A Tax-Shaped Retail Landscape

Feng Chi* Limin Fang† Mengwei Lin‡ Nathan Yang§

July 12, 2023

Abstract

We investigate the impact that uniform "one-size-fits-all" tax policies have on shaping the retail landscape. An entry model demonstrates that tax effects on retailer entry can amplify market concentration, such that retailers with preexisting brand power advantages are disproportionately responsive to tax policies that impact the sunk costs of entry. Using comprehensive data about all retail establishments in the United States from 1990 to 2014, we show that while they are more likely to open in markets with favorable state tax policies, these markets become more concentrated as entry is dominated by the largest chains. Therefore, tax policies might impact the retail industry competitiveness, despite the policies' uniform design.

Keywords: Business Dynamism; Firm Size; Market Power; Place-Based Policies; Public Finance; Retail Landscape; Spatial Discontinuity; Tax Incentives; Urban Policy

*Cornell University, SC Johnson College of Business. Email: fc354@cornell.edu.

†University of British Columbia, Sauder School of Business. Email: limin.fang@sauder.ubc.ca.

‡Cornell University, SC Johnson College of Business. Email: ml2622@cornell.edu.

§Cornell University, SC Johnson College of Business. Email: ncy6@cornell.edu.

We are grateful for helpful discussions with Panle Jia Barwick, Yao Cui, Kory Kroft, Jura Liaukonyte, Nathan Miller, Cailin Slattery and Brian Wenzel, as well as conference/workshop participants at University of Hong Kong, Xiamen University, and Zhejiang University.

1 Introduction

Place-based tax policies are often designed with the understanding that they may impact firm entry as taxes that relate to property, purchased inputs/equipment, job creation/training, investment, research, and property are all incurred by firms as a component of the sunk entry cost. Moreover, in industries with small trade areas (e.g., retail), geographic markets can often only support a handful of firms that serve a localized set of customers. A relevant question then is whether certain types of firms will be disproportionately responsive to such tax policies.

A natural way to characterize firms in the retail industry is by their existing size. Retailers with extensive existing geographic coverage benefit from the brand equity/recognition as well as potential customer loyalty (e.g., national ad campaigns and sales promotions, reward programs). Intuitively, what this advantage suggests is that the already large and powerful retailers have *more* to gain from entering geographic markets, as compared with smaller retailers with *less* brand power. Therefore, a uniform "one-size-fits-all" tax policy that impacts the sunk cost of entry might potentially lead to asymmetric responses among retailers, depending on their existing size.

In light of this intuitive speculation, our research aims to develop a better understanding between the relationship between retailer power and uniform tax policies. We begin by exploring theoretically, whether or not differences in brand power across competing retailers can lead to asymmetric responses to uniform tax policies that impact (i.e., reduce or increase) fixed entry costs. A solution of the model's equilibrium confirms that brand power can indeed be responsible for these asymmetric responses to tax policies. Another way of interpreting our theoretical result is that favorable tax policies may lead to *more* concentrated markets, as large retailers with stronger brand recognition will be disproportionately responsive to such policies. Our empirical analysis aims to test this theoretically-motivated hypothesis.

To test our hypothesis, we study establishment entry in the US retail industry from 1990 to 2014, and analyze how retail entry patterns differ across states with varying tax policies. Identifying the causal effects of these tax policies is non-trivial, in light of potential confounds due to tax policies being set in anticipation of expected business activity in the future. Moreover, tax policies and establishment growth might be impacted by the same underlying economic conditions. To circumvent these identification issues, we use border identification methods augmented with flexible controls for geographic heterogeneity (Dell 2010, Holmes 1998). This empirical investigation yields a few insights. We first confirm that higher net taxes will indeed lead to lower retail establishment counts, and that this reduction is much more pronounced for larger retail firms than smaller firms. Further analysis using measures of market concentration, such as HHI, reveal that these tax policies appear to be stimulating establishment growth among the largest chains.[1] Taken together, these findings underscore that tax policies can indeed shape the retail landscape as well as its competitiveness and diversity.

The empirical patterns we uncover seem consistent with the backdrop of rising market concentration in retail. Much of the growth in certain retail sectors have been attributed to the largest firms, which has been the subject of both historical and modern anecdotal accounts of the accelerated growth of large retail chains occurring at the same time as the demise of smaller chains (Meyersohn 2021, Weld 1924). In particular, large national chains have increasingly dominated the retail trade industry (Foster et al. 2016), where these patterns were first observed in the 1950s (Segall 1955). For some industries, the top 1% of firms "expanded the number of markets per firm more than twice as fast as the average firm" (Hsieh and Rossi-Hansberg 2022). At the same time, critics of place-based tax policies, such as the prominent NY State Empire Zone (Commission 2008) suggest that the retailer responsiveness to such policies seem to be concentrated towards the largest retailers:

> The benefits are highly concentrated. Of the approximately 5,000 firms that

[1] Here, we interpret large chains as those with the ability to capture market shares, as physical stores themselves have been shown to increase customer value as manifested via re-patronage (Zhang et al. 2022).

> claimed credits in 2006, just 500 claimed almost $391 million, or 76 percent, of the $514 million total... Within that group of 500 firms, a handful account for $100 million... Many of the large corporations are "big box" retailers. Of the 25 firms among the Fortune 1000 that received Empire Zone credits 11 were retail chains. The firms - Wal-Mart, Home Depot, Costco, Target, Walgreen's, Lowe's, Staples, Kohl's, Family Dollar, Radio Shack, and Dick's Sporting Goods - got $30 million in credits.

We contribute towards two main areas of literature. First, we add to the study of local or national government policies and their impact on local businesses. Some examples include the impact of right-to-work laws on manufacturer entry (Holmes 1998), land use zoning regulation's impact on retail (Bertrand and Kramarz 2002, Suzuki 2013), information waves caused by census data releases (Chi 2022), and the effects of business improvement districts targeting retail (Shoag and Veuger 2018). Most relevant to us is the growing body of work about the impact of place-based tax policies on firm investment, primarily in manufacturing, innovation or entrepreneurship (Atkinsa et al. 2023, Brülhart et al. 2012, Criscuolo et al. 2019, Da Rin et al. 2011, Devereux et al. 2007, Fajgelbaum et al. 2019, Giroud and Rauh 2019, Hanson and Rohlin 2011, Kennedy and Wheeler 2021, Kline and Moretti 2014, LaPoint and Sakabe 2021, Mukherjee et al. 2017, Slattery and Zidar 2020). We provide complementary insights about the relationship between localized policies and the evolving retail landscape, by demonstrating that even if these policies help stimulate entry, the benefits from these policies may not be spread out evenly across all firms.

Second, we contribute to the literature on the drivers of retail entry across geographic markets.[2] Examples include but not limited to Bresnahan and Reiss (1991), Arcidiacono et al. (2016), Blevins et al. (2018), Fang and Yang (2022), Hollenbeck (2017), and Igami and Yang (2016). Many of these studies focus on industry-specific analysis of competition between firms with respect to location selection and market expansion decisions. In particular,

[2]This line of work falls within the broader set of empirical and theoretical literature about industry dynamics (Dunne et al. 1989, Hopenhayn 1992, Jovanovic 1982).

larger firms have been shown to drive much of the overall growth in retail (Haltiwanger et al. 2010), and these patterns of market dominance appear quite persistent over time (Basker et al. 2012, Blevins et al. 2018, Geurts and Van Biesebroeck 2016, Hanner et al. 2015, Jarmin et al. 2009, Paul 1994).[3] It has been evidenced that large retailers may carry size-based advantages via resilience to macroeconomic shocks (Basker et al. 2018), product-line variety (Hollenbeck and Giroldo 2022), management control systems (Sandino 2007), retail-network inventory flexibility (Ergin et al. 2022), productivity and efficiency (Javorcik and Li 2013), access to information and new technologies (Basker 2012, Chi 2022, Yang 2020), and strategic entry deterrence (Fang and Yang 2022, Igami and Yang 2016, Nishida and Yang 2020). We complement this branch of research in two ways: (1) we demonstrate government policies to be an important driver of market dominance of some firms in retail; and (2) we provide insights that are broadly applicable to all retail sectors, unlike most of the existing studies that are confined to only one particular retail sector. This broadened scope of analysis uncovers universal antitrust and urban-development implications of state-level tax policies for retail sectors as a whole.

Furthermore, our work also relates to research that aims to explain increasing concentration in non-traded sectors, and in particular, retail. Smith and Ocampo (2022) document increasing concentration in the retail sector using product-level revenue for all US retail stores. Similarly, Hsieh and Rossi-Hansberg (2022) demonstrates increasing national concentration in the service industries. This past research has posited that growing fixed costs (especially in technologies) and lower marginal costs have tilted the benefits towards large firms more than small firms in these sectors. We complement this existing literature by exploring a potential external force (i.e., government tax policies) that may further impact this apparent concentration in the retail sector.

[3]Beyond antitrust concerns, policies that disproportionately impact the entry of large versus small firms may also has implications on the availability of amenity variety might impact the municipality's attractiveness as a place to reside (Couture and Handbury 2020), local labor market conditions (Basker 2005a), or externalities from complementary businesses (Shoag and Veuger 2018).

2 A Retail Entry Model

In this section, we analyze an entry model and highlight potential asymmetry in the impact of uniform tax policies. Most importantly, we explore whether or not asymmetric responses might arise from pre-existing brand power firms have (i.e., do well-known retailers have disproportionately more to gain from entering in light of favorable tax policies). For this analysis, we consider a static entry game of incomplete information.

2.1 Actions, Payoffs, and Equilibrium

There are two firms in this industry, indexed by $i = 1, 2$. At the beginning of the entry game, they decide simultaneously whether or not to enter the market, which we denote $a_i \in \{0, 1\}$. For firm 1, the variable profit is 0 if it does not enter the market, 1 if it enters as a monopolist, and $\rho \in [0, 1]$ if it enters as a duopolist (i.e. with firm 2 entering at the same time).[4] Firm 2's variable profit is defined analogously, except that its duopoly variable profit is $(1 - \rho)$. Here, market size is normalized to be 1.

The parameter ρ can be interpreted as firm 1's market share, which represents firm 1's relative strength with respect to its ability to steal firm 2's business; $(1 - \rho)$ then represents firm 2's relative strength with respect to its ability to steal firm 1's business. In reality, the stronger business stealing ability might represent a firm's pricing power, likely related to their market dominance (i.e., firm presence and size). For example, past research has demonstrated that large chains tend to charge lower prices (Klopack 2022), while Hollenbeck (2017) and Hollenbeck and Giroldo (2022) have highlighted revenue-based advantages to branding/scale for retail chains. Note that all of these examples reflect size-based advantages in retail that appear to benefit variable profits, which would be reflected in ρ and $(1 - \rho)$ in our model.

There is a cost of entry, $\kappa < 1$, and each firm has private information about its own

[4] Note that we do not consider exit in this model. For this reason, our empirical analysis about retail activity (section 4), such as the number of firms can be interpreted as entry and staying decisions. This interpretation is consistent with a related study about state tax effects on business activity by Giroud and Rauh (2019).

productivity, which we denote as ε_i.[5] We assume that ε_i is i.i.d. and has a uniform distribution, U$[0, 1]$. The uniform distribution will permit analytical solutions to the entry game. Furthermore, ε_i is private information and is known only to i. These assumptions allow us to characterize the equilibrium entry probabilities in closed-form. The payoff of entering a market for firms 1 and 2 are defined as

$$\pi_1(a_1 = 1, a_2) = 1 - a_2(1 - \rho) - \kappa - \varepsilon_1, \tag{1}$$

$$\pi_2(a_1, a_2 = 1) = 1 - a_1\rho - \kappa - \varepsilon_2. \tag{2}$$

With the defined variable profits, sunk costs, and private information, the entry conditions for firms 1 and 2 can be obtained. As entry decisions are made simultaneously, firms form expectations about what their competitor will do (i.e., firm 1's expectation about $a_2 = 1$, and firm 2's expectation about $a_1 = 1$), their decision rules will be functions of choice probabilities, $\sigma_i = \Pr(a_i = 1) \in [0, 1]$. In particular, firm 1 will enter given its expectations about firm 2's choice probability if and only if

$$1 - (1 - \rho)\sigma_2 - \kappa \geq \varepsilon_1, \tag{3}$$

while firm 2 will enter given its expectations about firm 1's choice probability if and only if

$$1 - \rho\sigma_1 - \kappa \geq \varepsilon_2. \tag{4}$$

Given the assumption about the distribution for ε_i, we can write the choice probabilities for firms 1 and 2 as

$$\sigma_1 = 1 - (1 - \rho)\sigma_2 - \kappa, \tag{5}$$

[5] This assumption follows the framework by Seim (2006) for studying retail entry via a simultaneous-move game of incomplete information.

$$\sigma_2 = 1 - \rho\sigma_1 - \kappa. \tag{6}$$

By expressing these strategy profiles as choice probabilities σ_1 and σ_2, we can use a Bayesian Nash Equilibrium (BNE) to characterize their optimal entry decisions, as defined below:

Definition 1. A strategy profile $\{\sigma_i^*\}_{\forall i}$ is a BNE if and only if $\pi_i(\sigma_i^*, \sigma_j^*) \geq \pi_i(\sigma_i, \sigma_j^*)$ for all $\sigma_i \in [0, 1]$.

