + \lambda_2 \cdot distance_{bijp}^2 \tag{3}$$

This allows for nonlinear spatial gradients, permitting establishment density to decline at increasing or decreasing rates as one moves away from borders. In both specifications, we allow all distance terms to differ on the high-regulation versus low-regulation side through the interaction with $Low\ Regulations_{ip}$. This flexibility is crucial because the spatial distribution of establishments may differ systematically across regulatory regimes. For instance, if regulatory differentials create incentives to cluster near borders to maintain market access while minimizing regulatory costs.

While the regression discontinuity design controls for smooth spatial variation, we include additional location-specific controls to improve precision and address potential threats to identification. Our baseline specification controls for several measures of market access and infrastructure availability. We include log population per square kilometer in each bin, measured using census tract-level population data aggregated to our spatial bins, to control for local market size, labor supply, and consumer demand, all of which affect establishment location independent of regulation. We measure the road network distance (in kilometers) from each bin's centroid to the nearest commercial airport, as airport access affects transportation costs and connectivity to distant markets, particularly for industries relying on air freight or business travel. Similarly, we control for distance to the nearest rail freight terminal, which is particularly relevant for manufacturing and wholesale trade establishments that ship heavy or bulky goods. We also include the road network distance from each bin to the boundary of the nearest Metropolitan Statistical Area, as proximity to urban centers provides access to specialized labor, suppliers, and customers, creating agglomeration benefits independent of regulatory considerations. Finally, we control for broadband availability, measured as the number of internet service providers at each location, as broadband access has become increasingly important for modern businesses and may correlate with economic vitality and regulatory environments, particularly in technology-dependent sectors.

We further control for geographic and environmental characteristics that might correlate with state boundaries. We construct a road ruggedness measure using elevation data, calculating the

standard deviation of elevation gradients within a 10km radius of each bin, as rugged terrain increases construction and transportation costs while potentially being correlated with state boundaries that often follow geographic features. We also include Federal Emergency Management Agency flood risk scores to control for natural disaster exposure, since states may differ in flood insurance requirements and building code stringency in response to local risks, creating correlation between regulation and environmental hazards. These controls address the concern that state borders might coincide with geographic features or infrastructure discontinuities that independently affect establishment patterns. By conditioning on these observables, we reduce the scope for omitted variable bias, though our primary identification still relies on the continuity assumption inherent in the RD design.

4 Results

4.1 Baseline Estimates of Regulatory Sorting

4.1.1 Extensive Margin: Establishment Counts

Table 1 presents our baseline estimates of the establishment density discontinuity at state borders, providing the first well-identified evidence that firms systematically sort across state boundaries in response to regulatory accumulation. The dependent variable in all specifications is the natural logarithm of establishment counts within spatial bins defined by drive time to the nearest border crossing. We report results from both linear (columns 1-3) and quadratic (columns 4-6) specifications for the distance function, progressively adding control variables to assess the robustness of our core findings.

State-by-industry bins are based on 1 minute drive times, and establishments located more than a 50-minute drive time to another state border are omitted. Both of these criteria are relaxed in our robustness checks.

[Table 1 here]

The coefficient of primary interest is β on the *low regulations* indicator, which captures the discrete jump in establishment density at the border between the high-regulation and low-regulation sides. Across all six specifications, we find consistent evidence of a positive and statistically significant discontinuity, with establishments disproportionately locating on the low-regulation side of

state borders. In our most parsimonious specification (column 1), which includes only the regulatory treatment indicator, distance controls, and border-pair × industry fixed effects, we estimate a coefficient of 0.0432 ($p < 0.10$). This point estimate implies that moving from the high-regulation to the low-regulation side of a border is associated with approximately 4.4 percent higher establishment density, holding distance from the border constant.[2]

As we add geographic and infrastructure controls in columns (2) and (3), the estimated discontinuity increases in both magnitude and statistical precision. In column (2), which adds our core set of location controls, population density, distance to the nearest airport, distance to the nearest rail yard, and distance to the nearest metropolitan statistical area, the coefficient on low regulations increases to 0.0546, indicating a 5.6 percent discontinuity in establishment density. Column (3) further incorporates controls for road ruggedness, FEMA flood risk scores, and broadband availability, yielding our preferred linear specification with an estimated discontinuity of 0.0576, or approximately 5.9 percent.

The quadratic specifications in columns (4) through (6) allow for more flexible spatial gradients in establishment density, permitting nonlinear relationships between distance from the border and firm location patterns. These specifications prove important for two reasons. First, they accommodate the possibility that establishments may cluster particularly densely very close to borders to maintain market access on both sides while minimizing regulatory burdens, which is a pattern that would manifest as curvature in the relationship between distance and density. Second, they provide a more conservative approach to functional form specification, reducing the risk that our estimated discontinuity reflects misspecification of the distance function rather than a genuine regulatory effect.

The quadratic specifications yield uniformly larger and more precisely estimated discontinuities than their linear counterparts. In the most parsimonious quadratic specification (column 4), we estimate a coefficient of 0.0549 on the low regulations indicator. Adding our full set of geographic and infrastructure controls in columns (5) and (6), we obtain coefficients of 0.0687 ($p < 0.01$) and 0.0773 ($p < 0.01$), respectively. Our preferred specification with the complete set of controls (column 6) implies that establishment density is approximately 8.0 percent higher on the low-

[2]We calculate the percentage effect as $100 \times (\exp(\beta) - 1)$, which for small values of β is well-approximated by $100 \times \beta$.

regulation side of state borders, representing our most robust estimate of the regulatory sorting effect.

The distance coefficients provide insight into the spatial decay of establishment density as one moves away from state borders. In the linear specifications, the coefficient on drive time to border is consistently negative and highly significant, indicating that establishment density declines with distance from borders regardless of which side one is on. However, the interaction term between low regulations and drive time is positive and highly significant across all specifications, revealing that the rate of decline differs systematically between the high- and low-regulation sides. Specifically, establishment density *declines more steeply* on the high-regulation side (where the total effect is -0.0099 in column 3) than on the low-regulation side (where the total effect is $-0.0099 + 0.0169 = 0.0070$ in column 3). This asymmetric pattern is consistent with the theoretical perspective that regulatory differentials create incentives for firms to locate as close as possible to borders on the low-regulation side, while firms on the high-regulation side face stronger incentives to locate further inland where other locational advantages may offset regulatory costs.

This asymmetric spatial gradient has important implications for understanding the mechanism through which regulatory competition affects firm behavior. If regulatory differences simply made one jurisdiction uniformly more attractive than another, we would expect to see a level shift in establishment density but similar spatial decay patterns on both sides of the border. Instead, the flatter gradient on the low-regulation side suggests that establishments actively optimize their position relative to the border, clustering close to it to maintain access to both markets while minimizing regulatory burdens. An establishment located just inside the low-regulation side of a border can serve customers in both states, source inputs from suppliers in both states, and potentially hire workers residing in either state, all while facing only the regulatory requirements of the low-regulation jurisdiction. This positioning advantage diminishes with distance from the border, creating incentives for concentration in the immediate border area.

Conversely, the steeper decline in establishment density as one moves inland from the border on the high-regulation side is consistent with firms in high-regulation states facing a trade-off between proximity to the border (which offers potential market access advantages) and proximity to other economic amenities located deeper in state interiors (such as major metropolitan areas, specialized supplier networks, or research institutions). For these establishments, moving toward the border

brings them closer to a regulatory regime they are trying to avoid rather than one they are trying to access, so border proximity per se offers fewer advantages. As a result, establishment density in high-regulation states declines more sharply with proximity to borders, as firms prefer to locate near alternative economic centers rather than near boundaries with low-regulation neighbors.

The magnitude of the interaction effect, 0.0169 in our preferred linear specification, implies substantial differences in spatial organization across regulatory regimes. At a distance of 30 minutes from the border, this interaction effect cumulates to approximately a 51 percentage point difference ($0.0169 \times 30 = 0.507$) in the slope of the density-distance relationship. This large differential in spatial gradients reinforces the interpretation that regulatory differences fundamentally reshape the economic geography of border regions, creating asymmetric patterns of development that would not exist in the absence of regulatory discontinuities. The fact that we observe this pattern consistently across 89 border pairs and 77 industries suggests that these spatial sorting dynamics represent a general feature of interjurisdictional regulatory competition rather than idiosyncratic responses to particular state policies or local conditions.

The quadratic distance terms in columns (4) through (6) capture nonlinearities in these spatial gradients. The negative and highly significant coefficient on the squared distance term indicates that the rate of decline in establishment density accelerates with distance from borders. The near-zero and statistically insignificant interaction between low regulations and squared distance suggests that this nonlinearity is similar on both sides of the border, though the level difference (captured by the discontinuity) and the linear slope (captured by the interaction with distance) both favor the low-regulation side.

The quadratic functional form provides additional insight into the spatial structure of establishment clustering near borders. The negative coefficient on the squared distance term indicates that establishment density does not simply decline linearly with distance from borders but rather exhibits accelerating decline; the rate of decrease becomes steeper as one moves further into state interiors. This nonlinear pattern is economically intuitive: establishments located very close to borders can easily access cross-border markets and may benefit from direct comparison shopping by consumers or strategic positioning for regulatory arbitrage. As distance from the border increases, these advantages diminish at an increasing rate, because travel costs rise, information about cross-border opportunities becomes more limited, and the practical feasibility of serving both markets

simultaneously declines.

The near-zero interaction between low regulations and squared distance is itself informative. It suggests that the curvature in the density-distance relationship is similar on both sides of the border, indicating that the spatial decay of economic activity follows comparable functional forms regardless of regulatory regime. What differs is not the fundamental geographic structure of economic activity (which appears to follow similar distance-decay relationships everywhere) but rather the *level* around which that decay is centered. Establishments on the low-regulation side start from a higher baseline density at the border and decline at a slower linear rate, but the acceleration of that decline (captured by the quadratic term) operates similarly on both sides. This pattern is consistent with regulatory competition affecting the intercept and slope of spatial gradients while leaving the underlying curvature—which likely reflects more fundamental geographic and transportation cost considerations—largely unchanged.

Comparing the spatial patterns across the extensive and intensive margins reveals additional nuance. For mean employment (Table 2), the linear interaction term (0.0106) is substantially smaller than for establishment counts (0.0593), indicating that the size advantage of establishments on the low-regulation side diminishes more quickly with distance from the border than does the numerical density advantage. This differential spatial decay across margins suggests that the largest establishments tend to locate very close to borders on the low-regulation side, where they can most effectively exploit regulatory advantages while maintaining market access. Smaller establishments, which may be less sensitive to regulatory costs or less capable of strategic positioning, are more evenly distributed across space. This pattern provides micro-level evidence that regulatory competition particularly influences the location decisions of establishments for which compliance costs represent a larger share of total costs or where strategic positioning relative to borders offers the greatest advantages.