These conditions reflect that neither firm 1 nor firm 2 has an unilateral incentive to deviate from their strategy profiles (σ_1^*, σ_2^*). Rearranging equations 5 and 6, we have

$$\sigma_1 + (1 - \rho)\sigma_2 = 1 - \kappa, \tag{7}$$

$$\sigma_2 + \rho\sigma_1 = 1 - \kappa. \tag{8}$$

The BNE is obtained by solving this system of equations for σ_1 and σ_2:

$$\sigma_1^* = \frac{(1 - \kappa)\rho}{1 - \rho(1 - \rho)}, \tag{9}$$

$$\sigma_2^* = \frac{(1 - \kappa)(1 - \rho)}{1 - \rho(1 - \rho)}. \tag{10}$$

Here, the BNE is summarized by (σ_1^*, σ_2^*). In the next section, we explore the implications of taxes that impact the cost of entry (i.e., κ).

2.2 Asymmetric Tax Effects

Under the BNE, we consider a tax policy that increases the entry costs by τ.[6] This policy would lead to a different entry strategies for firms 1 and 2, which we denote as $\tilde{\sigma}_1$ and $\tilde{\sigma}_2$.

[6]Note that results for a tax cut will mirror the ones discussed here.

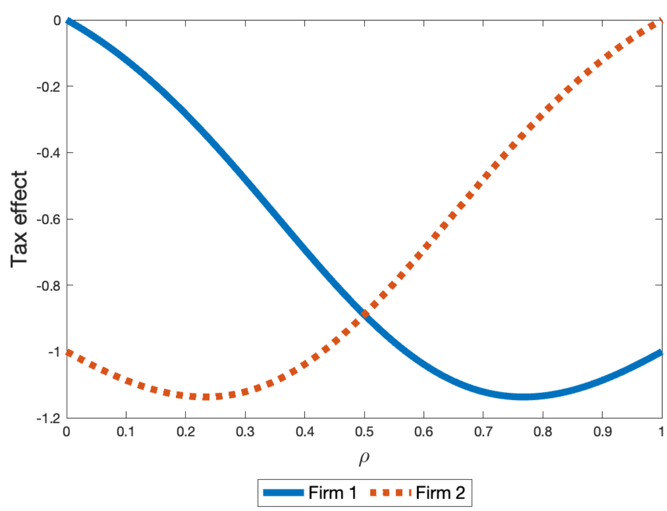
The equilibrium strategies with this tax policy are written as

$$\tilde{\sigma}_1 = \sigma_1^* - \frac{\tau\rho}{1-\rho(1-\rho)}, \tag{11}$$

$$\tilde{\sigma}_2 = \sigma_2^* - \frac{\tau(1-\rho)}{1-\rho(1-\rho)}. \tag{12}$$

By comparing the equilibrium choice probabilities with and without this tax policy, we evaluate the tax effect. These changes in equilibrium entry probabilities with respect to tax policy changes. That is, $(\tilde{\sigma}_1 - \sigma_1^*)/\tau$ and $(\tilde{\sigma}_2 - \sigma_2^*)/\tau$ are both less than 0 for all $\rho \in [0, 1]$. This result implies that higher taxes will stifle establishment entry, and conversely, lower taxes will encourage establishment entry. That is, we will see more establishment entry in the industry (i.e., $\tilde{\sigma}_1 + \tilde{\sigma}_2 > \sigma_1^* + \sigma_2^*$), as a whole. These patterns underscore a potential benefit associated with favorable tax conditions on firm entry. However, the marginal impact of this policy differs between the two firms, except when $\rho = 0.5$ (i.e., firms 1 and 2 are equally strong at stealing business from one another).

Figure 1: Tax Effect and Firm Strength



This result confirms that it is possible for a tax policy, that is uniformly applied to all firms in an industry, to yield asymmetric effects across firms.[7] For this exercise, the driver for this asymmetry relates to each firm's relative strength (e.g., product quality, brand equity, customer loyalty, reputation), whereby this strength can be a function of its overall size and presence (Reddy et al. 1994, Smith 2006). We can evaluate more closely the relationship between the firm's strength and the sensitivity to tax policies that impact the cost of entry. In particular, Figure 1 plots the tax effects on firms 1 and 2 across the range of ρ. This figure shows that firm 1 is more sensitive (i.e., negative response) to tax policy changes when $\rho > 0.5$ (i.e., firm 1 is stronger than 2). One way to interpret this result is that firms with stronger business stealing capabilities will be more sensitive to changes to the tax policies. Therefore, favorable tax policies leads to disproportionately *more* entry among *stronger* firms.

A consequence of these asymmetric responses is that tax policies can potentially shift market power. If we use a concentration measure based on firm presence, then concentration would be minimized if firms have equal entry probabilities (i.e., $\tilde{\sigma}_1 = \tilde{\sigma}_2$). In other words, the greater the difference between $\tilde{\sigma}_1$ and $\tilde{\sigma}_2$, the higher the market concentration. To assess the extent to which taxes τ bifurcates entry probabilities $\tilde{\sigma}_1$ and $\tilde{\sigma}_2$, we calculate the partial derivative of $(\tilde{\sigma}_1 - \tilde{\sigma}_2)$ as

$$\frac{\partial(\tilde{\sigma}_1 - \tilde{\sigma}_2)}{\partial\tau} = \frac{1-2\rho}{1-\rho(1-\rho)}, \tag{13}$$

which is equal to 0 if and only if $\rho = 0.5$. Moreover, the tax-induced bifurcation works to the detriment of firm 1 if $\rho > 0.5$, and works to the advantage of firm 1 if $\rho < 0.5$. In particular, if the tax is a subsidy on entry cost instead of an increase in cost, the tax-induced bifurcation will benefit the stronger firm (i.e. firm 1 if $\rho > 0.5$ and firm 2 if $\rho < 0.5$). From this perspective, uniform taxes have the potential to shift entry rates away from levels that minimize market concentration.

In summary, this analysis demonstrates asymmetric responses to tax policy sensitivity in

[7] In the Appendix, we consider an alternative formulation for which taxes are proportional to the entry cost.

a model of strategic entry, and in particular, the extent to which this asymmetric sensitivity relates to a firm's relative competitive strength in the market.

2.3 Tax Design to Shape the Retail Landscape

An implication of this theoretical analysis is that uniform tax policies may lead to non-uniform entry strategies across firms.[8] In this section, we demonstrate how taxes that induce balanced growth can be designed when entry is strategic. We illustrate some of these theoretical insights for our empirically-grounded case study about home-improvement retail chains in Appendix B.

Using the equilibrium entry strategies, we can design a tax policy that would achieve symmetric entry strategies. In practice, it does seem possible to design policies that impact retail firms differently, depending on their size or market power. While it is unlikely feasible to impose different tax rates on different firms based on their size, such proposed tax policies can be operationalized by creating a special incentive aimed at small establishment entities[9]

For this analysis, we consider a tax design that increases the cost for firms 1 and 2 by τ_1 and τ_2, respectively. The resulting entry costs under this tax policy would be $\kappa_1 = \kappa + \tau_1$ for firm 1, and $\kappa_2 = \kappa + \tau_2$ for firm 2. Symmetry of equilibrium entry rates would be achieved if $\tilde{\sigma}_1 = \tilde{\sigma}_2$. Such a policy may be akin to tax policies that are cognizant of customer preferences for product variety (Kroft et al. 2021). The implication of such as policy is that the tax policy for one firm can be written as a function of the other firm's taxes:

$$\tau_1(\tau_2) = \left[1 - \frac{(1-\rho)}{\rho}\right](1-\kappa) + \frac{(1-\rho)}{\rho}\tau_2. \tag{14}$$

Based on this tax policy, we see that $\tau_1 = \tau_2$ when $\rho = 0.5$. Otherwise, a uniform tax policy will never achieve symmetric responses by firms for any other value of ρ. Although this is

[8]Designing tax policies under the context of oligopoly competition is not a new concept; see Anderson et al. (2001) and Besley (1989)

[9]As an indirect tax and/or size-based regulations can be particularly burdensome to large firms (Garicano et al. 2016, Gourio and Roys 2014).

beyond the scope of our analysis, we note that it might be possible to calibrate this tax policy based on inferred model primitives. For example, a firm's business stealing strength (ρ) and entry costs (κ) are often estimated in structural models of entry. Therefore, for a fixed τ_2, policy makers could set a τ_1 based on the analytical relationship described above. More specifically, policy makers could try to maximize their total tax revenues,

$$T = \tilde{\sigma}_1 \tau_1 + \tilde{\sigma}_2 \tau_2. \tag{15}$$

Given the policy objective of $\tilde{\sigma}_1 = \tilde{\sigma}_2$, and the resulting relationship between τ_1 and τ_2, the optimal value[10] of τ_2 is set to be

$$\tau_2 = (1 - \rho)(1 - \kappa), \tag{16}$$

which would imply τ_1 to equal

$$\tau_1 = \rho(1 - \kappa). \tag{17}$$

These tax policies can be represented solely as functions of ρ and κ. With this policy, we see that the tax for firm 2 decreases as firm 1's strength (ρ) increases. At the same time, firm 1's tax would increase with its strength. This policy suggestion is particularly salient if we look at the following ratio:

$$\frac{\tau_1}{\tau_2} = \frac{\rho}{1 - \rho}, \tag{18}$$

which is entirely dependent on each firm's relative strength in the market. Therefore, the degree of asymmetry in tax policy can be dictated by inferred business stealing effects.

2.4 Summary of Theoretical Insights

This analysis demonstrates potential antitrust implications on state tax policies. The main theoretical prediction from this exercise is that while tax increases (decreases) can deter

[10] We obtain this optimal value by using the first order condition of T with respect to τ_2, along with the constraints $\tilde{\sigma}_1 = \tilde{\sigma}_2$ and the function $\tau_1(\tau_2)$ from equation above.

(encourage) firm entry, firms will in most scenarios respond *asymmetrically* to uniform tax policies as stronger firms (with respect to business stealing capabilities) will respond more to uniform tax changes. Thus, uniform tax policies have the potential to distort the prevailing market power. Our subsequent empirical analysis (section 3) will focus on assessing the extent to which this hypothesis holds empirically. The results from this analysis are summarized in section 4, while an illustration of how taxes that induce symmetric firm responses can be established is discussed in Appendix B.

3 Empirical Strategy

This section provides details about our empirical setting of US retail establishment entry, along with the data we use to measure tax policies across markets. We then describe the identification strategy and econometric specifications to infer the causal effects of the tax policies on establishment entry and local market concentration.

3.1 Data

Our analysis relies on data about retail establishments, state taxes, and local market demographics like population. We now describe each of the datasets.

Retail establishments. To study the entry of retail establishments, we use the National Establishment Time-Series (NETS) Database. This database records each establishment's exact location, entry and exit years, the number of employees, and the headquarter's address.[11] We focus on the sub-sample of establishments with SIC codes that correspond to retail trade from 1990 to 2014. A list of the SIC codes along with establishment counts for each retail sector is included in Appendix C. As Rossi-Hansberg et al. (2021) point out, retail trade is among the industries that is well-captured by this data. In particular, our database contains all relevant establishment locations in the US during the sample period.

[11] Barnatchez et al. (2017) provides an assessment of the validity of the NETS database.

Since the retail sectors can be interpreted as selling non-tradable goods (i.e. goods targeting the local market instead of nation-wide or international markets (Zeugner 2013)), we treat the markets of the retail establishments as counties. Given this consideration, we organize each establishment's entry decision at the county-year level.

Using this data, we construct the main outcomes of interest: (1) establishment counts and (2) market concentration. The establishment counts are calculated via the total number of active establishments in a given county and year. Figure 2 provides a snapshot for the retail establishment counts across all counties. As shown, there is variation in the number of establishments across counties and across time. For some of our analysis, we also distinguish between entry patterns among large versus small retail chains. We define a chain as being big if it has 10 or more outlets nationwide. This cut-off value is largely inspired by the thresholds municipal governments use to determine whether or not a retailer, based on its establishment count, should face a different set of zoning ordinances or regulations. For example, the threshold used by Provincetown is 10 (Greenfield 2010) and San Francisco's is 11 (Lagos and Dineen 2014), as retailers with location counts that exceed these thresholds must obtain special permits for further expansion. A small chain is defined as a retailer with 2 to 10 outlets nationwide. Finally, independents are those with only 1 outlet in total.[12]

To calculate market concentration, we use a Herfindahl-Hirschman Index (HHI) measure based on establishment count shares. We calculate the HHI as $HHI_{jm} = \sum_i^I s_{ijm}^2$, where $s_{ijm} = n_{ijm}/N_{jm}$ is the outlet share of firm i in retail sector j in market m. Here, n_{ijm} is the number of establishments belonging to firm i in retail sector j in market m, and N_{jm} is the total number of establishments in retail sector j and market m. The notation I is the set of all firms in market m. The retail sectors are based on the 4-digit SIC. Although ideally the HHI index should be calculated based on sales, due to the lack of information on sales at the establishment level, the HHI index based on count shares assumes all establishments have the

[12]In fact, some municipalities have used thresholds along these dimensions to enact "chain store bans." For example, San Francisco bans any retail firm with 11 nationwide establishments or more from entering certain neighborhoods (Klopack 2022).

same level of sales; thus the index can be seen as a lower bound of market concentration.[13]

State taxes. The state-level information about taxes and incentives are obtained from the Panel Database on Incentives and Taxes (PDIT) available via the Upjohn Institute for Employment Research.[14] This database records marginal tax rates and business incentives, with a particular focus for new and expanding businesses, for 45 industries across 47 cities and 33 states in the U.S.from 1990 to 2015. In addition, the database contains predictions of the level of tax incentives a firm would receive in a city given its balance sheet. From this data, we use in our analysis the observed state-level taxes and incentives for the retail trade industries during our sample period of 1990-2014. We focus on the impact of the state's net tax, which is calculated by the PDIT as the total tax net of total incentives.[15] Items that contribute towards the total taxes include property, sales, and corporate income tax, while those items that relate to the total incentives include the job creation, investment, research and development tax credit, property tax abatement as well as a customized job training subsidy. These taxes are measured as a percentage of value-added for the corresponding industry or group of industries for a particular state or nation. This normalization makes it easy to compare the impact of taxes across different industries and geographies.

Figure 3 illustrates a snapshot of the geographic and temporal variation for the net taxes, where the light to dark blue ranges capture low to high net tax states. As can be seen, the state-level net tax ranges from 2% to 8%, with a lot of variations both across states and

[13]We have tried to use the number of employees at the establishment level as a proxy for sales, but because the number of employees information is missing for many establishments in a market, we eventually opt for the count-based HHI.

[14]This dataset is developed by Bartik (2017) using a "rules-based" approach. Slattery and Zidar (2020) describe the approach as involving "collecting data on the rules of each tax, tax credit, and incentive program offered in a locality and predicting the incentives for a firm given its activity and rules." (page 101.) This data has been used in past research to study the impact of state tax policies on entrepreneurship (Fazio et al. 2019). Bartik (2017) indicates that the model used to construct the state-specific tax metrics"probably does a good job of capturing overall tax and incentive regime differences across states, including differences in property tax and abatement regimes, even if some of the property tax information may not represent all jurisdictions even in these metro areas." We note also that this data do not include sales taxes that consumers pay, as studied in Anderson et al. (2010), Baugh et al. (2018), and Luna (2004).

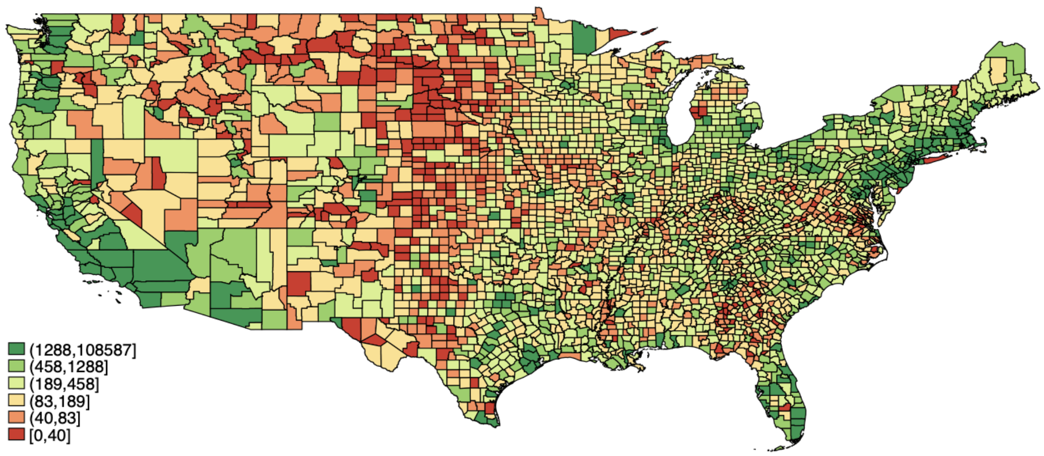
[15]Note that the tax measures in PDIT are deflated to 2015 dollars using the GDP-implicit price deflator, while incentives are discounted at 3% (Bartik 2017). The units of measurement for the total taxes and incentives are the same, which allows PDIT to add and subtract different components in the taxes together.

time. In particular, there are many bordering states with differential taxes. For example, New Mexico and Texas share a border, but New Mexico's net tax is about 2% higher than that of Texas in 1990. In 2000, the tax gap closes to about 1%, only to widen again in 2014 back to about 2%. This temporal variation across state borders allows us to infer the causal impact of taxes on firm entry using the border identification approach, which we will discuss in detail in section 3.3.

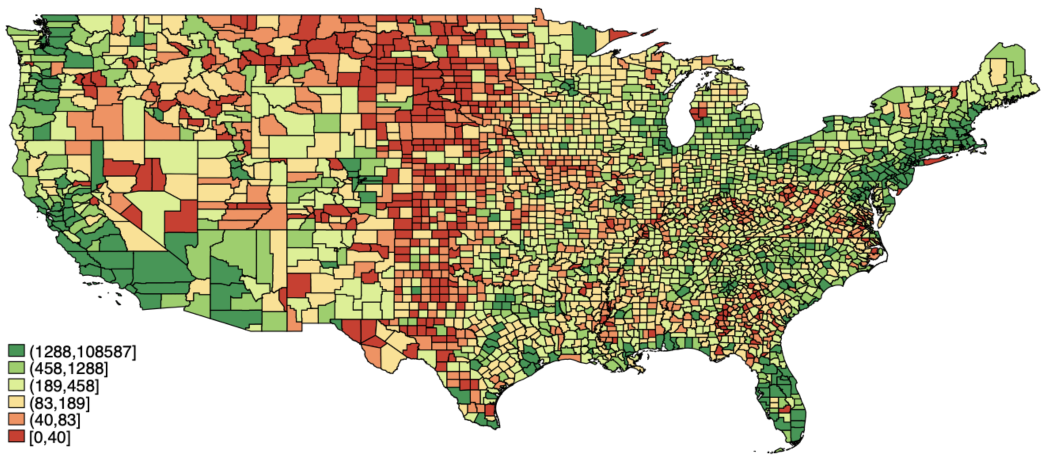
Market size proxy. Finally, to control for market size, we obtain data about demographics at the county level from the US Census and American Community Survey. In particular, we use population as the main proxy for market size. Given the focus of our on entry, population is the most relevant factor to control for as it is the key driver of firm entry (Bresnahan and Reiss 1991), and has been commonly used as a proxy for market size in canonical studies of entry (Bresnahan and Reiss 1991, Campbell and Hopenhayn 2005).

3.2 Descriptive Patterns

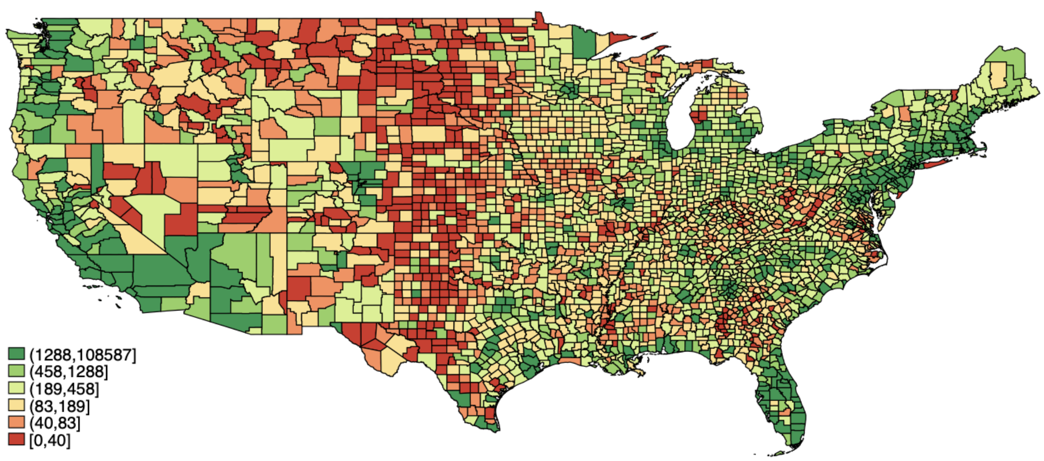
Combining all sources, we have a panel data containing the the state tax policies and the number of retail establishments across over 60 retail sectors at the four-digit SIC code level in over 3000 counties in the US from 1990 to 2014. Table 1 below summarizes this data. From this summary, we can confirm that the bordering counties are reasonably representative of the total collection of counties. For instance, the net tax and population exhibit very similar distributions when we compare bordering counties with the full sample.



(a) 1990

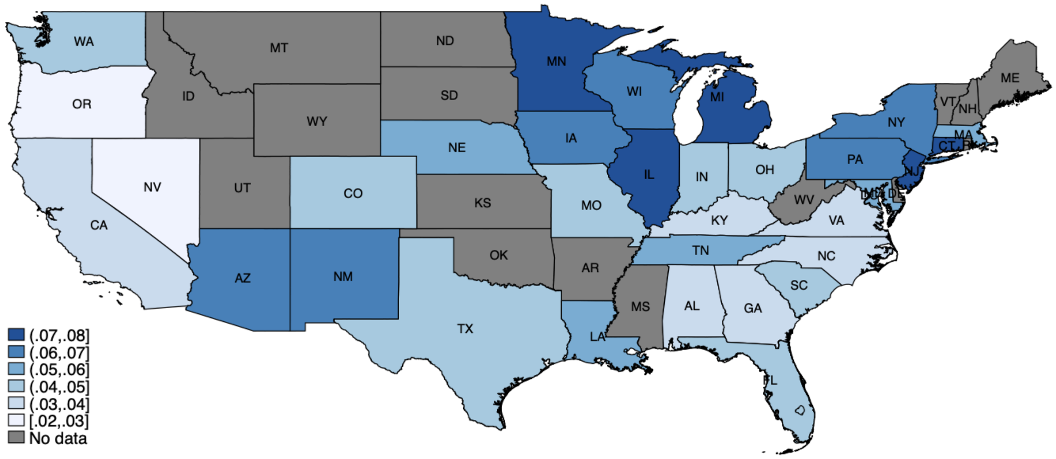


(b) 2000

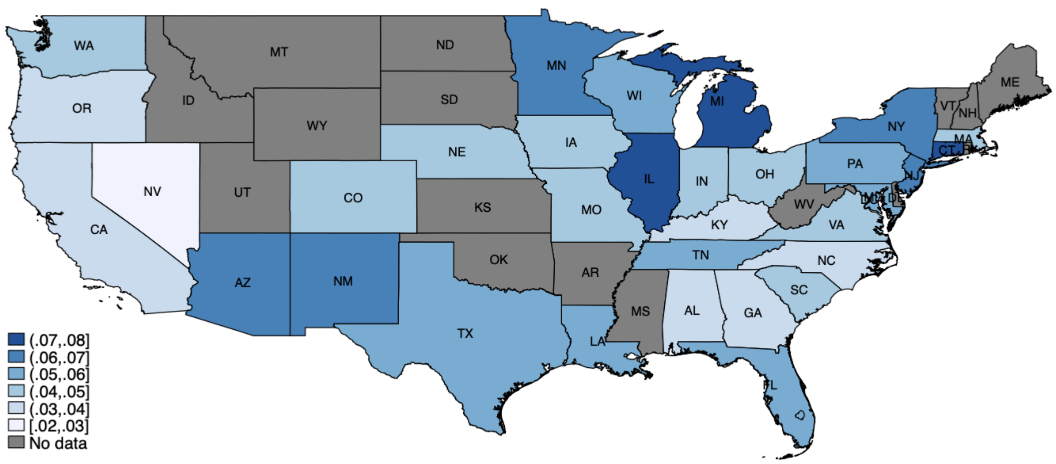


(c) 2014

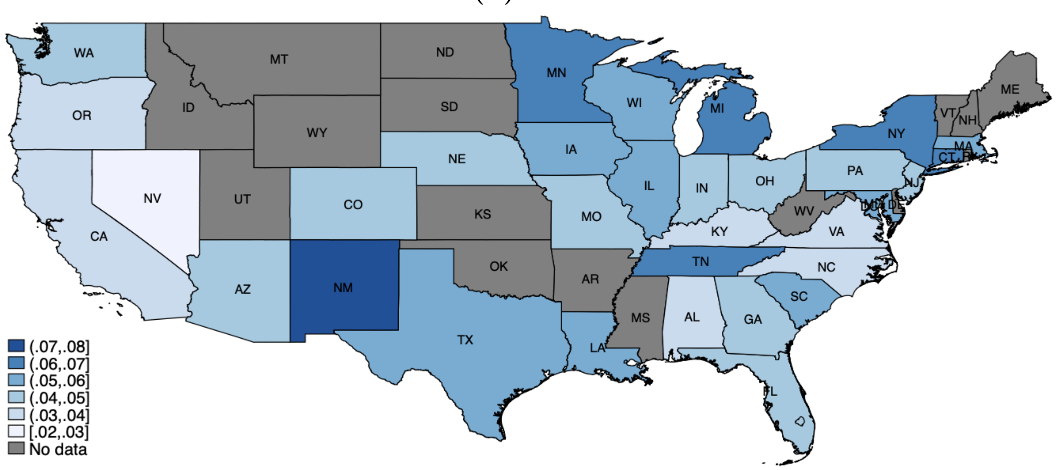
Figure 2: Geographic and Temporal Variation in Establishment Counts