The spatial gradients also speak to the geographic scope of regulatory competition. The fact that we observe significant discontinuities and asymmetric slopes within a 50-minute drive time of borders indicates that regulatory competition influences firm location decisions over economically meaningful distances, roughly 75-100 kilometers in typical settings. This spatial extent is large enough to encompass multiple counties, numerous small cities, and substantial portions of many metropolitan areas that straddle state borders. The policy implication is that regulatory competi-

tion does not merely affect firms in the immediate vicinity of border crossings but rather reshapes economic geography across sizable regions. State-level regulatory reforms can therefore induce spatial reallocation of economic activity across territories containing millions of residents and tens of thousands of establishments, suggesting that the aggregate effects of interjurisdictional competition may be economically significant even if the percentage effects at borders appear modest.

The control variables in our preferred specifications (columns 3 and 6) enter with economically sensible and statistically significant coefficients, lending credibility to our identification strategy. Population density exhibits a strong positive relationship with establishment counts (coefficient ≈ 0.008), reflecting fundamental agglomeration forces whereby denser areas offer larger markets, thicker labor pools, and greater opportunities for inter-firm linkages.

Infrastructure access proves critical for establishment location. Distance to the nearest commercial airport enters with a substantial negative coefficient of approximately -0.023, reflecting the importance of air connectivity for modern business operations, particularly for industries engaged in long-distance trade and just-in-time supply chains. Distance to rail freight terminals (≈ -0.005) and metropolitan statistical areas (≈ -0.003) similarly exhibit negative and significant coefficients, indicating that both freight access and urban proximity attract establishments. The residual effect of MSA proximity after controlling for population density likely captures agglomeration benefits beyond raw market size, such as access to specialized business services, knowledge spillovers, and deeper labor markets.

Our terrain and environmental controls also enter significantly. Road ruggedness exhibits a negative coefficient (≈ -0.001), consistent with difficult terrain raising construction and transportation costs. The FEMA flood risk score shows a small but significant positive coefficient, likely reflecting that flood-prone areas are often located in river valleys and coastal zones offering other locational advantages such as water access and flat terrain. Finally, broadband availability exhibits a strong positive relationship with establishment density, with a coefficient of approximately 0.037 indicating that each additional ISP option is associated with roughly 3.8 percent higher establishment density, underscoring the critical importance of digital infrastructure for modern business operations.

4.1.2 Intensive Margin: Mean Employment Per Establishment

Beyond the extensive margin of establishment location, we also examine whether regulations affect the intensive margin, or the size of establishments that do locate near borders. Table 2 presents parallel specifications using the natural logarithm of mean employment per establishment as the dependent variable. The results reveal that establishments on the low-regulation side of borders are not only more numerous but also systematically larger. In our preferred quadratic specification with full controls (column 6), the coefficient on the low regulations indicator is 0.0351, significant at the 1 percent level. This implies that establishments on the low-regulation side employ approximately 3.6 percent more workers on average than their counterparts on the high-regulation side.

The magnitude of the intensive margin effect is notably smaller than the extensive margin effect (3.6 percent versus 8.0 percent), suggesting that regulatory sorting operates primarily through firms' discrete location choices rather than through constraints on the scale of operations for establishments that do locate in high-regulation jurisdictions. This pattern is consistent with regulatory accumulation primarily imposing fixed costs of compliance, such as licensing requirements, permitting processes, and administrative burdens, that deter establishment entry but matter less for operational scale once these fixed costs are incurred. If regulations primarily raised variable costs that scaled with firm size, we would expect to see larger intensive margin effects as establishments in high-regulation areas remained small to minimize compliance costs.

The distance patterns for mean employment largely parallel those for establishment density, though with smaller magnitudes. The interaction between low regulations and drive time is positive and significant at 0.0106 in our preferred specification (Table 2, column 6), indicating that the employment size advantage of low-regulation establishments is greatest at the immediate border and declines gradually with distance. This spatial gradient reinforces our interpretation that regulatory differentials influence firm decisions specifically in the context of cross-border location choices, where establishments can optimize their position relative to state boundaries to balance market access with regulatory costs.

The magnitude of our estimated regulatory discontinuity deserves careful interpretation in the context of existing literature on policy-induced border discontinuities. Our baseline estimate of

approximately 8 percent higher establishment density on the low-regulation side is economically substantial but smaller than some estimates from studies of specific regulations. For instance, Rohlin (2011) finds that minimum wage increases can reduce establishment density by approximately 8-12 percent, while Plemmons (2022) estimates that higher occupational licensing costs reduce establishment likelihood by similar magnitudes. The fact that our estimates are of comparable magnitude despite measuring the cumulative effect of *all* state regulations rather than single policies suggests either that (1) different regulations may partially offset each other in their locational effects, (2) general regulatory accumulation has more diffuse effects than targeted policies, or (3) our identification strategy may provide a more conservative estimate by averaging across a highly heterogeneous set of border pairs and industries.

It is also worth noting that our estimated discontinuity represents an average effect across 89 state border pairs and 77 industries, masking substantial heterogeneity in the strength of regulatory sorting. Some border pairs exhibit very large regulatory differentials (for instance, California borders Nevada and Oregon, states with markedly different regulatory philosophies), while others feature relatively similar regulatory environments. Similarly, some industries face far more stringent regulation than others, and the tradability of industries varies dramatically. The baseline estimates in Table 1 therefore represent a weighted average of these diverse contexts, and one might expect to find heterogenous effects in specific subsamples characterized by large regulatory gaps and highly tradable industries, hypotheses we test explicitly in our heterogeneity analysis below.

A potential concern with any regression discontinuity design is that the estimated discontinuity might reflect factors other than the treatment variable of interest, in our case, state-level regulatory differences. While our border-pair $\times$ industry fixed effects control for all time-invariant differences in average establishment density along each border segment for each industry, there remains the possibility that factors correlated with regulatory differences might drive our results. For instance, if high-regulation states systematically differ from low-regulation states in their tax policies, labor market regulations, or business climate more broadly, our estimated discontinuity might conflate these various policy dimensions rather than isolating the effect of regulatory accumulation per se.

Several features of our research design mitigate this concern. First, our regulatory measure from State RegData provides the most comprehensive measure of regulatory stringency that encompasses a wide range of policy domains. While taxes and some labor market policies are not

directly measured through administrative code word counts, the density of regulatory restrictions correlates strongly with broader measures of business climate and government intervention. Second, by focusing on locations within 50 minutes of state borders, we compare jurisdictions that are geographically proximate and economically integrated, reducing the scope for confounding differences in economic fundamentals, factor endowments, or institutional quality. Third, our rich set of covariates controls for many observable determinants of establishment location, and our covariate balance tests (discussed in the next section) provide evidence that these factors do not exhibit discontinuities at borders.

4.2 Covariate Balance and Identification Validity

A fundamental identifying assumption of our spatial regression discontinuity design is that, conditional on smooth spatial trends, all factors other than regulatory policy should vary continuously at state borders. If this assumption holds, any discontinuous jump in establishment density at borders can be attributed to the discrete change in regulatory regime rather than to confounding factors that might independently affect business location decisions. While this assumption is inherently untestable because one cannot observe all potential confounders, we can assess its plausibility by testing whether observable covariates exhibit discontinuities at state borders.

[Table 3 here]

Table 3 presents results from a series of covariate balance tests that serve as falsification checks for our identification strategy. Each column reports results from a separate regression where the dependent variable is one of our key control variables: population density (column 1), distance to the nearest airport (column 2), distance to the nearest rail yard (column 3), distance to the nearest metropolitan area (column 4), terrain ruggedness (column 5), FEMA flood risk scores (column 6), and broadband carrier availability (column 7). The key coefficient of interest in each regression is on the low regulations indicator, which tests whether that particular covariate exhibits a discontinuous jump at state borders.

Reassuringly, we find no evidence of systematic discontinuities in our control variables at state borders. The coefficient on low regulations is statistically insignificant at conventional levels in six of the seven specifications. In column (1), the coefficient on low regulations for population

density is −1.009 with a standard error of 0.858, indicating no significant difference in population density between the high- and low-regulation sides of borders once we control for smooth spatial trends. This null result is particularly important because population density is perhaps the most fundamental determinant of establishment location, and any discontinuity in population would raise serious concerns about the validity of our design.

Similarly, we find no evidence of discontinuities in infrastructure access. The coefficient on low regulations for distance to the nearest airport (column 2) is a negligible 0.027 kilometers with a standard error of 0.075, economically tiny relative to the mean distance of approximately 50 kilometers. Distance to rail yards (column 3) shows a statistically insignificant coefficient of −0.222 with a standard error of 0.447, and distance to the nearest metropolitan area (column 4) exhibits a coefficient of 0.896 with a standard error of 0.612. The magnitudes of these point estimates are small—representing less than 1 percent of mean distances in our sample—and none approach statistical significance, providing strong evidence that infrastructure access does not vary discontinuously at state borders in ways that might confound our regulatory effect estimates.

Environmental and geographic characteristics also pass our balance tests. Terrain ruggedness (column 5) shows no significant discontinuity, with a coefficient of 1.309. FEMA flood risk scores (column 6) exhibit a large point estimate of −30.880 but with a very large standard error of 56.218, rendering the coefficient statistically indistinguishable from zero and economically small relative to the substantial variation in flood risk scores across locations. Broadband carrier availability (column 7) similarly shows no evidence of a discontinuity, with a coefficient of −0.062.

The distance coefficients in the covariate balance regressions provide additional insight into the spatial structure of our data. The negative and significant coefficient on drive time for population density (column 1) indicates that population density declines as one moves away from state borders, a pattern consistent with the fact that many state borders run through less densely populated areas. Several other covariates show significant relationships with distance, but these spatial gradients are precisely what our identification strategy is designed to accommodate through the inclusion of flexible distance functions and their interactions with the treatment indicator.

The near-universal null results in Table 3 provide strong support for the validity of our identification strategy. If observable determinants of establishment location do not exhibit discontinuities at state borders, then this lends credibility to the assumption that unobservable determinants are

also likely to vary smoothly.

4.3 Robustness to Bin Width Specification

Table 4 presents our first major robustness check, examining the sensitivity of our baseline results to alternative specifications of the spatial bin width used to aggregate establishments. In our baseline analysis, we construct bins based on 1-minute increments of drive time to the nearest border crossing, yielding 100 bins (50 on each side of each border) within our 50-minute bandwidth. While this fine-grained spatial discretization has the advantage of preserving maximum variation in the distance dimension, it also means that bins in more sparsely populated areas may contain very few observations, potentially introducing noise into our density estimates.

[Table 4 here]

To assess whether our results are robust to the spatial aggregation level, we re-estimate our preferred quadratic specification using progressively coarser bin widths: 1.5 minutes (columns 1-2), 2 minutes (columns 3-4), and 2.5 minutes (columns 5-6). For each bin width, we report results both with and without our full set of geographic and environmental controls, examining both establishment counts (columns 1-6) and mean employment per establishment (columns 7-12). This robustness check serves two purposes. First, it tests whether the discrete choice of bin width meaningfully affects our discontinuity estimates. If results are highly sensitive to this specification, then it would raise concerns about the reliability of our baseline findings. Second, it provides a useful sensitivity analysis for the signal-to-noise ratio in our data; coarser bins may reduce measurement error in density estimates by averaging over larger geographic areas, potentially improving precision, but at the cost of reduced variation in the distance dimension.

The results in Table 4 demonstrate considerable stability in our estimated discontinuity across different bin width specifications for both margins of adjustment. For establishment counts, in the 1.5-minute bin width specification without controls (column 1), we estimate a coefficient of 0.0704 on the low regulations indicator, nearly identical to our baseline estimate of 0.0773 from Table 1. Adding the full set of controls in column (2) yields a coefficient of 0.0665, again very close to our baseline. This consistency persists across the 2-minute bins (columns 3-4), where we estimate coefficients of 0.0652 and 0.0605, and the 2.5-minute bins (columns 5-6), where we estimate coefficients

of 0.0667 and 0.0619. In all six specifications, the discontinuity remains positive, economically meaningful (ranging from 6.2 to 7.3 percent in percentage terms), and statistically significant at the 5 percent level or better.

For mean employment per establishment, the results show similar stability across bin width specifications. Coefficients range from 0.0224 to 0.0348 across the various specifications (columns 7-12), maintaining statistical significance in most cases and consistently indicating that establishments on the low-regulation side are 2-4 percent larger on average. The pattern of smaller intensive margin effects relative to extensive margin effects persists across all bin width specifications, reinforcing our interpretation that regulatory accumulation primarily affects location decisions rather than operational scale.

The slight decline in point estimates as we move to coarser bins is consistent with classical measurement error attenuation. As bins become wider, we aggregate establishments over larger geographic areas that are further from the border, which may introduce some averaging bias toward zero if the regulatory effect is strongest at the immediate border and decays with distance. However, the magnitude of this decline is quite modest. For establishment counts, the point estimate falls by less than 2 percentage points (from 7.7 to 6.2 percent) as we move from 1-minute to 2.5-minute bins—suggesting that the spatial decay of the regulatory effect is relatively gradual rather than extremely localized. For mean employment, estimates remain stable between 2.2 and 3.5 percent across specifications.

The sample sizes decline as expected with coarser bins: from 298,761 observations in our baseline 1-minute bins to 220,136 observations with 1.5-minute bins, 179,246 with 2-minute bins, and 150,940 with 2.5-minute bins. Despite these substantial reductions in sample size, standard errors remain similar or even decline slightly in some specifications, reflecting the improved signal-to-noise ratio from aggregating over larger areas. This pattern provides additional confidence that our baseline results are not driven by noise in sparsely populated bins but reflect genuine spatial patterns in establishment location and size decisions.

Overall, the evidence in Table 4 strongly supports the robustness of our baseline findings to the specific choice of spatial aggregation level. The estimated regulatory discontinuity remains economically and statistically significant across all bin width specifications for both establishment counts and mean employment. For establishment counts, point estimates vary by less than 20 percent

around our baseline estimate, ranging from 6.2 to 7.9 percent. For mean employment, coefficients range from 2.2 to 3.5 percent, maintaining the pattern that extensive margin effects are roughly 2-2.5 times larger than intensive margin effects. This stability across spatial aggregation levels indicates that our results reflect robust patterns of regulatory sorting evident at multiple levels of geographic resolution, rather than artifacts of arbitrary binning choices. The consistent finding that both margins respond to regulatory differentials, with the extensive margin showing stronger effects, reinforces our interpretation that regulatory accumulation primarily deters establishment entry rather than constraining the growth of establishments that do locate in high-regulation jurisdictions.

4.4 Robustness to Bandwidth Choice

Our baseline analysis includes all establishments within 50 minutes' drive time of the nearest border crossing, but this choice, while common in the spatial discontinuity literature, is inherently somewhat arbitrary. If our estimated discontinuity is driven by genuine regulatory effects that are strongest near borders, we should observe consistent results across a range of reasonable bandwidths. Conversely, if results are highly sensitive to bandwidth choice, it might suggest that our findings reflect spurious patterns specific to our chosen distance threshold rather than robust regulatory sorting. This section explores the sensitivity of the baseline estimates to different bandwidths. These estimates are presented in Table 5.

[Table 5 here]

We re-estimate our preferred quadratic specification with full controls using five different bandwidths: 30 minutes, 40 minutes, 50 minutes (our baseline), 60 minutes, and 75 minutes. This range spans from a relatively narrow bandwidth that restricts attention to areas very close to borders (where regulatory effects should be strongest but sample sizes are smaller) to a much wider bandwidth that includes establishments well into state interiors (where regulatory effects may be diluted by other locational considerations but sample sizes are larger). The pattern of results across these bandwidths provides insight into both the robustness of our findings and the spatial extent of regulatory sorting behavior. We examine both establishment counts (columns 1-5) and mean employment per establishment (columns 6-10).

The results reveal a consistent and precisely estimated regulatory discontinuity across all five bandwidth specifications for both outcomes. For establishment counts, in the narrowest 30-minute bandwidth (column 1), we estimate a coefficient of 0.0368 on the low regulations indicator. While this point estimate is somewhat smaller than our baseline and falls just short of conventional statistical significance, it still implies a 3.7 percent density advantage for the low-regulation side of borders. The reduced precision in this specification reflects the trade-off inherent in narrow bandwidths: we are focusing on areas where treatment effects should be largest, but we are doing so with a considerably smaller sample (N = 174,053 compared to 298,761 in the baseline).

As we expand the bandwidth to 40 minutes (column 2), both the point estimate and statistical significance increase. We now estimate a coefficient of 0.0469, significant at the 10 percent level, with a sample of 236,637 observations. This pattern continues with our baseline 50-minute bandwidth (column 3), which yields our familiar estimate of 0.0773, significant at the 1 percent level with 298,761 observations. Expanding further to 60 minutes (column 4) produces the largest point estimate in the table, 0.0825, representing an 8.6 percent density discontinuity with 364,790 observations.

Interestingly, when we expand to our widest 75-minute bandwidth (column 5), the point estimate moderates to 0.0586, still highly significant but somewhat smaller than the 50- and 60-minute specifications. This non-monotonic pattern is economically sensible and provides insight into the spatial structure of regulatory sorting. The initial increase in point estimates as we expand from 30 to 60 minutes likely reflects improving signal-to-noise ratios as sample sizes grow, combined with the fact that regulatory effects may extend beyond the immediate border area. However, as we push to 75 minutes, which includes establishments up to 75 minutes' drive time into state interiors, we begin incorporating firms whose location decisions may be dominated by factors other than border proximity and regulatory differentials, leading to attenuation of the estimated discontinuity.

For mean employment per establishment, the bandwidth sensitivity analysis reveals similar patterns but with smaller magnitudes throughout. Coefficients range from 0.0181 in the 30-minute bandwidth to 0.0401 in the 60-minute bandwidth (columns 6-9). The estimates are generally statistically significant and show the same non-monotonic pattern as establishment counts, peaking at the 60-minute bandwidth before declining at 75 minutes. The intensive margin effects remain consistently smaller than the extensive margin effects across all bandwidth specifications, with

the ratio of extensive to intensive margin effects ranging from approximately 2.0 to 2.5 across bandwidths. This persistent pattern reinforces our interpretation that regulatory sorting operates primarily through establishment location choices rather than through constraints on firm size.

The evidence in Table 5 provides support for the robustness of our baseline findings across both margins of adjustment. Across a wide range of bandwidth choices, we consistently find evidence of both higher establishment density and larger average establishment size on the low-regulation side of state borders. While point estimates vary somewhat across specifications, they remain economically meaningful and statistically significant in nearly all cases. For establishment counts, estimates range from 3.7 to 8.3 percent across bandwidths, while for mean employment they range from 1.8 to 4.0 percent. The pattern of results is economically coherent for both outcomes: effects are detectable but less precisely estimated in narrow bandwidths where sample sizes are limited, strengthen as we reach our baseline 50-60 minute bandwidth where we balance precision and localization, and begin to attenuate only when we extend so far into state interiors that many firms' location decisions become disconnected from border considerations.

This bandwidth sensitivity analysis speaks to both the robustness and external validity of our findings. The fact that we observe consistent regulatory sorting effects on both establishment location and size across a range of distances from borders suggests that regulatory competition influences firm behavior over meaningfully large geographic areas, not just in the immediate vicinity of state lines. A firm located 50 or 60 minutes from a border can still plausibly access markets on both sides while enjoying regulatory advantages from locating on the low-regulation side, indicating that the spatial market for regulatory competition extends over substantial distances. Moreover, the persistent finding that extensive margin effects exceed intensive margin effects across all bandwidth specifications provides strong evidence that our core interpretation (that regulatory accumulation primarily affects location decisions rather than operational scale) holds regardless of how we define the border region. This geographic breadth has important implications for evaluating the welfare effects of regulatory federalism and for understanding the practical limits of regulatory competition as a disciplining force on government policy.

4.5 Randomization Inference and Placebo Tests

Figure 4 presents results from randomization inference procedures that provide formal tests of the null hypothesis that our estimated regulatory discontinuities could have arisen by chance due to random assignment of which side of each border is designated as "low regulation." We conduct this analysis separately for both establishment counts (Panel A) and mean employment (Panel B). This nonparametric approach to inference is particularly valuable in settings like ours where the number of clusters (border pairs × industries) is large but finite, and where conventional asymptotic approximations for clustered standard errors may not fully capture the sampling distribution of our estimators under the null hypothesis of no treatment effect.

[Figure 4 here]

The randomization inference procedure works as follows. We randomly permute the low regulations indicator within each border pair × industry combination, effectively assigning the "low regulation" label to each side of the border with 50 percent probability, independent of the actual regulatory environment. We then re-estimate our preferred quadratic specification using this randomized treatment assignment and record the coefficient on the low regulations indicator. We repeat this procedure 20,000 times for each outcome variable, generating distributions of placebo treatment effects that represent what we would observe if regulatory differences had no causal effect on firm behavior and our baseline estimates arose purely from chance.