(a) 1990



(b) 2000



(c) 2014

Figure 3: Geographic and Temporal Variation in Net Tax

Table 1: Descriptive Statistics of All Variables

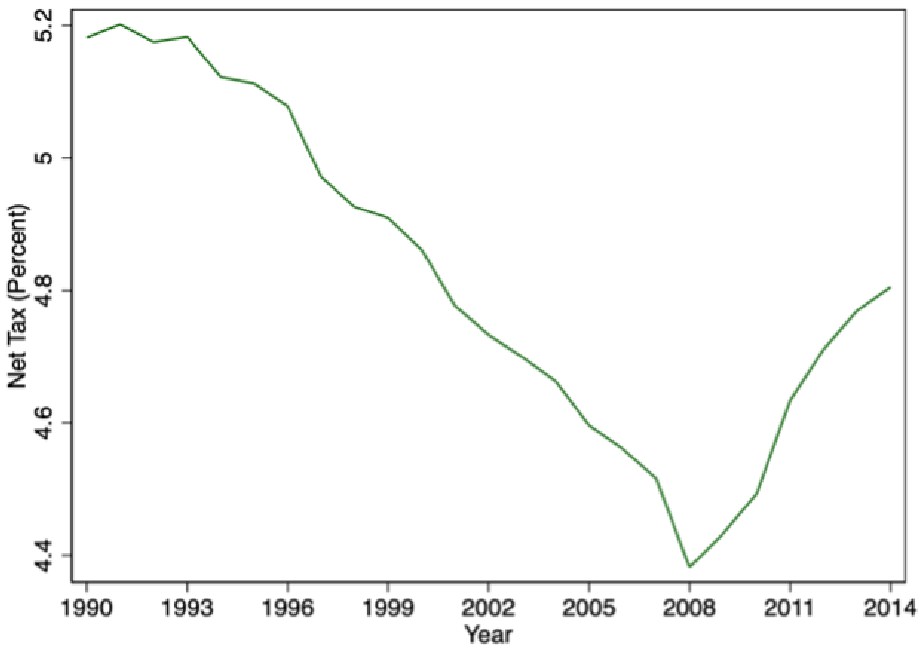
	Obs	Mean	Std.Dev.	Min	Max
All counties					
Number of Establishments	45956	843.73	2761.08	1.00	108587.00
Net Tax (Percent)	45956	4.78	1.24	2.03	7.93
Population (10,000)	45956	11.75	36.51	0.01	1003.34
Bordering counties					
Number of Establishments	15794	744.42	1902.08	1.00	37076.00
Net Tax (Percent)	15794	4.72	1.26	2.03	7.93
Population (10,000)	15794	10.79	29.28	0.01	537.34

Note: Our analysis includes 33 states, encompassing a total of 1,839 counties (first three lines of this table), out of which 632 are bordering counties (last three lines of this table).

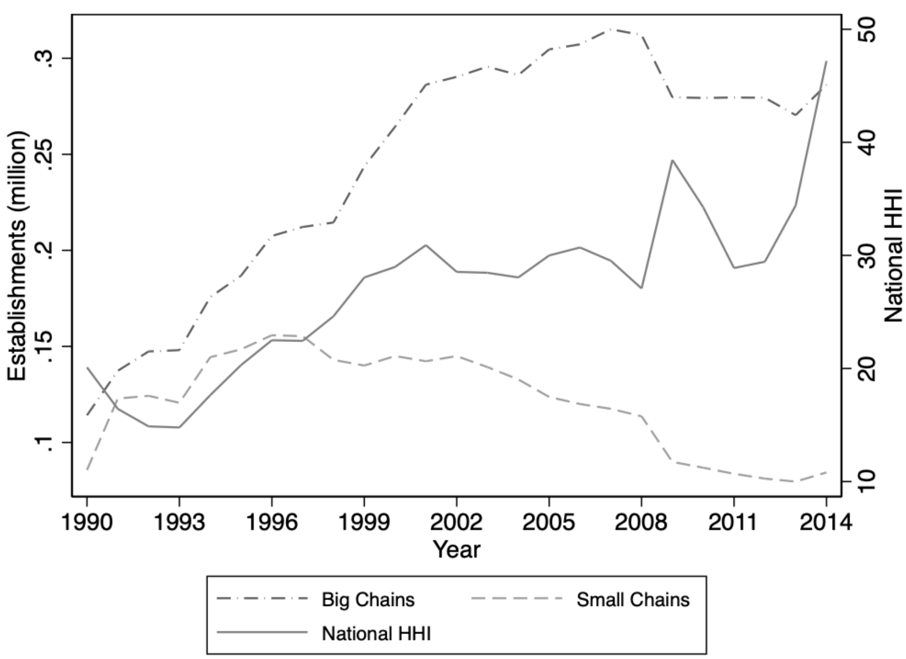
We now highlight some general patterns in state taxes and retail establishment entry over time. Figure 4 provides the averaged net taxes (Figure 4a), along with the total number of establishments (Figure 4b) over time. Retail establishments have been steadily increasing from 1990 to 2014. When we distinguish between growth among large versus small retail chains, these figures suggest that the trend of decreasing net taxes at the state level coincide with trending growth among the largest retail chains. At the same time, the smallest chains have not experienced noticeable growth over time. Moreover, we have seen a steady rise in the national HHI, suggesting increased market concentration in retail over time. Here, the national HHI is calculated in a similar manner as Hsieh and Rossi-Hansberg (2022), whereby our calculations for this figure also aggregates observations to year-firm-sector. In summary, these figures suggest net taxes might be a relevant factor in studying retail establishment entry among the largest versus smallest chains.

3.3 Identification Strategy

Our research objective is to investigate the causal impact of state tax policies on (1) establishment entry and (2) market concentration. To examine the effects, one can run a simple OLS regression with the outcomes as the dependent variables and taxes and other controls as the independent variable. However, such a naive approach cannot be interpreted as causal



(a) Averaged net taxes



(b) National establishment counts and HHI

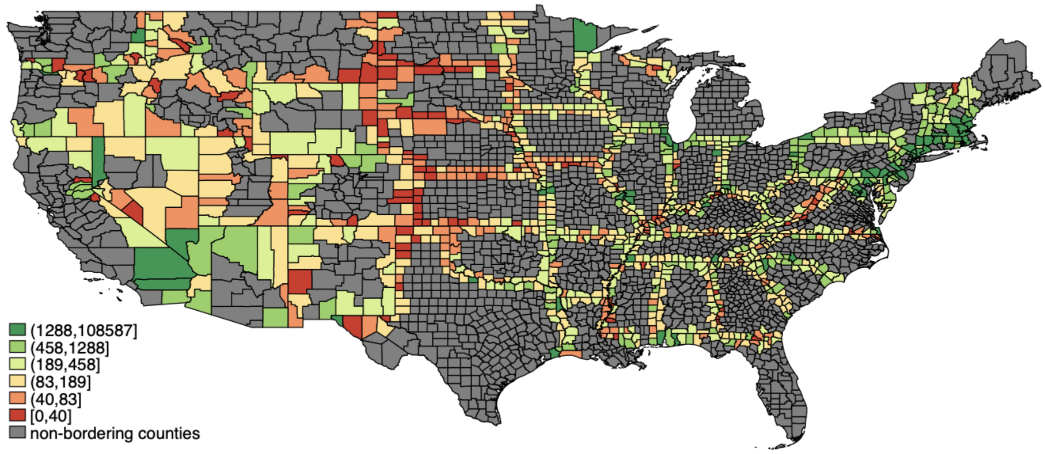
Figure 4: Net Tax, Establishment Entry and Market Concentration Dynamics

because there may be many unobserved factors that are correlated with state tax policies and also affect firm entry. To achieve credible identification with a causal interpretation, we implement a border identification approach as introduced by (Dell 2010) and (Holmes 1998).[16] Specifically, we compare counties that border state boundaries. On one side of the border, counties are likely subject to a different set of tax policies than those counties on the other side. As discussed previously, this is indeed the case. This identification strategy relies on the condition that contiguous border counties serve as adequate controls. That is, these contiguous border counties have similar underlying economic conditions as their neighbors on the other side of the border. In particular, we need sufficient differences in net taxes within cross-state county-pairs. Moreover, counties would ideally be more similar to its cross-state counterpart than to a randomly chosen county. Figure 5 illustrates the geographic and temporal variation in establishment counts for the border counties, and Table 2 demonstrates the variation in the data that can be exploited to tease out the causal effects.

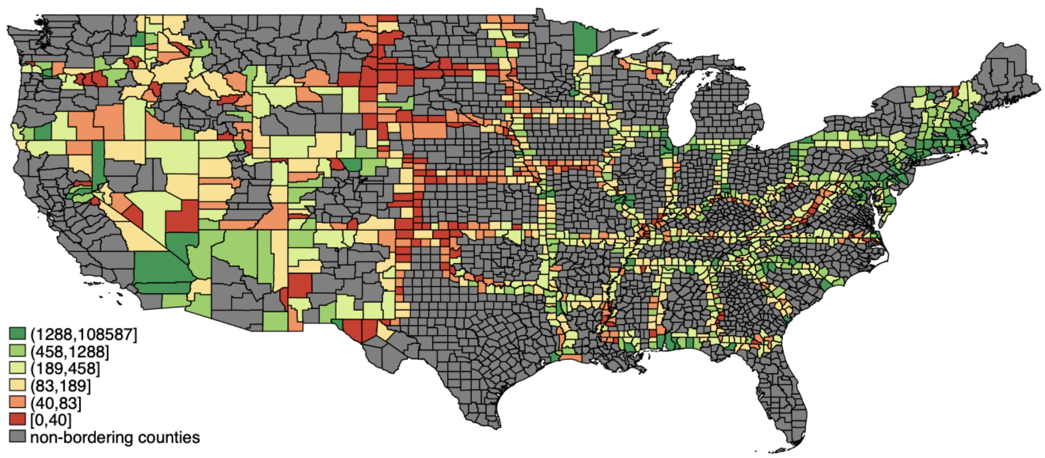
In Table 2, the total number of establishments, the number of establishments per capita, and the HHI are listed for neighboring counties, whereby one county has relatively higher taxes than the other. This comparison showcases the potential identification power of using the spatial discontinuity in the form of state borders. As shown in the table, both the number of establishments per capita and HHI measures are larger on the side of the border with lower taxes. Although the total number of establishments follows the reverse pattern, it may simply be that counties in higher tax states have a bigger population. For this reason, we control for population in our analysis. In addition, the difference in HHI across the border changes in a non-monotonic manner with respect to the distance from border. This pattern motivates us to control for counties' geographic heterogeneity in a flexible manner.

Our main specification accounts for this geographic heterogeneity by following the semi-parametric approach introduced by Holmes (1998) and Dell (2010):

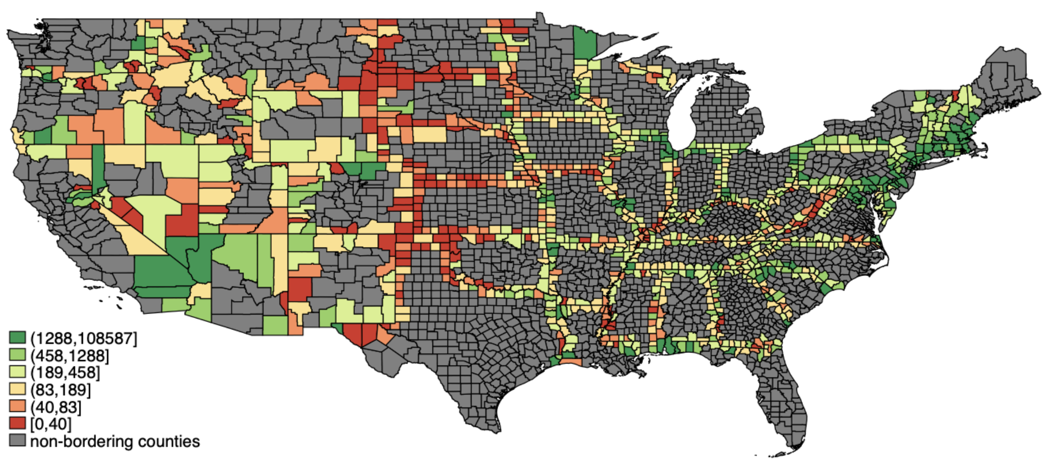
[16] Many studies that have used the border identification approach; for example, Dube et al. (2010), Kroft et al. (2020), and Barwick et al. (2021)



(a) 1990



(b) 2000



(c) 2014

Figure 5: Geographic and Temporal Variation in Establishment Counts for Border Counties

Table 2: Average Establishment Counts and HHI on Both Sides of the State Border

Distance from Border (km)	Establishment Counts	Establishment Counts per 10000 Capita	HHI (Four-digit SIC)	HHI per 10000 Capita
	Higher Tax Side of Border			
>100	1997	79	3396	2865
75-100	1391	71	3980	5938
50-75	564	71	4180	3912
25-50	674	73	4257	4607
1-25	844	71	4594	3573
0	767	74	4251	3591
	Lower Tax Side of Border			
0	723	77	4382	7108
1-25	689	73	4562	3171
25-50	491	77	4448	4568
50-75	392	75	4720	4536
75-100	636	72	4442	3663
>100	787	78	4851	8635

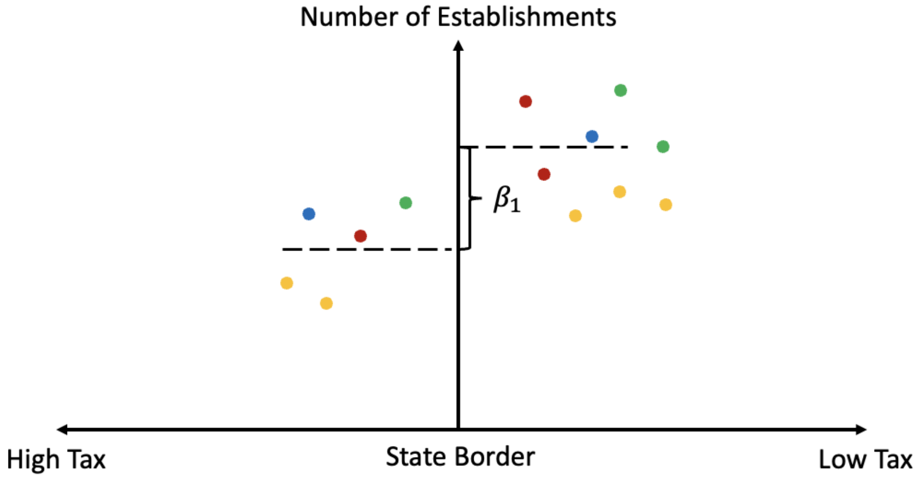
Note: This table shows the number of establishments in counties located on both sides of the state border. The first column measures the minimum distance from a county to its closest state border.

$$y_{mt} = \beta_0 + \beta_1 \text{tax}_{st} + \beta_2 \text{pop}_{mt} + f(\text{geographic location}_m) + \phi_b + \delta_t + \varepsilon_{mt}, \tag{19}$$

where the dependent variable, y_{mt}, measures the outcome of interest (i.e., establishment counts and market concentration) in county m and year t. For the establishment-counts regression, we aggregate the number of establishments across all retail sectors to the county and year level; for the market-concentration regression with HHI, our observation is at the retail sector, county and year level, and we incorporate retail sector fixed effects to account for difference in retail sector composition across borders. Furthermore, tax_{st} is state-retail net tax in state s in year t, and δ_t represents year fixed effects. pop_{mt} is the population for county m in year t. The geographic controls are incorporated in the specification using $f(\text{geographic location}_i)$, which is a standard regression discontinuity polynomial. This term controls for geographic heterogeneity via a smooth function of geographic location (i.e., longitude, latitude). For our analysis, we will consider linear, quadratic, cubic, and quartic functional form specifications for $f(\text{geographic location}_i)$. For example, if (x, y) represent latitude and longitude for an establishment, then a cubic polynomial function can be written as $\alpha_1 x + \alpha_2 y + \alpha_3 xy + \alpha_4 x^2 + \alpha_5 y^2 + \alpha_6 x^3 + \alpha_7 y^3 + \alpha_8 x^2 y + \alpha_9 xy^2$. Furthermore, ϕ_b is state border fixed effects, which ensure that the comparison is between county m and its neighboring county on the same state border, but not between different state borders.

Compared with a simple border regression, which does not include the flexible geographic controls ($f(\text{geographic location}_m)$), this method identifies control counties from a weighted regression instead of a one-to-one comparison (see Figure 6). In particular, as noted by Dell (2010), this approach requires two main identifying assumptions. First, all relevant factors besides the net tax vary smoothly at the state border. That is, the expected value of the outcome conditional on the longitude and latitude is continuous at the discontinuity threshold. This assumption allows us to interpret counties located on one side of the state border to be an appropriate counterfactual for counties on the other side. Second, identification uses only variation at the discontinuity, which can be approximated using reasonably flexible non-parametric or semi-parametric techniques provided that the number of observations around the border are sufficiently large.

Figure 6: Illustration of Border Identification Design



Notes: This figure illustrates the border identification strategy. Each point denotes a county, where counties located near the same state border are indicated with the same color. For example, the two yellow dots on the left (high tax) side denote counties in state s, and the other three yellow dots on the right (low tax) side denote counties in neighboring state s'. These five yellow dots (we call them a pair) stand for counties located near the state border "ss'". β_1 captures the weighted average of the state net tax policy effects on the number of establishments for these different pairs. To flexibly control for geography, we will consider linear, quadratic, and cubic specifications for $f(\text{geographic location}_i)$. For example, if (x, y) represent latitude and longitude for an establishment, then a cubic polynomial function can be written as $\alpha_1 x + \alpha_2 y + \alpha_3 xy + \alpha_4 x^2 + \alpha_5 y^2 + \alpha_6 x^3 + \alpha_7 y^3 + \alpha_8 x^2 y + \alpha_9 xy^2$.

We note that a potential confound relates to tax-induced demographic shifts because tax policies on one side of the border might impact migration to or from a county on the other side of the border. If that happens, neighbouring counties on each side of the state border will in theory not be good controls for each other. In the Appendix, we provide further details about this potential confound and explain, via additional empirical analysis, why it might not be a major concern for identification.

For all of our regressions, in addition to the border design approach, we also present results from a naive OLS regession, with the following specification:

$$y_{mt} = \alpha_0 + \alpha_1 \text{tax}_{st} + \alpha_2 \text{pop}_{mt} + \delta_t + \varepsilon_{mt}, \tag{20}$$

where all variables are same as previously defined. While this specification does not have a causal interpretation, the estimates will reflect the overall correlation between the outcomes of firm entry and state tax policies. In addition, it is informative of which way the bias may be without credible identification. The sample used for this regression is all counties in the US.

4 The Impact of Taxes on Retail Entry

We summarize our main findings in this section. First, we confirm that tax policies do indeed impact the absolute level of establishment entry. Second, and most importantly, we then highlight the asymmetry we observe in these effects for big versus small retail chains, (i.e. firms that own more than one outlets). Here, we use the size of the chain as a proxy for the firm's capability at capturing market share due to the lack of data on establishment-level revenues. Chain size is a good proxy for market share because a chain with many physical stores may help increase customer value, loyalty and re-patronage (Zhang et al. 2022).[17] Finally, we examine the impact on market concentration, the HHI index, which is likely to change as the result of the heterogenous effects of taxes on small and large chains.[18]

Industry size. We first demonstrate the existence of tax effects in retail entry. That is, how are establishment counts impacted by state tax policies? Answering this question will help us confirm the first theoretical prediction from our model, in that industry shrinkage (growth) could be induced by tax (decreases). The results from all of the specifications we consider are presented in each of the tables. These overall findings are summarized in Table 3, while retail sector-specific tax effects are shown in Figure 7.

[17]The ample presence of a chain's physical stores offers customers more opportunities to engage in product inspections and multi-sensory shopping experiences; these activities that are especially important for experience goods (Nelson 1970, Peck and Wiggins 2006).

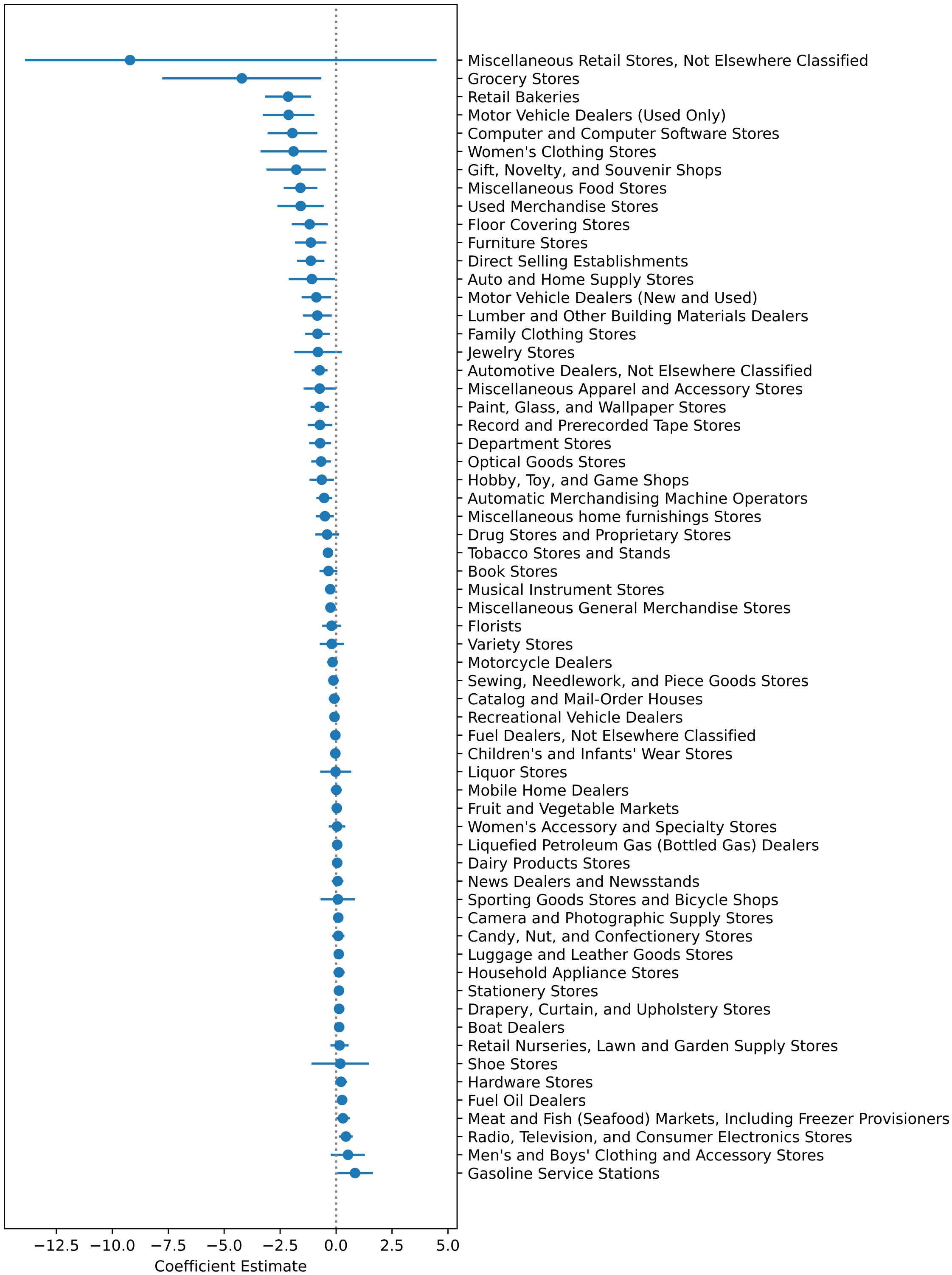
[18]In the Appendix, we replicate the findings in this section for the food service sector, which is not included in the SIC retail sector classification.

Table 3: Relationship Between Establishment Counts and Net Taxes

	(1) All	(2) Border	(3) Border	(4) Border	(5) Border	(6) Border
$NetTax(percent)$	-14.21	-24.14**	-23.36**	-22.08**	-23.73**	-21.76*
	(8.96)	(11.40)	(11.15)	(10.92)	(11.04)	(11.96)
$Population(10,000)$	73.03***	59.93***	59.95***	60.08***	60.12***	60.27***
	(3.10)	(3.82)	(3.76)	(3.82)	(3.82)	(3.80)
$BorderFE$	No	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes	Yes
$GeoControl$	No	No	Linear	Quadratic	Cubic	Quartic
Observations	45956	15794	15794	15794	15794	15794
R^2	0.93	0.92	0.92	0.92	0.92	0.92

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Column (1) uses the whole sample (i.e., all bordering and non-bordering counties); Column (2) uses the specification that compares bordering counties; Columns (3)-(6) use bordering counties with linear, quadratic, cubic and quartic functions to control for geography. Standard errors are clustered by county.

Figure 7: Tax Effect on Retail Entry Across Retail Sectors



Notes: This plot presents the effect of state taxes on establishment counts using the specification from column 5 of Table 3. The dot represents the estimated tax effect, while the horizontal blue line represents the confidence interval. Results are presented for each of the retail sectors (over 60 of them).