Panel A displays the distribution of placebo coefficients for establishment counts. The distribution is centered very close to zero, with a mean of approximately -0.0001 and a standard deviation of 0.012, confirming that our randomization procedure successfully generates a null distribution under the hypothesis of no regulatory effect. The distribution is roughly symmetric and approximately normal in shape, with the vast majority of placebo estimates falling between -0.03 and $+0.03$. Importantly, the distribution exhibits very thin tails, with only a tiny fraction of placebo estimates exceeding 0.05 in absolute value.

Our actual baseline coefficient of 0.077 (column 6 in Table 1) is marked with a red vertical line at the far right tail of the distribution, well beyond the bulk of placebo estimates. Not a single one of the 20,000 randomized permutations produces a coefficient as large as our actual estimate,

yielding a one-tailed p-value of $p < 0.00005$ (or $p < 1/20000$). This extraordinarily small p-value provides overwhelming evidence against the null hypothesis of no regulatory sorting effect. The probability that we would observe a discontinuity as large as 0.077 purely by chance is less than one in twenty thousand.

Panel B shows parallel results for mean employment per establishment. The placebo distribution is similarly centered near zero with a standard deviation of approximately 0.008, reflecting the smaller magnitudes typical of intensive margin effects. The distribution is again roughly symmetric and normal in shape, with the vast majority of estimates falling between -0.02 and $+0.02$. Our actual baseline coefficient of 0.035 (column 6 in Table 2) is marked with a red vertical line at the far right tail of the distribution. As with establishment counts, not a single one of the 20,000 placebo estimates exceeds this value, yielding a one-tailed p-value of $p < 0.00005$. This provides equally strong evidence against the null hypothesis for the intensive margin as for the extensive margin.

These extraordinarily small p-values provide very strong evidence against the null hypothesis of no regulatory sorting effect on either margin of firm behavior. The probability that we would observe discontinuities as large as our estimates purely by chance is less than one in twenty thousand for both outcomes. The fact that both the extensive and intensive margin effects lie in the 100th percentile of their respective placebo distributions (not just beyond the 95th or 99th percentile) indicates that our findings are not marginal results that barely cross conventional significance thresholds. Rather, they represent extremely unusual outcomes that would virtually never occur if regulatory differences had no effect on firm location and size decisions. This provides a high degree of confidence that we have identified genuine causal effects rather than spurious correlations arising from data mining, specification searching, or chance.

Several features of this randomization test deserve emphasis. First, it is entirely nonparametric and makes no assumptions about the functional form of standard errors or the distribution of our test statistics. We are directly computing the sampling distribution under the null hypothesis through repeated random permutation, then comparing our actual estimates to these empirical distributions. This approach is robust to arbitrary forms of heteroskedasticity, arbitrary correlation structures within border-pairs and industries, and any other violations of classical regression assumptions that might affect the validity of parametric standard errors.

Second, the randomization is conducted at the border-pair $\times$ industry level, which is the level at

which our treatment (regulatory differential) varies and the level at which we cluster our standard errors in our main specifications. This ensures that the randomization inference procedure respects the clustering structure of our data and accounts for any within-cluster correlation in establishment patterns. If, for example, establishments within the same industry along the same border tend to make correlated location decisions due to agglomeration effects or industry-specific local shocks, this correlation will be reflected in the variance of our placebo distributions.

Third, the fact that our actual estimates lie in the 100th percentile of the placebo distributions for both outcomes provides unusually strong evidence of treatment effects. Many well-regarded studies in spatial discontinuity designs report p-values in the 0.01 to 0.05 range; our p-values of less than 0.00005 indicate effects that are orders of magnitude less likely to have arisen by chance. This extraordinary statistical significance, combined with economically meaningful effect sizes, provides compelling evidence that regulatory accumulation materially affects firm location and size decisions near state borders.

The narrowness of the placebo distributions (standard deviation of 0.012 for establishment counts and 0.008 for mean employment) also provides information about the precision of our design. Despite the fact that we are analyzing nearly 300,000 establishment-distance bins across 89 border pairs and 77 industries, the distributions of estimates we would obtain under the null hypothesis are quite concentrated around zero. This indicates that our identification strategy effectively controls for confounding variation in establishment patterns, with border-pair $\times$ industry fixed effects and distance controls explaining a large share of the total variation. The regulatory effects we estimate stand out sharply against these low-variance null distributions, further strengthening our confidence in the results.

5 Extension to Industry Tradability

A central prediction of Tiebout-style models of interjurisdictional competition is that only mobile factors can effectively "vote with their feet" in response to policy differences. In the context of firm location decisions, this logic suggests that regulatory sorting may be more pronounced for establishments in tradable industries that can produce in one location while serving customers in distant markets. By contrast, non-tradable industries such as restaurants, retail stores, and personal services must locate near their customers and therefore face limited ability to relocate in response

to regulatory differentials while maintaining market access. This section tests whether regulatory sorting patterns vary systematically with industry tradability, examining both the extensive margin (establishment location) and intensive margin (establishment size).

We employ three complementary measures of industry tradability to ensure our results are robust to alternative classifications. First, we use the Gervais and Jensen (2019) tradability index, which builds on the methodology of Autor et al. (2013). This measure combines information on the geographic concentration of production, the ratio of exports to domestic shipments, and the distance over which industries typically ship their products. Industries such as manufacturing, wholesale trade, and information services score high on this index, while retail trade, accommodation and food services, and healthcare score low. Second, we employ the industry tradability classifications from Mian and Sufi (2014), who distinguish industries based on their responsiveness to local versus aggregate demand shocks. Non-tradable industries in their classification exhibit strong correlation between local economic conditions and performance, as they serve local customers, whereas tradable industries respond to national or global market conditions. This classification emphasizes whether an industry's customer base is geographically concentrated or dispersed. Third, we employ the Tian (2018) measure derived from Bureau of Economic Analysis trade flow data, which directly measures the share of industry output that is exported across state lines or internationally. This metric provides the most direct assessment of an industry's ability to serve distant markets, capturing both interstate and international trade patterns. While these three measures reflect somewhat different conceptualizations of tradability, such as geographic concentration, demand exposure, and direct trade flows, they are positively correlated and generate broadly similar industry rankings. Manufacturing, professional services, finance, and information technology consistently rank as highly tradable, while retail trade, food services, healthcare, and personal services consistently rank as non-tradable.

To test for heterogeneous treatment effects by tradability, we estimate an expanded version of our baseline specification that includes interactions between the regulatory treatment, distance from borders, and industry tradability. Specifically, we divide industries into quintiles based on each tradability measure, with the first quintile (least tradable industries) serving as the reference category. We then estimate:

$$\ln(Y_{bijp}) = \alpha + \beta \cdot \text{Low Regulations}_{ip} + f(\text{distance}_{bijp}) + \sum_{q=2}^{5} \gamma_q \cdot \text{TradQ}_q^j$$
$$+ \sum_{q=2}^{5} \delta_q \cdot \text{Low Regulations}_{ip} \times \text{TradQ}_q^j$$
$$+ \sum_{q=2}^{5} \lambda_q \cdot \text{Low Regulations}_{ip} \times f(\text{distance}_{bijp}) \times \text{TradQ}_q^j$$
$$+ X'_{bijp}\phi + \theta_{pj} + \epsilon_{bijp} \tag{4}$$

The coefficients δ_q capture how the border discontinuity varies across tradability quintiles, while the coefficients λ_q (specifically, the triple interaction with the linear distance term) capture how spatial gradients differ across quintiles. We estimate this specification separately for establishment counts (extensive margin) and mean employment per establishment (intensive margin). If highly tradable industries are more responsive to regulatory differentials, we would expect both δ_q and λ_q to increase with tradability.

Figure 5 presents the estimated heterogeneous treatment effects for establishment counts across tradability quintiles for all three measures. Panel A displays the two-way interaction coefficients (δ_q), which capture differences in the border discontinuity across tradability quintiles, while Panel B displays the triple interaction coefficients (λ_q), which capture differences in spatial gradients. The results reveal a striking and somewhat counterintuitive pattern. Panel A shows that the border discontinuity itself does not vary systematically with industry tradability. Across all three tradability measures, the two-way interaction coefficients cluster tightly around zero and are statistically indistinguishable from one another. This implies that at the immediate border (distance = 0), establishments in both highly tradable and non-tradable industries exhibit similar density differences between high- and low-regulation sides. The estimated discontinuity of approximately 7-8 percent documented in our baseline results appears to be a common feature across the tradability distribution.

[Figure 5 here]

In sharp contrast, Panel B reveals substantial heterogeneity in spatial gradients. The triple

interaction coefficients are uniformly positive and statistically significant, indicating that the gap in establishment density between regulatory regimes widens more rapidly with distance from the border for tradable industries than for non-tradable industries. However, the pattern across quintiles is non-monotonic and particularly strong for moderately tradable industries (Q2-Q3) rather than the most tradable industries (Q5). Specifically, using the Gervais and Jensen (2019) measure, the triple interaction coefficient for Q2 is 0.0100, highly significant and economically substantial. For Q3, the coefficient is 0.0130, representing the peak effect. However, for Q4 and Q5, the coefficients decline to 0.0036 and 0.0109, respectively, though Q5 remains positive and significant. This pattern is broadly consistent across all three tradability measures: moderately tradable industries (Q2-Q3) exhibit the largest triple interaction coefficients, while the most tradable industries (Q5) show smaller effects.

To interpret these magnitudes, consider an establishment in Q3 (moderately tradable) compared to one in Q1 (least tradable, the reference category). At the border itself, both industries show similar regulatory sorting, with approximately 7 percent higher density on the low-regulation side. However, as one moves 10 kilometers inland from the border, the Q3 industry accumulates an additional regulatory advantage of $0.0130 \times 10 = 0.130$ log points relative to Q1, or approximately 14 percent higher relative density. At 20 kilometers from the border, this cumulative advantage reaches $0.0130 \times 20 = 0.260$ log points, or roughly 30 percent higher relative density. While these effects are more modest than a naive reading of the coefficients might suggest, they remain economically meaningful: over distances of 30-40 kilometers from borders, moderately tradable industries accumulate regulatory advantages of 40-60 percent relative to non-tradable industries.

The absence of heterogeneity in border discontinuities but substantial heterogeneity in spatial gradients suggests that all industries (regardless of tradability) engage in some degree of border bunching, but only tradable industries sustain and amplify this regulatory advantage as distance from the border increases. This pattern is consistent with a model in which border proximity itself offers value to establishments (through cross-border market access or consumer traffic), but the ability to concentrate in low-regulation jurisdictions while serving distant markets varies with industry mobility. The least tradable industries (Q1), such as retail trade and food services, must locate near their customers and therefore cannot engage in substantial spatial sorting beyond the immediate border area. The near-zero triple interaction coefficients for Q1 (by construction, since

it is the reference category) reflect the fact that these industries show similar spatial decay patterns on both sides of the border because they must distribute themselves according to population density regardless of regulatory environment.