All of the specifications in Table 3 confirm that an increase in net tax will reduce the establishment counts. For the specification that uses border identification with flexible geographic controls, we see that a 1% increase in net tax will reduce the number of establishments in a given market by about 22 to 24 for the specifications that compare bordering counties. A comparison of the first specification that uses the whole sample (i.e., all bordering and non-bordering counties) with the regressions that only use bordering counties provide us a hint about the potential biases. In particular, the net tax effect is markedly lower in magnitude (and statistically insignificant) as compared with the specifications with border identification. This pattern seems consistent with state taxes being higher when regional governments anticipate establishment entry to be high due to favorable economic outlooks about the state's prospects. Consequently, the negative impact of higher net taxes will be dampened, as establishments would have entered the economically promising markets *despite* the high taxes that a state may wish to take advantage of.

There also appears to be some heterogeneity in the tax effect across different retail sectors. From Figure 7, the inferred effects appear most pronounced (and statistically significant) for grocery stores, bakeries, used car dealerships, computer stores, and women's clothing stores. As demonstrated in Appendix A, the size of entry costs can potentially amplify the tax effects and thus lead to heterogeneous tax effects across retail sectors. In particular, it is worth noting that retailers that tend to require large parcels of land for their establishments (e.g., grocery and department stores) exhibit statistically significant tax effects, whereas retail sectors that have smaller-sized establishments (e.g., liquor stores, children's show stores, newsstands) exhibit almost no tax effects.

Asymmetric impact. Having confirmed the main effects associated with the state tax policies, we now investigate how these effects might differ across firms. As our theoretical analysis shows, firms with greater business stealing capabilities are likely to be more sensitive to changes in the tax policies. Therefore, tax policies, even if they are uniform, may have the effect of reinforcing market dominance among the already dominant retail chains. We first investigate potential asymmetry in the state tax effects across retail firms of different sizes. As mentioned before, for this analysis, we use the number of establishments as the main outcome of interest, except that we estimate two different specifications based on the number of establishments for the big (Table 4) or small (Table 5) chains. Retail firms with only one establishment are excluded from the analysis (i.e., independents). Note that while our discussion in this section is focused on specifications using the 10 store cut-off to distinguish between large and small chains, we demonstrate robustness of our main findings for alternative thresholds. Details from this supplementary sensitivity analysis are available in the Appendix.

Table 4: Relationship Between Establishment Counts and Net Taxes (Big Chains)

	(1) All	(2) Border	(3) Border	(4) Border	(5) Border	(6) Border
$NetTax(percent)$	-1.53	-4.68**	-4.61**	-4.57**	-4.73**	-4.49*
	(1.41)	(2.22)	(2.19)	(2.16)	(2.19)	(2.29)
$Population(10,000)$	7.17***	7.52***	7.52***	7.53***	7.54***	7.56***
	(0.52)	(0.41)	(0.40)	(0.41)	(0.41)	(0.41)
$BorderFE$	No	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes	Yes
$GeoControl$	No	No	Linear	Quadratic	Cubic	Quartic
Observations	45956	15794	15794	15794	15794	15794
R^2	0.89	0.90	0.91	0.91	0.91	0.91

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Column (1) uses the whole sample (i.e., all bordering and non-bordering counties); Column (2) uses the specification that compares bordering counties; Columns (3)-(6) use bordering counties with linear, quadratic, cubic and quartic functions to control for geography. Standard errors are clustered by county.

Table 5: Relationship Between Establishment Counts and Net Taxes (Small Chains)

	(1) All	(2) Border	(3) Border	(4) Border	(5) Border	(6) Border
$NetTax(percent)$	1.25*	1.83	1.81	1.86	1.82	2.29*
	(0.64)	(1.37)	(1.38)	(1.39)	(1.36)	(1.37)
$Population(10,000)$	3.55***	3.49***	3.49***	3.50***	3.51***	3.53***
	(0.10)	(0.19)	(0.19)	(0.19)	(0.20)	(0.20)
$BorderFE$	No	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes	Yes
$GeoControl$	No	No	Linear	Quadratic	Cubic	Quartic
Observations	45956	15794	15794	15794	15794	15794
R^2	0.88	0.81	0.81	0.81	0.82	0.82

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Column (1) uses the whole sample (i.e., all bordering and non-bordering counties); Column (2) uses the specification that compares bordering counties; Columns (3)-(6) use bordering counties with linear, quadratic, cubic and quartic functions to control for geography. Standard errors are clustered by county.

This analysis shows that net taxes (Table 3) impact the large chains almost exclusively, as the net tax effect is negative and statistically significant only for these firms.[19] One way of interpreting this result is that decreases in state tax will lead to growth in establishment counts among the already large chains. Ultimately, favorable tax policies can have the effect of increasing retail entry, while inducing large chains to crowd out smaller ones.

Market competitiveness. To assess the implications of tax policies on market structure, we repeat our main specifications using the HHI measure as the dependent variable of interest calculated based on establishment shares (Table 6). The magnitude of these effects are non-trivial, as a 1% increase in the net tax will decrease the HHI by about 23 to 30 points, depending on the specification used. Therefore, tax cuts and incentives can lead to *more concentrated* markets with increasingly dominant retail chains. The negative coefficients of population in Table 6 is worth noting. In all previous regressions of establishment counts, the coefficient is consistently positive and significant, reflecting that larger markets will

[19]If we view entry as a form of investment, these patterns are qualitatively similar to past research that has shown little impact of corporate tax policies on small businesses in Finland (Harju et al. 2022).

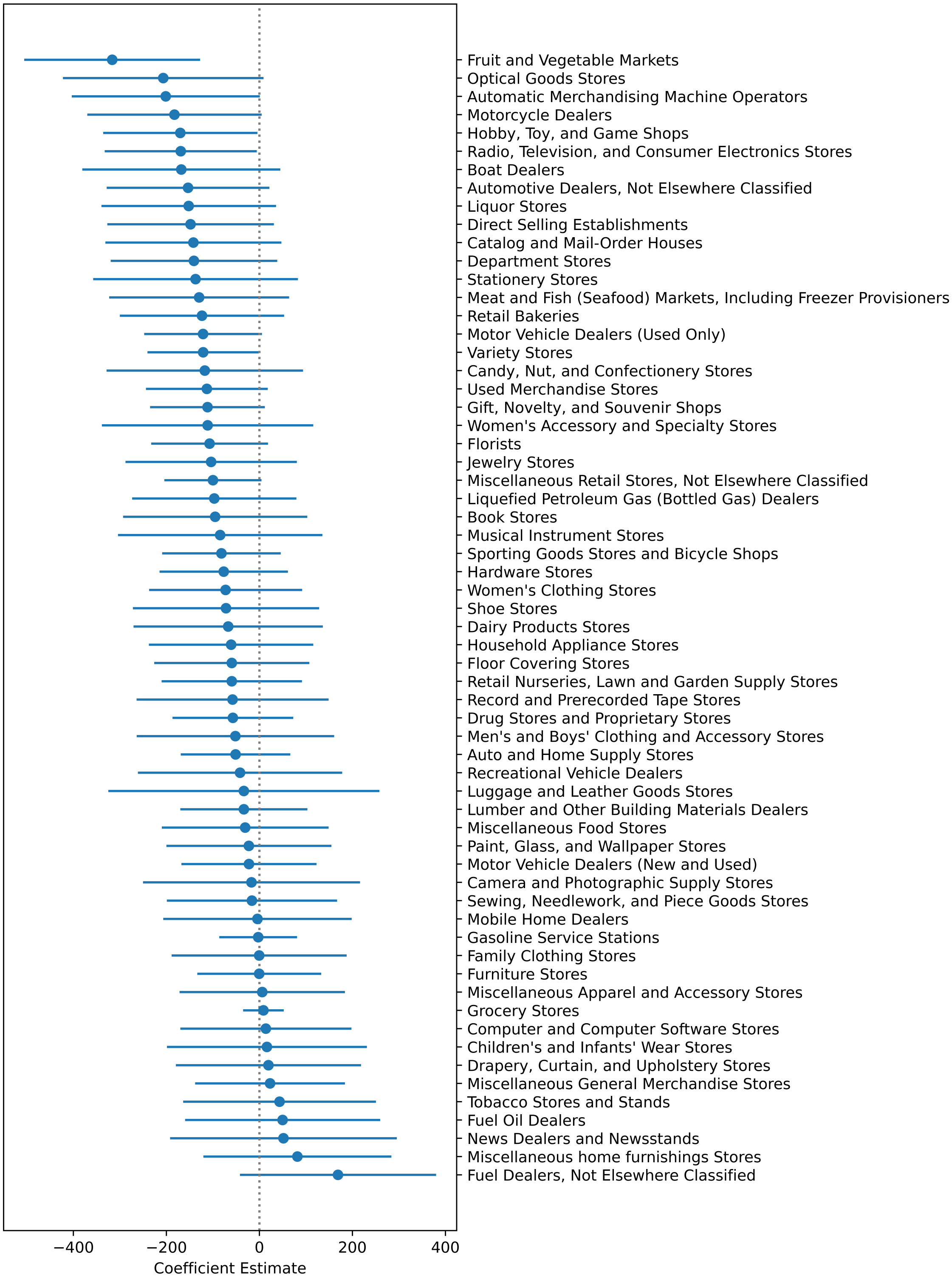
accommodate more establishments. However, as the market gets large, it encourages the entry of both large and small firms; in particular, larger markets are known to increase variety of products and services, leading to a decrease in market concentration (Lancaster 1990). The negative coefficient from Table 6 is consistent with that pattern.

Table 6: Relationship Between HHI and Net Taxes

	(1) All	(2) Border	(3) Border	(4) Border	(5) Border	(6) Border
$NetTax(percent)$	-78.34***	-63.59***	-66.46***	-69.66***	-64.87***	-75.56***
	(12.34)	(8.70)	(8.73)	(8.88)	(8.82)	(8.92)
$Population(10,000)$	-22.89***	-24.79***	-24.88***	-24.00***	-24.20***	-25.19***
	(0.79)	(0.91)	(0.91)	(0.90)	(0.88)	(0.91)
$BorderFE$	No	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes	Yes
$SectorFE$	Yes	Yes	Yes	Yes	Yes	Yes
$GeoControl$	No	No	Linear	Quadratic	Cubic	Quartic
Observations	2031175	692891	692891	692891	692891	692891
R^2	0.23	0.33	0.33	0.34	0.34	0.34

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Column (1) uses the whole sample (i.e., all bordering and non-bordering counties); Column (2) uses the specification that compares bordering counties; Columns (3)-(6) use bordering counties with linear, quadratic, cubic and quartic functions to control for geography. Standard errors are clustered by sector.

Figure 8: Tax Effect on HHI Across Retail Sectors



Notes: This plot presents the effect of state taxes on HHI using the specification from column 5 of Table 6. The dot represents the estimated tax effect, while the horizontal blue line represents the confidence interval. Results are presented for each of the retail sectors (over 60 of them).

There is also some heterogeneity in the impact of tax policies on market concentration. Figure 8 summarizes the differences in the tax effect on HHI across different retail sectors. These results confirm that increases in the net tax appears to be negatively correlated the HHI for most of the retail sectors (with the exception of about 10 of them). It is worth noting that when we compare with Figure 7, an retail sector that will experience increased entry *and* market concentration is women's clothing stores. A caveat though is that as the sector-specific analysis involves much smaller samples, so we see statistical significance only for the fruit and vegetables market retail sector.

5 Conclusion

We present new insights about the impact of place-based tax policies on shaping the retail landscape. With a model of entry, we demonstrate patterns of equilibrium entry *asymmetry* across firms when *uniform* tax policies are imposed. The model predicts that stronger firms are more sensitive to tax policy changes, and thus, favorable tax policies will disproportionately increase entry among these firms. Using comprehensive data that captures retail entry across the US, we demonstrate that the impact of tax policies is asymmetric across firms of different sizes. In particular, we show that the inferred tax effects on establishment entry are disproportionately driven by the largest retail firms. Consequently, policies that decrease taxes will ultimately weaken market competitiveness. For instance, tax subsidies aimed at encouraging establishment entry might further reinforce the market concentration among the already dominant firms.

Our theoretical and empirical framework for analyzing the impact of tax policy on the retail landscape abstracts away from potential bidding for firms. It has been demonstrated that states compete against one another as a means to attract firms and local investment (Slattery 2022). This competition might lead to increasingly attractive tax policies aimed at enticing firm entry. Given that our theoretical and empirical analysis shows that tax cuts can lead to decreased competitiveness in retail, it might be worthwhile for future research to investigate the extent to which this state-vs-state bidding exacerbates the asymmetric tax effects that induce already dominant retailers to become even more dominant.

These findings may also have implications on discussions about efficiency and incidence effects of place-based policies in public finance (Suárez Serrato and Zidar 2016). The amplification of dominant retailers' market power from favorable state tax policies might yield negative incidence effects, as past research has shown that the entry of large chains might have a negative impact on localized wages (Basker 2007). But at the same time, the proliferation of large chains might lead to efficiency gains, which could end up being passed on to consumers and thus be welfare-improving (Basker 2005b).

There remains ambiguity about the macroeconomic implications of place-based tax policies in the retail sector. As retail contributes about 6% of the overall GDP, tax policies that have asymmetric impact across retail firms of different sizes might lead to broader effects on employment and customer welfare. Moreover, there might be some value of linking the disproportionate sensitivity to tax policies among the largest firms with observations of increasing markups/concentration at national level and decreasing business dynamism over time (Affeldt et al. 2021, Akcigit and Ates 2021, Cao et al. 2017, Covarrubias et al. 2020, De Loecker and Eeckhout 2018, De Loecker et al. 2020, Feenstra et al. 2022, Grullon et al. 2019, Gutiérrez and Philippon 2017, Kwon et al. 2023, Leung and Li 2022, Liu et al. 2022, Smith and Ocampo 2022, West 2018). These patterns of rising concentration seem especially prevalent in the services sector (Hsieh and Rossi-Hansberg 2022), that retail would be part of.

The presence of a link between tax policies and firm entry suggests that these policies could offer one helpful source of exogenous variation for the purpose of identifying structural models of entry. To complement past research by Dearing (2022) and Zoutman et al. (2018) about the usefulness of tax rates as exclusion restrictions for estimating demand systems, new research could explore the identification power of tax policies for estimating supply-side models.

References

Affeldt P, Duso T, Gugler KP, Piechucka J (2021) Market concentration in europe: Evidence from antitrust markets. *Working paper* .

Akcigit U, Ates ST (2021) Ten facts on declining business dynamism and lessons from endogenous growth theory. *American Economic Journal: Macroeconomics* 13(1):257–98.

Anderson ET, Fong NM, Simester DI, Tucker CE (2010) How sales taxes affect customer and firm behavior: The role of search on the internet. *Journal of Marketing Research* 47(2):229–239.

Anderson SP, De Palma A, Kreider B (2001) The efficiency of indirect taxes under imperfect competition. *Journal of Public Economics* 81(2):231–251.

Arcidiacono P, Bayer P, Blevins JR, Ellickson PB (2016) Estimation of dynamic discrete choice models in continuous time with an application to retail competition. *The Review of Economic Studies* 83(3):889–931.

Atkinsa RM, Hernández-Lagosb P, Jara-Figueroad C, Seamansc R (2023) Jue insight: What is the impact of opportunity zones on job postings? *Journal of Urban Economics* forthcoming.

Barnatchez K, Crane LD, Decker R (2017) An assessment of the national establishment time series (nets) database. *FEDS working paper* .

Bartik TJ (2017) A new panel database on business incentives for economic development offered by state and local governments in the united states. *Working paper* .

Barwick PJ, Cao S, Li S (2021) Local protectionism, market structure, and social welfare: China's automobile market. *American Economic Journal: Economic Policy* 13(4):112–51.

Basker E (2005a) Job creation or destruction? labor market effects of wal-mart expansion. *Review of Economics and Statistics* 87(1):174–183.

Basker E (2005b) Selling a cheaper mousetrap: Wal-mart's effect on retail prices. *Journal of Urban Economics* 58(2):203–229.

Basker E (2007) The causes and consequences of wal-mart's growth. *Journal of Economic Perspectives* 21(3):177–198.

Basker E (2012) Raising the barcode scanner: Technology and productivity in the retail sector. *American Economic Journal: Applied Economics* 4(3):1–27.

Basker E, Klimek S, Hoang Van P (2012) Supersize it: The growth of retail chains and the rise of the "big-box" store. *Journal of Economics & Management Strategy* 21(3):541–582.

Basker E, Vickers C, Ziebarth NL (2018) Competition, productivity, and survival of grocery stores in the great depression. *International Journal of Industrial Organization* 59:282–315.

Baugh B, Ben-David I, Park H (2018) Can taxes shape an industry? evidence from the implementation of the "amazon tax". *The Journal of Finance* 73(4):1819–1855.

Bertrand M, Kramarz F (2002) Does entry regulation hinder job creation? evidence from the french retail industry. *the quarterly journal of economics* 117(4):1369–1413.

Besley T (1989) Commodity taxation and imperfect competition: A note on the effects of entry. *Journal of Public Economics* 40(3):359–367.

Blevins JR, Khwaja A, Yang N (2018) Firm expansion, size spillovers, and market dominance in retail chain dynamics. *Management Science* 64(9):4070–4093.

Bresnahan TF, Reiss PC (1991) Entry and competition in concentrated markets. *Journal of Political Economy* 99(5):977–1009.

Brülhart M, Jametti M, Schmidheiny K (2012) Do agglomeration economies reduce the sensitivity of firm location to tax differentials? *The Economic Journal* 122(563):1069–1093.

Campbell JR, Hopenhayn HA (2005) Market size matters. *The Journal of Industrial Economics* 53(1):1–25.

Cao D, Hyatt HR, Mukoyama T, Sager E (2017) Firm growth through new establishments. *Available at SSRN 3361451* .

Chi F (2022) Information waves and firm investment. *Available at SSRN* .

Commission CB (2008) *It's Time to End New York State's Empire Zone Program* (Citizens Budget Commission).

Couture V, Handbury J (2020) Urban revival in america. *Journal of Urban Economics* 119:103267.

Covarrubias M, Gutiérrez G, Philippon T (2020) From good to bad concentration? us industries over the past 30 years. *NBER Macroeconomics Annual* 34(1):1–46.

Criscuolo C, Martin R, Overman HG, Van Reenen J (2019) Some causal effects of an industrial policy. *American Economic Review* 109(1):48–85.

Da Rin M, Di Giacomo M, Sembenelli A (2011) Entrepreneurship, firm entry, and the taxation of corporate income: Evidence from europe. *Journal of public economics* 95(9-10):1048–1066.

De Loecker J, Eeckhout J (2018) Global market power. Technical report, National Bureau of Economic Research.

De Loecker J, Eeckhout J, Unger G (2020) The rise of market power and the macroeconomic implications. *The Quarterly Journal of Economics* 135(2):561–644.

Dearing A (2022) Estimating structural demand and supply models using tax rates as instruments. *Journal of Public Economics* 205:104561.

Dell M (2010) The persistent effects of peru's mining mita. *Econometrica* 78(6):1863–1903.

Devereux MP, Griffith R, Simpson H (2007) Firm location decisions, regional grants and agglomeration externalities. *Journal of public economics* 91(3-4):413–435.

Dube A, Lester TW, Reich M (2010) Minimum wage effects across state borders: Estimates using contiguous counties. *The Review of Economics and Statistics* 92(4):945–964.

Dunne T, Roberts MJ, Samuelson L (1989) The growth and failure of us manufacturing plants. *The Quarterly Journal of Economics* 104(4):671–698.

Ergin E, Gümüş M, Yang N (2022) An empirical analysis of intra-firm product substitutability in fashion retailing. *Production and Operations Management* 31(2):607–621.

Fajgelbaum PD, Morales E, Suárez Serrato JC, Zidar O (2019) State taxes and spatial misallocation. *The Review of Economic Studies* 86(1):333–376.

Fang L, Yang N (2022) Measuring deterrence motives in dynamic oligopoly games. *Management Science* forthcoming.

Fazio C, Guzman J, Stern S (2019) The impact of state-level r&d tax credits on the quantity and quality of entrepreneurship. Technical report, National Bureau of Economic Research.

Feenstra RC, Macedoni L, Xu M (2022) Large firms, consumer heterogeneity and the rising share of profits. Technical report, National Bureau of Economic Research.

Foster L, Haltiwanger J, Klimek S, Krizan C, Ohlmacher S (2016) The evolution of national retail chains: How we got here. *Handbook on the Economics of Retailing and Distribution*, 7–37 (Edward Elgar Publishing).

Garicano L, Lelarge C, Van Reenen J (2016) Firm size distortions and the productivity distribution: Evidence from france. *American Economic Review* 106(11):3439–79.

Geurts K, Van Biesebroeck J (2016) Firm creation and post-entry dynamics of de novo entrants. *International Journal of Industrial Organization* 49:59–104.

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

Glovera B, Levineb O (2021) Corporate tax avoidance, firm size, and capital misallocation. Technical report, Working paper.

Gourio F, Roys N (2014) Size-dependent regulations, firm size distribution, and reallocation. *Quantitative Economics* 5(2):377–416.

Greenfield B (2010) Cape Cod Residents Keep the Chain Stores Out. *The New York Times* URL https://www.nytimes.com/2010/06/09/realestate/commercial/09chain.html, (accessed March 24, 2023).

Grullon G, Larkin Y, Michaely R (2019) Are us industries becoming more concentrated? *Review of Finance* 23(4):697–743.

Gutiérrez G, Philippon T (2017) Declining competition and investment in the us. Technical report, National Bureau of Economic Research.

Haltiwanger J, Jarmin R, Krizan CJ (2010) Mom-and-pop meet big-box: complements or substitutes? *Journal of Urban Economics* 67(1):116–134.

Hanner D, Hosken D, Olson LM, Smith LK (2015) Dynamics in a mature industry: Entry, exit, and growth of big-box grocery retailers. *Journal of Economics & Management Strategy* 24(1):22–46.

Hanson A, Rohlin S (2011) Do location-based tax incentives attract new business establishments? *Journal of Regional Science* 51(3):427–449.

Harju J, Koivisto A, Matikka T (2022) The effects of corporate taxes on small firms. *Journal of Public Economics* 212:104704.

Hollenbeck B (2017) The economic advantages of chain organization. *The RAND Journal of Economics* 48(4):1103–1135.

Hollenbeck B, Giroldo RZ (2022) Winning big: Scale and success in retail entrepreneurship. *Marketing Science* 41(2):271–293.

Holmes TJ (1998) The effect of state policies on the location of manufacturing: Evidence from state borders. *Journal of Political Economy* 106(4):667–705.

Hopenhayn HA (1992) Entry, exit, and firm dynamics in long run equilibrium. *Econometrica: Journal of the Econometric Society* 1127–1150.

Hsieh CT, Rossi-Hansberg E (2022) The industrial revolution in services. *Journal of Political Economy Macroeconomics* forthcoming.

Igami M, Yang N (2016) Unobserved heterogeneity in dynamic games: Cannibalization and preemptive entry of hamburger chains in canada. *Quantitative Economics* 7(2):483–521.

Jarmin RS, Klimek SD, Miranda J (2009) The role of retail chains: National, regional and industry results. *Producer dynamics: New evidence from micro data*, 237–262 (University of Chicago Press).

Javorcik BS, Li Y (2013) Do the biggest aisles serve a brighter future? global retail chains and their implications for romania. *Journal of International Economics* 90(2):348–363.

Jovanovic B (1982) Selection and the evolution of industry. *Econometrica: Journal of the econometric society* 649–670.

Kennedy P, Wheeler H (2021) Neighborhood-level investment from the us opportunity zone program: Early evidence. *Available at SSRN 4024514* .

Kline P, Moretti E (2014) Local economic development, agglomeration economies, and the big push: 100 years of evidence from the tennessee valley authority. *The Quarterly journal of economics* 129(1):275–331.

Klopack B (2022) One size fits all? the value of standardized retail chains. *RAND Journal of Economics* forthcoming.

Kroft K, Laliberté JWP, Leal-Vizcaíno R, Notowidigdo MJ (2020) Salience and taxation with imperfect competition. Technical report, National Bureau of Economic Research.

Kroft K, Laliberté JWP, Vizcaíno RL, Notowidigdo MJ (2021) Efficiency and incidence of taxation with free entry and love-of-variety preferences. Technical report, National Bureau of Economic Research.

Kwon SY, Ma Y, Zimmermann K (2023) 100 years of rising corporate concentration. *University of Chicago, Becker Friedman Institute for Economics Working Paper* .

Lagos M, Dineen J (2014) Compromise reached on San Francisco's chain store limits. *SF-GATE* URL https://www.sfgate.com/politics/article/Compromise-reached-on-San-Francisco-s-chain-5870444.php, (accessed March 24, 2023).

Lancaster K (1990) The economics of product variety: A survey. *Marketing science* 9(3):189–206.

LaPoint C, Sakabe S (2021) Place-based policies and the geography of corporate investment. *Available at SSRN 3950548* .

Leung J, Li Z (2022) Rising retail concentration: Superstar firms and household demand. *Available at SSRN 3981995* .

Liu E, Mian A, Sufi A (2022) Low interest rates, market power, and productivity growth. *Econometrica* 90(1):193–221.

Luna L (2004) Local sales tax competition and the effect on county governments' tax rates and tax bases. *Journal of the American Taxation Association* 26(1):43–61.

Meyersohn N (2021) These major chains boomed as small retailers had to close up shop. *CNN* URL https://www.cnn.com/2021/11/27/business/supply-chain-retailers-small-stores/index.html, (accessed March 24, 2023).