The non-monotonic relationship between tradability and spatial sorting admits several potential interpretations. One possibility is that the most tradable industries (Q5), such as manufacturing and finance, can serve distant markets from any location and therefore do not gain particular advantage from border proximity. These industries may locate based on other considerations such as access to major metropolitan areas, ports, or specialized labor markets, with regulatory costs being just one of many factors. By contrast, moderately tradable industries such as construction, business services, and professional services can serve regional markets spanning multiple states but still benefit from border proximity for maintaining access to customers on both sides. These industries appear to engage in strategic positioning, concentrating in low-regulation jurisdictions at increasing rates as distance from the border grows, but maintaining enough proximity to access cross-border markets.

An alternative interpretation focuses on the nature of regulatory costs across industries. If highly tradable industries face regulatory costs that are relatively uniform across jurisdictions (such as federal regulations that apply nationwide), then state-level regulatory differences may matter less for their location decisions despite their mobility. Conversely, if moderately tradable industries face state-specific regulations that vary substantially across borders (such as state-level licensing requirements, environmental permits, or local business regulations), they may be particularly responsive to these differences while still maintaining enough tradability to act on their preferences through location choices. This heterogeneity in regulatory exposure could explain why Q2-Q3 industries show the strongest spatial sorting patterns.

Figure 6 presents parallel results for mean employment per establishment, examining whether regulatory sorting on the intensive margin also varies with industry tradability. As with establishment counts, Panel A shows no systematic variation in the border discontinuity across tradability quintiles. The two-way interaction coefficients are small in magnitude and statistically insignificant across all three tradability measures, confirming that the 3-4 percent employment size advantage on the low-regulation side documented in our baseline results applies broadly across the tradability distribution. Panel B reveals much more modest heterogeneity in spatial gradients for the intensive

margin compared to the extensive margin. The triple interaction coefficients are generally smaller in magnitude—ranging from approximately 0.002 to 0.013 across tradability measures and quintiles and exhibit less systematic patterns. For the Gervais and Jensen (2019) measure, Q2 shows a coefficient of 0.0073, while Q3 peaks at 0.0086. The Mian and Sufi (2014) and Tian (2018) measures show similar magnitudes, with peak effects in the 0.008-0.013 range for middle quintiles.

[Figure 6 here]

The smaller magnitudes and less pronounced patterns for average employment relative to establishment counts reinforce our earlier finding that regulatory sorting operates primarily through the extensive margin rather than through the intensive margin. At a distance of 20 kilometers from the border, the cumulative advantage in employment size for Q3 establishments amounts to approximately $0.0086 \times 20 = 0.172$ log points, or roughly 19 percent. While statistically significant, this effect is smaller than the corresponding 30 percent advantage in establishment density, suggesting that regulatory competition affects the number of establishments more than their individual sizes. This differential responsiveness of the extensive versus intensive margins provides additional insight into the mechanism of regulatory sorting. The fact that establishment location shows stronger tradability-related heterogeneity than establishment size suggests that regulatory competition primarily influences entrepreneurs' initial decisions about where to locate new establishments rather than affecting how existing establishments grow over time. This pattern is consistent with regulatory costs operating primarily as fixed costs of entry, such as licensing fees, permitting requirements, and initial compliance setup, rather than as variable costs that scale with firm size. If regulations primarily raised variable costs, we would expect to see comparable heterogeneity on both margins, as establishments in high-regulation areas would remain small to minimize ongoing compliance burdens.

From a policy perspective, these results have important implications for understanding the distributional effects of regulatory competition. If regulatory sorting primarily affects moderately tradable industries concentrated in border regions, then the economic impact of regulatory reforms may be particularly pronounced for specific sectors and geographic areas rather than uniformly distributed across the economy. States seeking to attract business through regulatory reforms should anticipate the strongest responses from industries with regional rather than national market

scope, and should recognize that these responses may manifest primarily through spatial reallocation within border regions rather than wholesale relocations from state interiors. The findings also speak to broader debates about federalism and regulatory competition. The fact that spatial sorting is most pronounced for industries with moderate rather than perfect mobility suggests that regulatory competition operates most effectively when firms face meaningful constraints on their location choices. If all industries were perfectly mobile, regulatory competition might be so intense as to create a race to the bottom; if no industries were mobile, competition would be absent. The observed pattern, with strongest effects in the middle of the tradability distribution, suggests that regulatory federalism generates localized competitive pressure that is economically consequential but bounded by the geographic scope of firms' market access requirements.

6 Conclusion

This paper provides the first well-identified evidence that the accumulation of state-level regulations systematically influences firm location decisions near state borders. Using a spatial regression discontinuity design that compares establishment patterns in narrow geographic bands on opposite sides of 89 state border pairs, we find that establishment density is approximately 8 percent higher on the low-regulation side of state boundaries, with establishments also being roughly 3.6 percent larger on average. These effects are robust to alternative specifications of spatial bin widths, bandwidths, functional forms, and control variables, and placebo tests based on randomization inference.

Several features of our results provide insight into the mechanisms through which regulatory competition operates. First, the fact that sorting effects are substantially larger on the extensive margin (establishment location) than the intensive margin (establishment size) suggests that regulatory accumulation primarily imposes fixed costs of entry and compliance rather than variable costs that scale with firm operations. This interpretation is consistent with regulatory burdens arising from licensing requirements, permitting processes, and administrative setup costs that deter new establishment entry but matter less for operational scale once these fixed costs are incurred. Second, the asymmetric spatial gradients we document, with establishment density declining more steeply on the high-regulation side of borders than on the low-regulation side, reveal that firms actively optimize their position relative to state boundaries, clustering close to borders on the

low-regulation side to maintain market access while minimizing regulatory burdens.

Our heterogeneity analysis yields a particularly striking finding: while the border discontinuity itself does not vary with industry tradability, spatial gradients differ dramatically across industries, with the strongest effects concentrated among moderately tradable industries (Q2-Q3) rather than the most tradable sectors (Q5). This non-monotonic pattern suggests that regulatory competition operates most powerfully for industries that face meaningful constraints on their location choices but retain sufficient mobility to act on their preferences. Industries with very high mobility/tradability may locate based on considerations other than regulatory costs, while industries with minimal mobility must distribute themselves according to population density regardless of regulatory environment. The middle of the tradability distribution, which comprises industries such as construction, business services, and professional services, appears to engage in strategic spatial positioning, concentrating increasingly in low-regulation jurisdictions as distance from borders grows while maintaining proximity for regional market access.

These findings have important implications for policy debates about regulatory federalism and interjurisdictional competition. The evidence that firms systematically sort across state boundaries in response to regulatory accumulation vindicates the Tiebout hypothesis that interjurisdictional competition can serve as a disciplining force on government policy. States with burdensome regulatory environments face competitive pressure from neighboring jurisdictions, as establishments relocate to escape excessive regulation while maintaining access to markets on both sides of borders. This competitive dynamic may provide incentives for states to rationalize their regulatory codes, eliminate outdated or duplicative regulations, and focus regulatory efforts on areas where genuine market failures or public interest concerns justify government intervention.

However, our results also suggest important limitations on the disciplining power of regulatory competition. The fact that spatial sorting effects extend only 50-75 kilometers from borders indicates that regulatory competition influences firm location decisions over economically meaningful but geographically bounded areas. Establishments located deep in state interiors face prohibitive costs of relocating to borders and therefore experience little competitive pressure from neighboring jurisdictions' policies. This geographic limitation implies that regulatory competition may be insufficient to fully discipline state governments, particularly in large states where most economic activity occurs far from borders. Moreover, the concentration of sorting effects among moderately

tradable industries suggests that many sectors—including crucial components of the service economy such as healthcare, retail, and personal services—face limited ability to respond to regulatory differentials, further circumscribing the scope of competitive discipline.

The distributional implications of regulatory sorting also warrant consideration. To the extent that regulatory competition induces spatial reallocation of establishments toward low-regulation border regions, it may exacerbate economic inequality across localities within states. Interior regions in high-regulation states may experience establishment losses without enjoying offsetting benefits, while border regions in low-regulation states may experience establishment gains that strain local infrastructure and services. These spatial redistributions could create political economy challenges, as the benefits of regulatory reform (concentrated in border regions that attract establishments) may be separated from the costs (borne by interior regions that lose establishments or by residents who value the public goods that regulations provide).

Our findings also speak to methodological debates in the regulatory economics literature. The fact that we estimate economically substantial effects of regulatory accumulation on establishment location that are comparable in magnitude to those found for specific high-profile regulations such as minimum wages and occupational licensing suggests that the cumulative burden of regulatory accumulation matters at least as much as any single regulation. This result helps reconcile earlier mixed findings in the literature about whether federal regulatory accumulation affects entrepreneurship. The stronger identification afforded by spatial discontinuity designs at state borders, combined with our comprehensive measure of state-level regulatory stringency, allows us to isolate regulatory effects that might be confounded in cross-sectional or time-series analyses at broader geographic scales.

Several limitations of our analysis suggest directions for future research. First, our measure of regulatory stringency, based on counting restrictive terms in state administrative codes, captures the quantity of regulations but not their content, stringency, or enforcement. Future work could examine whether particular types of regulations (environmental, labor, consumer protection, etc.) exert differential effects on firm location, or whether regulatory complexity and administrative burden matter beyond simple restriction counts. Second, our focus on establishment location and size leaves open questions about other margins of firm response, such as exit rates, establishment births, productivity, and innovation. Regulatory sorting through location decisions may be only one chan-

nel through which regulatory competition affects economic outcomes. Third, our cross-sectional design identifies spatial patterns but cannot fully separate regulatory effects from other state-level policies that may correlate with regulatory accumulation, such as taxes, labor market regulations, or infrastructure investment. Future research exploiting within-state variation in regulations over time, combined with spatial discontinuity methods, could provide complementary evidence on these margins.

Finally, our results raise important questions about the welfare implications of regulatory competition. While our evidence demonstrates that firms respond to regulatory differentials by sorting across borders, we cannot directly assess whether this spatial reallocation improves allocative efficiency or simply reflects wasteful regulatory arbitrage. If regulations provide genuine public benefits—protecting consumers, workers, or the environment, then firm sorting toward low-regulation jurisdictions may represent welfare-reducing evasion of socially beneficial rules rather than welfare-enhancing escape from bureaucratic excess. Conversely, if regulations primarily reflect rent-seeking by incumbents or overreach by bureaucrats, then spatial sorting may improve welfare by allowing entrepreneurs to locate in jurisdictions that better match their preferences and by creating competitive pressure for regulatory reform. Distinguishing between these scenarios requires careful analysis of specific regulatory domains and their effects on various stakeholders and is an important agenda for future research.

Notwithstanding these limitations, our findings provide compelling evidence that regulatory accumulation influences firm location decisions in economically meaningful ways and that interjurisdictional competition serves as a consequential disciplining mechanism on state regulatory policy. The laboratory of democracy functions, with establishments voting with their feet to escape burdensome regulations, though the geographic and sectoral scope of this competitive discipline is bounded by the tradability of industries and the distance over which firms can feasibly relocate while maintaining market access.

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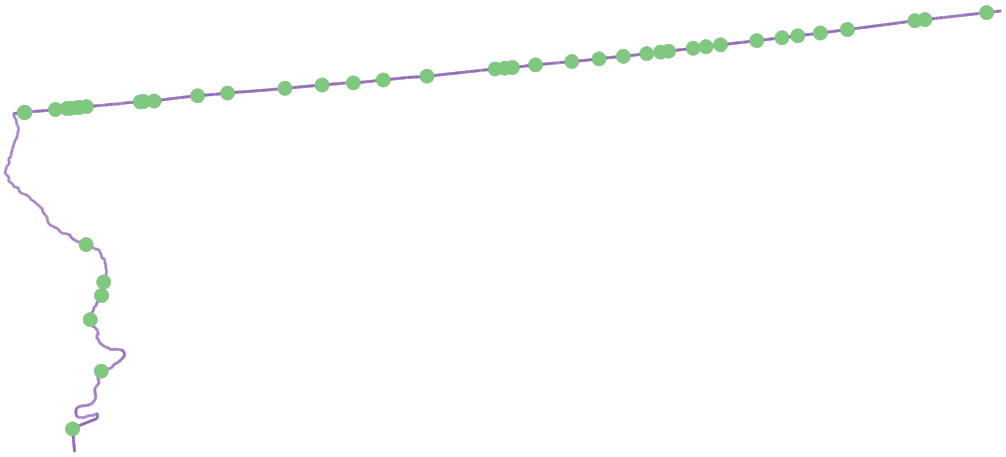
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Figure 1: State by Industry Regulatory Heatmap: 2022



Notes: Total state by industry regulatory counts are from the State RegData (McLaughlin et al. 2021). The figure only depicts state-industry regulation counts if industry data are available for state border pairs. Darker colors indicate a larger number of total regulations for a given state-industry combination.

Figure 2: Road Crossings at Alabama-Florida Border



Source: Open Street Maps. There are a total of 50 road crossings along the Alabama-Florida shared border.

Table 1: Baseline Establishment Density Discontinuity

	Dependent variable:					
	log(establishment count)					
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
low regulations	0.0432*	0.0546**	0.0576***	0.0549**	0.0687***	0.0773***
	(0.0257)	(0.0212)	(0.0210)	(0.0279)	(0.0230)	(0.0229)
drive time to border	-0.0096***	-0.0103***	-0.0099***	-0.0310***	-0.0321***	-0.0322***
	(0.0011)	(0.0008)	(0.0008)	(0.0027)	(0.0023)	(0.0022)
low regulations*drive time	0.0153***	0.0176***	0.0169***	0.0569***	0.0596***	0.0593***
	(0.0019)	(0.0014)	(0.0014)	(0.0049)	(0.0043)	(0.0043)
drive time^2				-0.0004***	-0.0004***	-0.0004***
				(0.0000)	(0.0000)	(0.0000)
low regulation*drive time^2				0.0000	0.0000	0.0000
				(0.0001)	(0.0000)	(0.0000)
population density		0.0090***	0.0083***		0.0091***	0.0084***
		(0.0008)	(0.0008)		(0.0008)	(0.0008)
closest airport km		-0.0299***	-0.0229***		-0.0300***	-0.0232***
		(0.0013)	(0.0013)		(0.0013)	(0.0013)
closest rail yard km		-0.0064***	-0.0054***		-0.0064***	-0.0054***
		(0.0005)	(0.0004)		(0.0005)	(0.0004)
closest msa km		-0.0033***	-0.0028***		-0.0032***	-0.0027***
		(0.0004)	(0.0003)		(0.0003)	(0.0003)
road ruggedness			-0.0011***			-0.0011***
			(0.0001)			(0.0001)
fema risk			0.0000***			0.0000***
			(0.0000)			(0.0000)
broadband carriers			0.0356***			0.0367***
			(0.0032)			(0.0033)
N	298761	298761	298761	298761	298761	298761
Border FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

This table presents estimates of the establishment density discontinuity at state borders using a spatial regression discontinuity design. The dependent variable is the natural logarithm of the number of establishments within each bin. The sample includes all establishments within 50 minutes' drive time of state borders, aggregated into 1 minute bins. Columns (1)-(3) show linear specifications and columns (4)-(6) show quadratic specifications. Standard errors are clustered at the border and industry dimensions and reported in parentheses. *** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. All regressions include fixed effects and a constant term that are not reported.

Table 2: Mean Establishment Employment Density Discontinuity

	Dependent variable:					
	log(mean employment)					
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
low regulations	0.0274**	0.0290***	0.0312***	0.0217	0.0273**	0.0351***
	(0.0112)	(0.0103)	(0.0101)	(0.0144)	(0.0136)	(0.0133)
drive time to border	-0.0008**	-0.0012***	-0.0009***	-0.0052***	-0.0055***	-0.0060***
	(0.0004)	(0.0003)	(0.0003)	(0.0011)	(0.0011)	(0.0010)
low regulations*drive time	0.0004	0.0012**	0.0008	0.0098***	0.0102***	0.0106***
	(0.0007)	(0.0005)	(0.0005)	(0.0019)	(0.0017)	(0.0017)
drive time^2				-0.0001***	-0.0001***	-0.0001***
				(0.0000)	(0.0000)	(0.0000)
low regulation*drive time^2				0.0000	0.0000	0.0000
				(0.0000)	(0.0000)	(0.0000)
population density		0.0007**	0.0003		0.0007**	0.0003
		(0.0003)	(0.0003)		(0.0003)	(0.0003)
closest airport km		-0.0170***	-0.0141***		-0.0171***	-0.0141***
		(0.0008)	(0.0008)		(0.0008)	(0.0008)
closest rail yard km		-0.0030***	-0.0025***		-0.0030***	-0.0025***
		(0.0002)	(0.0002)		(0.0002)	(0.0002)
closest msa km		-0.0012***	-0.0010***		-0.0012***	-0.0010***
		(0.0002)	(0.0002)		(0.0002)	(0.0002)
road ruggedness			-0.0004***			-0.0004***
			(0.0001)			(0.0001)
fema risk			0.0000***			0.0000***
			(0.0000)			(0.0000)
broadband carriers			0.0323***			0.0326***
			(0.0016)			(0.0016)
N	298761	298761	298761	298761	298761	298761
Border FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

This table presents estimates of the establishment employment density discontinuity at state borders using a spatial regression discontinuity design. The dependent variable is the natural logarithm of mean employment per establishment within each bin. The sample includes all establishments within 50 minutes' drive time of state borders, aggregated into 1 minute bins. Columns (1)-(3) show linear specifications and columns (4)-(6) show quadratic specifications. Standard errors are clustered at the border and industry dimensions and reported in parentheses. *** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. All regressions include fixed effects and a constant term that are not reported.

Figure 3: Raw Data Bins Plotted (All Industries)

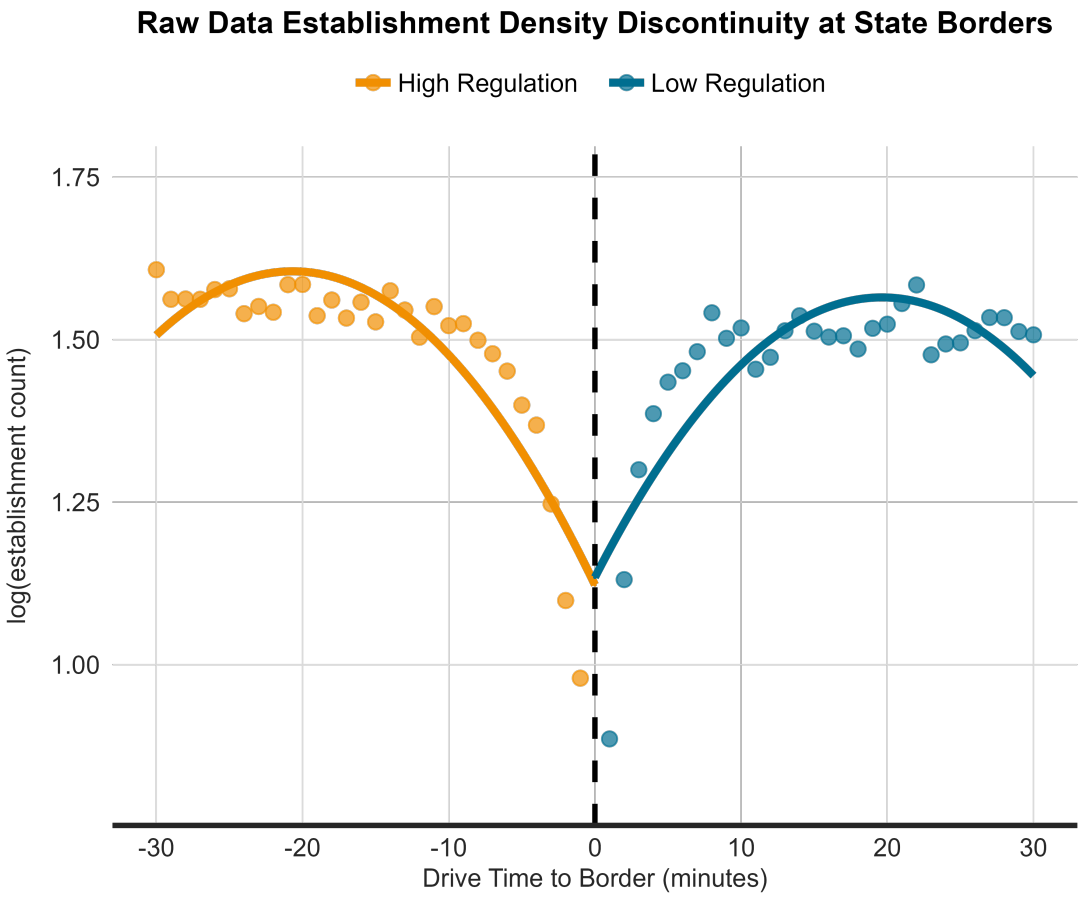


Table 3: Covariate Balance Tests

	Dependent variable:						
	pop density	distance to airport km	distance to rail km	closest msa km	area tri range	fema risk	bbcarrier
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS
low regulations	-1.0085	0.0272	-0.2222	0.8956	1.3091	-30.8799	-0.0620
	(0.8581)	(0.0752)	(0.4472)	(0.6115)	(1.0328)	(56.2175)	(0.0486)
drive time to border	-0.0449**	0.0014	0.0003	-0.0111	0.0201	0.7419	-0.0013
	(0.0206)	(0.0014)	(0.0091)	(0.0109)	(0.0274)	(0.7083)	(0.0009)
drive time^2	-0.0007	0.0001**	0.0021***	-0.0004	-0.0014**	-0.0491***	0.0001***
	(0.0006)	(0.0000)	(0.0003)	(0.0004)	(0.0006)	(0.0157)	(0.0000)
N	298761	298761	298761	298761	298761	298761	298761
Border FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table presents covariate balance tests to assess the validity of the regression discontinuity design. Each column reports results from a separate regression where the dependent variable is the specified covariate. The key coefficient of interest is on the low regulation indicator, which tests whether each covariate exhibits a discontinuity at state borders. The sample includes all observations within 50 minutes' drive time of state borders, aggregated into 1 minute bins. All regressions include border fixed effects and control for quadratic distance from the border. Standard errors are clustered at the border and industry dimensions and reported in parentheses. *** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

Table 4: Robustness Check: Expanded Bin Widths

	Dependent variable:											
	log(establishments)						log(mean employment)					
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) OLS	(8) OLS	(9) OLS	(10) OLS	(11) OLS	(12) OLS
low regulations	0.0711***	0.0793***	0.0638**	0.0718***	0.0648**	0.0747***	0.0275*	0.0348**	0.0224	0.0291*	0.0302*	0.0379**
	(0.0244)	(0.0244)	(0.0262)	(0.0262)	(0.0280)	(0.0280)	(0.0153)	(0.0149)	(0.0162)	(0.0159)	(0.0174)	(0.0170)
drive time to border	-0.0362***	-0.0363***	-0.0376***	-0.0377***	-0.0393***	-0.0393***	-0.0057***	-0.0061***	-0.0056***	-0.0061***	-0.0060***	-0.0065***
	(0.0025)	(0.0024)	(0.0025)	(0.0025)	(0.0026)	(0.0026)	(0.0011)	(0.0011)	(0.0012)	(0.0011)	(0.0013)	(0.0012)
drive time^2	-0.0005***	-0.0005***	-0.0005***	-0.0005***	-0.0005***	-0.0005***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
low regulations*drive time	0.0683***	0.0679***	0.0722***	0.0718***	0.0762***	0.0757***	0.0105***	0.0109***	0.0106***	0.0112***	0.0109***	0.0113***
	(0.0046)	(0.0046)	(0.0048)	(0.0048)	(0.0049)	(0.0049)	(0.0019)	(0.0018)	(0.0019)	(0.0019)	(0.0020)	(0.0019)
low regulation*drive time^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
population density	0.0100***	0.0093***	0.0110***	0.0102***	0.0115***	0.0106***	0.0009***	0.0004	0.0009***	0.0004	0.0010***	0.0005
	(0.0009)	(0.0009)	(0.0010)	(0.0009)	(0.0010)	(0.0010)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
closest airport km	-0.0335***	-0.0259***	-0.0359***	-0.0278***	-0.0376***	-0.0291***	-0.0169***	-0.0138***	-0.0169***	-0.0141***	-0.0166***	-0.0139***
	(0.0014)	(0.0015)	(0.0015)	(0.0016)	(0.0016)	(0.0017)	(0.0008)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0010)
closest rail yard km	-0.0066***	-0.0055***	-0.0068***	-0.0057***	-0.0069***	-0.0056***	-0.0029***	-0.0024***	-0.0030***	-0.0025***	-0.0029***	-0.0024***
	(0.0005)	(0.0005)	(0.0006)	(0.0005)	(0.0006)	(0.0006)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0002)
closest msa km	-0.0035***	-0.0029***	-0.0036***	-0.0030***	-0.0039***	-0.0032***	-0.0012***	-0.0009***	-0.0011***	-0.0008***	-0.0011***	-0.0008***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
road ruggedness		-0.0012***		-0.0013***		-0.0013***		-0.0004***		-0.0003***		-0.0003***
		(0.0001)		(0.0001)		(0.0001)		(0.0001)		(0.0001)		(0.0001)
fema risk		0.0000***		0.0000***		0.0000***		0.0000***		0.0000***		0.0000***
		(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)
broadband carriers		0.0401***		0.0433***		0.0470***		0.0347***		0.0357***		0.0361***
		(0.0036)		(0.0039)		(0.0042)		(0.0018)		(0.0019)		(0.0020)
N	220136	220136	179246	179246	150940	150940	220136	220136	179246	179246	150940	150940
Border FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bin Width (minutes)	1.5	1.5	2	2	2.5	2.5	1.5	1.5	2	2	2.5	2.5

This table presents estimates of the establishment density discontinuity at state borders using a spatial regression discontinuity design. The samples include all establishments within 50 minutes' drive time of state borders but varies the driving time bin width across specifications. Standard errors are clustered at the border and industry dimensions and reported in parentheses. *** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. All regressions include fixed effects and a constant term that are not reported.

Table 5: Robustness Check: Bandwith Sensitivity

	Dependent variable:									
	log(establishments)					log(mean employment)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
low regulations	0.0368	0.0469*	0.0773***	0.0825***	0.0586**	0.0181	0.0271*	0.0351***	0.0401***	0.0384***
	(0.0257)	(0.0249)	(0.0229)	(0.0232)	(0.0242)	(0.0167)	(0.0146)	(0.0133)	(0.0127)	(0.0121)
drive time to border	-0.0671***	-0.0470***	-0.0322***	-0.0227***	-0.0175***	-0.0126***	-0.0088***	-0.0060***	-0.0027***	-0.0020***
	(0.0041)	(0.0027)	(0.0022)	(0.0020)	(0.0017)	(0.0020)	(0.0012)	(0.0010)	(0.0008)	(0.0006)
drive time^2	-0.0015***	-0.0008***	-0.0004***	-0.0002***	-0.0001***	-0.0003***	-0.0002***	-0.0001***	0.0000**	0.0000*
	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
low regulations*drive time	0.1348***	0.0930***	0.0593***	0.0398***	0.0324***	0.0262***	0.0175***	0.0106***	0.0034**	0.0023**
	(0.0079)	(0.0053)	(0.0043)	(0.0037)	(0.0030)	(0.0032)	(0.0022)	(0.0017)	(0.0014)	(0.0011)
low regulation*drive time^2	-0.0001	-0.0001	0.0000	0.0000*	0.0000	-0.0001	0.0000	0.0000	0.0000	0.0000**
	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
population density	0.0070***	0.0078***	0.0084***	0.0092***	0.0102***	0.0001	0.0002	0.0003	0.0004	0.0004
	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.0010)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
closest airport km	-0.0234***	-0.0234***	-0.0232***	-0.0220***	-0.0217***	-0.0150***	-0.0141***	-0.0141***	-0.0141***	-0.0141***
	(0.0015)	(0.0014)	(0.0013)	(0.0012)	(0.0011)	(0.0009)	(0.0008)	(0.0008)	(0.0007)	(0.0007)
closest rail yard km	-0.0039***	-0.0046***	-0.0054***	-0.0062***	-0.0066***	-0.0022***	-0.0024***	-0.0025***	-0.0028***	-0.0030***
	(0.0005)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
closest msa km	-0.0024***	-0.0025***	-0.0027***	-0.0030***	-0.0029***	-0.0011***	-0.0010***	-0.0010***	-0.0011***	-0.0009***
	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
road ruggedness	-0.0009***	-0.0011***	-0.0011***	-0.0011***	-0.0011***	-0.0003***	-0.0004***	-0.0004***	-0.0004***	-0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)
fema risk	0.0000***	0.0000***	0.0000***	0.0000***	0.0000**	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
broadband carriers	0.0318***	0.0314***	0.0367***	0.0363***	0.0368***	0.0317***	0.0325***	0.0326***	0.0321***	0.0329***
	(0.0031)	(0.0030)	(0.0033)	(0.0032)	(0.0031)	(0.0020)	(0.0018)	(0.0016)	(0.0016)	(0.0015)
N	174053	236637	298761	364790	464832	174053	236637	298761	364790	464832
Border FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Max Bandwidth (minutes)	30	40	50	60	75	30	40	50	60	75

This table presents estimates of the establishment density discontinuity at state borders using a spatial regression discontinuity design. The dependent variable is the natural logarithm of the number of establishments or mean employment within 1 driving time bins. The maximum drive time (or distance) varies across specifications as follows: 30 minutes, 40, 50, 60, and 75. Standard errors are clustered at the border and industry dimension and reported in parentheses. *** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. All regressions include fixed effects and a constant term that are not reported.

Figure 4: Randomization Inference Placebo Tests

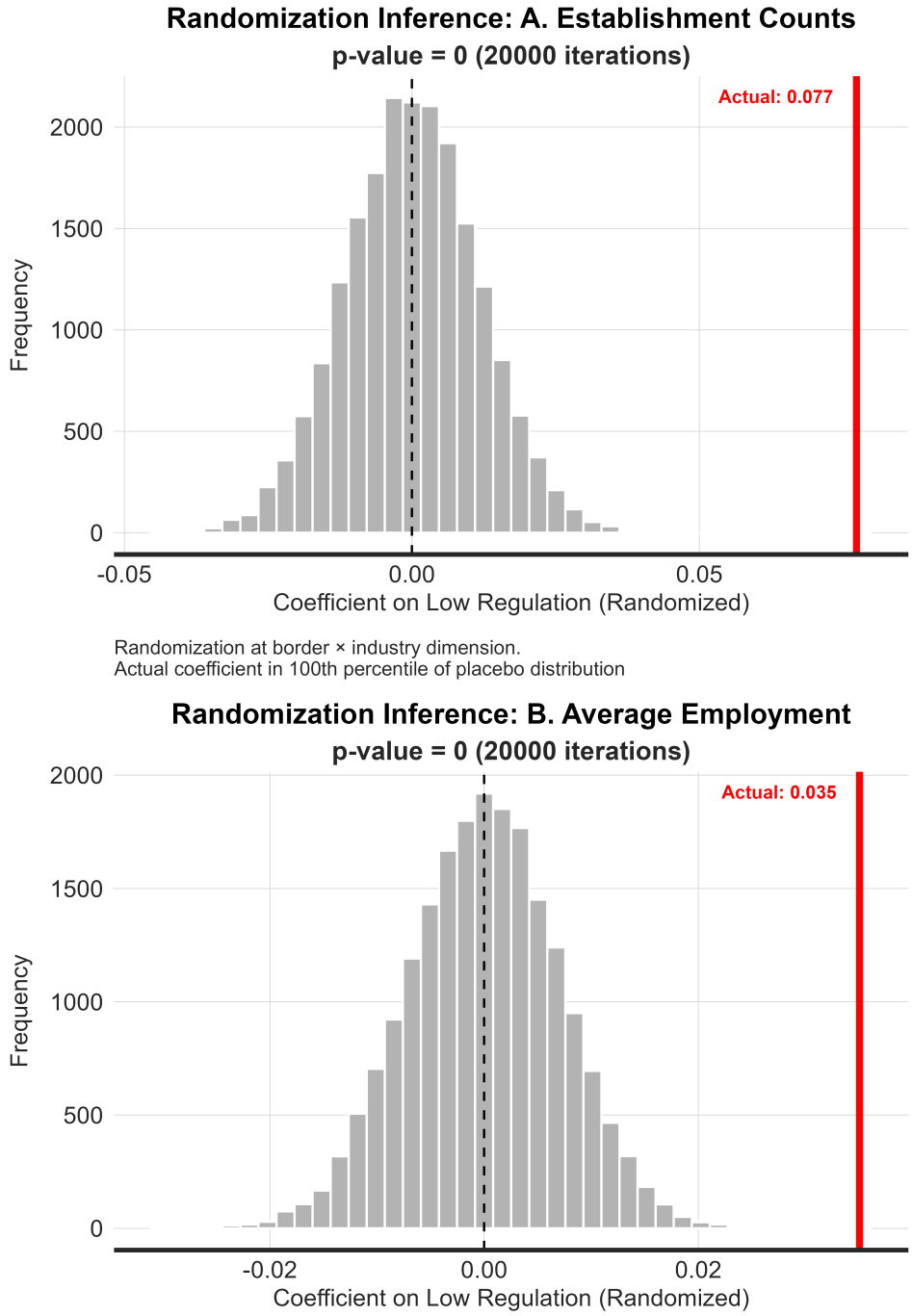
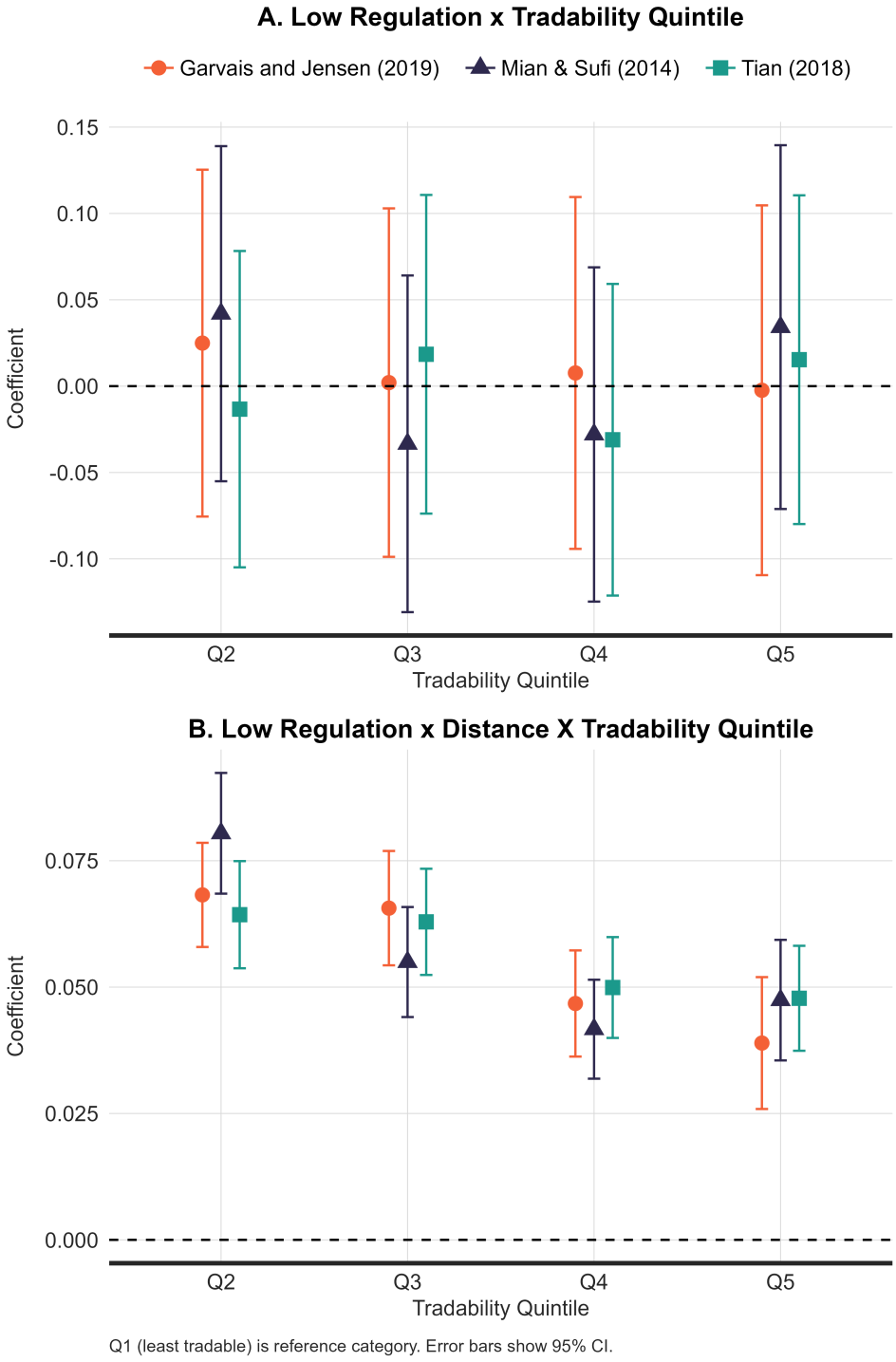
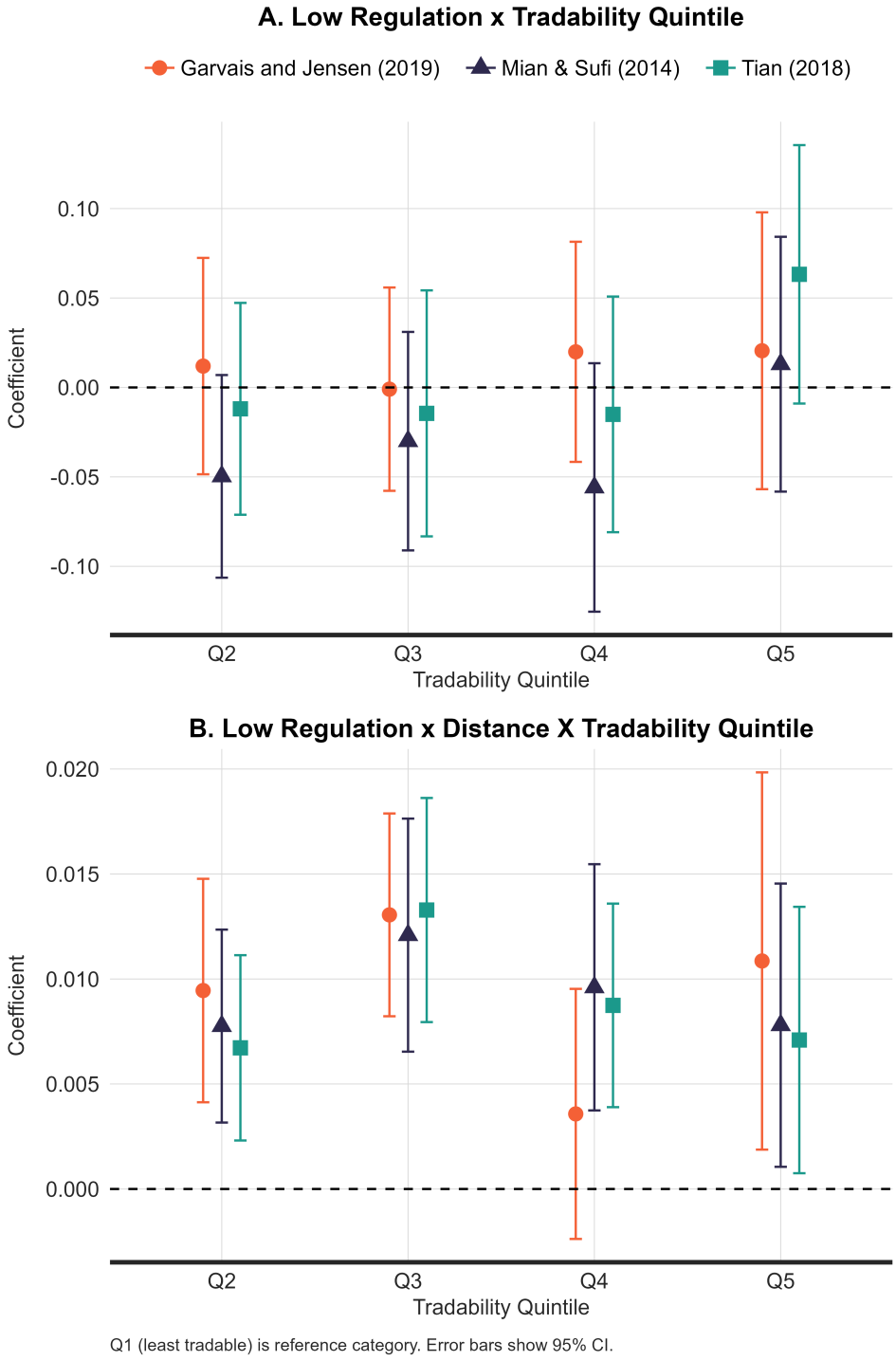


Figure 5: Heterogeneity by Industry Tradability: Establishment Counts



Notes: Notes: Panel A shows how the border discontinuity (low regulation × tradability) varies across tradability quintiles. Panel B shows how spatial gradients (low regulation × distance × tradability) vary across tradability quintiles. Q1 (least tradable) is the reference category. Error bars show 95% confidence intervals.

Figure 6: Heterogeneity by Industry Tradability: Mean Establishment Employment



Notes: Notes: Panel A shows how the border discontinuity (low regulation × tradability) varies across tradability quintiles. Panel B shows how spatial gradients (low regulation × distance × tradability) vary across tradability quintiles. Q1 (least tradable) is the reference category. Error bars show 95% confidence intervals.