Mukherjee A, Singh M, Žaldokas A (2017) Do corporate taxes hinder innovation? *Journal of Financial Economics* 124(1):195–221.

Nelson P (1970) Information and consumer behavior. *Journal of political economy* 78(2):311–329.

Nishida M, Yang N (2020) Threat of entry and organizational-form choice: The case of franchising in retailing. *Journal of Marketing Research* 57(5):810–830.

Paul RN (1994) Status and outlook of the chain-restaurant industry. *Cornell Hotel and Restaurant Administration Quarterly* 35(3):23–26.

Peck J, Wiggins J (2006) It just feels good: Customers' affective response to touch and its influence on persuasion. *Journal of Marketing* 70(4):56–69.

Reddy SK, Holak SL, Bhat S (1994) To extend or not to extend: Success determinants of line extensions. *Journal of marketing research* 31(2):243–262.

Rossi-Hansberg E, Sarte PD, Trachter N (2021) Diverging trends in national and local concentration. *NBER Macroeconomics Annual* 35(1):115–150.

Sandino T (2007) Introducing the first management control systems: evidence from the retail sector. *The Accounting Review* 82(1):265–293.

SeekingAlpha (2022) Home Depot Vs. Lowe's: The Clear Winner . *Seeking Alpha* URL https://seekingalpha.com/article/4501347-home-depot-vs-lowes-clear-winner-better-company, (accessed March 7, 2023).

Segall MS (1955) Some characteristics of retail competition in canada. *Journal of Marketing* 20(1):62–65.

Seim K (2006) An empirical model of firm entry with endogenous product-type choices. *The RAND Journal of Economics* 37(3):619–640.

Shoag D, Veuger S (2018) Shops and the city: Evidence on local externalities and local government policy from big-box bankruptcies. *Review of Economics and Statistics* 100(3):440–453.

Slattery C (2022) Bidding for firms: Subsidy competition in the u.s. *Working paper* .

Slattery C, Zidar O (2020) Evaluating state and local business incentives. *Journal of Economic Perspectives* 34(2):90–118.

Smith DA, Ocampo S (2022) The evolution of us retail concentration. *arXiv preprint arXiv:2202.07609* .

Smith H (2006) Store characteristics in retail oligopoly. *The RAND Journal of Economics* 37(2):416–430.

Suárez Serrato JC, Zidar O (2016) Who benefits from state corporate tax cuts? a local labor markets approach with heterogeneous firms. *American Economic Review* 106(9):2582–2624.

Suzuki J (2013) Land use regulation as a barrier to entry: evidence from the texas lodging industry. *International Economic Review* 54(2):495–523.

Vara-Orta F (2017) Tax Breaks for Big-Box Stores Can Drain Money From Schools . *Education Week Magazine* URL https://www.edweek.org/leadership/tax-breaks-for-big-box-stores-can-drain-money-from-schools/2017/08, (accessed March 7, 2023).

Weld L (1924) Are there too many retailers? *The ANNALS of the American Academy of Political and Social Science* 115(1):199–204.

West G (2018) *Scale: The universal laws of life, growth, and death in organisms, cities, and companies* (Penguin).

Yang N (2020) Learning in retail entry. *International Journal of Research in Marketing* 37(2):336–355.

Zeugner S (2013) Tradable vs. non-tradable: an empirical approach to the classification of sectors. *European Commission* 46–51.

Zhang JZ, Chang CW, Neslin SA (2022) How physical stores enhance customer value: The importance of product inspection depth. *Journal of Marketing* 86(2):166–185.

Zoutman FT, Gavrilova E, Hopland AO (2018) Estimating both supply and demand elasticities using variation in a single tax rate. *Econometrica* 86(2):763–771.

Online Appendix

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A Theoretical Extensions

Our discussions about the asymmetric responses to uniform tax policies have ignored the role of entry costs (κ). As the tax policy we considered entered additively, the discrepancy in the tax effects between firms 1 and 2 are invariant to the entry costs. To garner some insights about potential interactions with entry costs, we consider two extensions to the baseline model. One is proportional tax policy, and the other relates to heterogeneous entry costs for firms.

Proportional Tax Policy We consider an alternative uniform tax policy that is proportional to entry costs. That is, we consider entry costs $\kappa\tau$. When $\tau < 1$, the tax policy can be viewed as a subsidy or incentive, while $\tau > 1$ would relate to a tax that raises the entry cost.

With this alternative tax policy, we can write the difference between the equilibrium choice probabilities with and without the tax policy as

$$\tilde{\sigma}_1 = \sigma_1^* - \frac{(1-\tau)\kappa\rho}{1-\rho(1-\rho)}, \tag{21}$$

$$\tilde{\sigma}_2 = \sigma_2^* - \frac{(1-\tau)\kappa(1-\rho)}{1-\rho(1-\rho)}. \tag{22}$$

These expressions can help us understand the differences between $(\tilde{\sigma}_1 - \sigma_1^*)$ and $(\tilde{\sigma}_2 - \sigma_2^*)$. In particular,

$$|\tilde{\sigma}_1 - \sigma_1^*| = |\tilde{\sigma}_2 - \sigma_2^*| + \frac{|1-\tau|\kappa}{1-\rho(1-\rho)}(2\rho - 1). \tag{23}$$

As can be seen, as long as $\rho > 0.5$, firm 1, the larger firm, will always be more responsive to tax policy than firm 2. Furthermore, an implication of the magnitude of this difference is that regardless of whether $\tau > 1$ or $\tau < 1$, a larger entry cost κ will exacerbate differences in the tax effects between the two firms. This insight might be useful in helping researchers understand potential industry-specific heterogeneity in these asymmetric responses to tax policies between firms of various strengths, as some industries are characterized by large (or small) entry costs.

Heterogeneous Entry Costs Now we consider the case firms have different entry costs. This case is relevant only when a proportional tax policy is implemented. Let κ_1 and κ_2 denote the entry costs for firm 1 and firm 2 respectively. It is intuitive to assume that if $\rho > 0.5$, i.e. firm 1 is the larger firm, then $\kappa_1 > \kappa_2$. This is because higher-quality or more competitive firms are likely to have a higher entry cost. In our empirical context regarding large and small chains in particular, larger chains with many stores in a market can be more attractive to consumers because they are easy to access — consumers do not need to travel far to shop at their stores. In this case, the larger chain would incur a higher entry cost because it opens many stores in a market. Each store would require an entry cost for setting up the store. Although larger chains usually enjoy economies of scale in entry cost, the total entry cost associated with opening many stores would exceed that of the smaller chain that does not have many stores.

Following equations 21 and 22, we can show that the following equation holds:

$$|\tilde{\sigma}_1 - \sigma_1^*| = |\tilde{\sigma}_2 - \sigma_2^*| + \frac{|1-\tau|\kappa_2}{1-\rho(1-\rho)} \left((\frac{\kappa_1}{\kappa_2} + 1)\rho - 1 \right). \tag{24}$$

As can be seen, a higher κ_1 would exacerbate the difference in larger and smaller chains' responsiveness to tax policies.

This difference in responsiveness is loosely consistent as well to the possibility that large firms are better equipped at tax avoidance (Glovera and Levineb 2021). A proportional tax would ultimately further contribute towards the benefits of tax avoidance, especially for firms with large costs of entry.

B Tax Design Implications: A Calibrated Illustration

Having shown empirically the asymmetric responses to uniform state taxes, we revisit our theoretical analysis to explore how policy could be designed so as avoid these asymmetric patterns. For this exercise, we will consider an empirically-relevant case study about competition between two dominant home improvement chains, Home Depot and Lowe's. These chains are the market leaders in the US, with a combined market share of nearly 50% for this retail sector (SeekingAlpha 2022). This case study will utilize a subset of the data from our empirical analysis. Furthermore, both of these chains are known to benefit from state tax breaks (Vara-Orta 2017), which has important implications on public financing (i.e., funding of public schools). As taxes are potentially different across markets, one should view this exercise as a tax assessment for a single average or representative market.

Recall that in section 2.3, we characterized theoretically a suggested tax policy that could induce symmetric firm entry outcomes. The home improvement retail setting is an ideal context to analyze these tax policy suggestions, as there are two main competitors. To ensure a close match to the empirical environment we use for the theoretical insights, we consider a subset of the markets that have *at most* one Home Depot outlet and/or one Lowe's outlet. We focus on this sub-sample to ensure that the probability of entry is bounded below 1 for each of the chains.

B.1 Calibrated Model Primitives

Based on this sub-sample of data, we can obtain calibrated values of the key entry model primitives that are needed in order to construct the tax schedule $\tau_{HomeDepot}$ and τ_{Lowes}. From the raw data patterns in this sub-sample, we see that $\sigma^*_{HomeDepot} = \Pr(a_{HomeDepot} = 1) = 0.07$ and $\sigma^*_{Lowes} = \Pr(a_{Lowes} = 1) = 0.11$. If we define

$$\lambda = \frac{\sigma^*_{HomeDepot}}{\sigma^*_{Lowes}} = 0.64 \tag{25}$$

to be the ratio of the choice probabilities, we can calculate ρ as follows

$$\rho = \frac{\lambda}{1+\lambda} = 0.39, \tag{26}$$

while entry costs κ can be calibrated as

$$\kappa = 1 - \frac{\sigma^*_{HomeDepot}[1-\rho(1-\rho)]}{\rho} = 0.86. \tag{27}$$

B.2 Designing Taxes to Induce Balanced Entry

These calibrated values can be used to calculate the suggested taxes Home Depot and Lowe's could pay under the proposed tax policy, such that given this suggested tax policy, their entry probabilities are symmetric. Given this constraint for balanced firm entry, we can establish what tax levels should be set for Home Depot and Lowe's such that the total tax revenues are maximized. With the calibrated values from our data, we calculate these tax levels to be:

$$\tau_{HomeDepot} = \frac{\rho(1-\kappa)}{2} = 0.027, \tag{28}$$

$$\tau_{Lowes} = \frac{(1-\rho)(1-\kappa)}{2} = 0.042. \tag{29}$$

For the taxes to induce symmetric entry decisions, we would need to impose lower taxes on Home Depot relative to Lowe's (i.e., $\tau_{HomeDepot} < \tau_{Lowes}$). In summary, this calibration exercise demonstrates how tax policies could be customized across retail chains, if the objective is to optimize total tax revenues while at the same time, ensuring symmetric responses (with respect to entry probabilities across chains) to the tax policy.

C Details about the Retail Sectors

We present a tabulation of the establishments across different retail sectors (i.e., SIC 4-digit classification) in Table A1. This table shows that each retail sector is well-represented. The retail sectors that have disproportionately more establishments include grocery stores and women's clothing. Among the sectors with the lowest establishment counts are newsstands and luggage stores.

Table A1: Tabulation of Establishment Counts Across SIC 4-Digit Classification

SIC		Counts	SIC		Counts
5211	Lumber and Other Building Materials Dealers	51262	5713	Floor Covering Stores	48942
5231	Paint, Glass, and Wallpaper Stores	30364	5714	Drapery, Curtain, and Upholstery Stores	4612
5251	Hardware Stores	26637	5719	Miscellaneous home furnishings Stores	24682
5261	Retail Nurseries, Lawn and Garden Supply Stores	20818	5722	Household Appliance Stores	14207
5271	Mobile Home Dealers	5783	5731	Radio, Television, and Consumer Electronics Stores	22959
5311	Department Stores	27484	5734	Computer and Computer Software Stores	37180
5331	Variety Stores	37335	5735	Record and Prerecorded Tape Stores	14647
5399	Miscellaneous General Merchandise Stores	11771	5736	Musical Instrument Stores	10862
5411	Grocery Stores	200385	5912	Drug Stores and Proprietary Stores	62802
5421	Meat and Fish (Seafood) Markets, Including Freezer Provisioners	12402	5921	Liquor Stores	38473
5431	Fruit and Vegetable Markets	8578	5932	Used Merchandise Stores	62829
5441	Candy, Nut, and Confectionery Stores	9692	5941	Sporting Goods Stores and Bicycle Shops	63001
5451	Dairy Products Stores	4023	5942	Book Stores	19902
5461	Retail Bakeries	52622	5943	Stationery Stores	10023
5499	Miscellaneous Food Stores	40350	5944	Jewelry Stores	48372
5511	Motor Vehicle Dealers (New and Used)	60057	5945	Hobby, Toy, and Game Shops	34934
5521	Motor Vehicle Dealers (Used Only)	48300	5946	Camera and Photographic Supply Stores	2212
5531	Auto and Home Supply Stores	73681	5947	Gift, Novelty, and Souvenir Shops	83989
5541	Gasoline Service Stations	73420	5948	Luggage and Leather Goods Stores	1803
5551	Boat Dealers	9104	5949	Sewing, Needlework, and Piece Goods Stores	16186
5561	Recreational Vehicle Dealers	3836	5961	Catalog and Mail-Order Houses	21569
5571	Motorcycle Dealers	10448	5962	Automatic Merchandising Machine Operators	19079
5599	Automotive Dealers, Not Elsewhere Classified	21407	5963	Direct Selling Establishments	50045
5611	Men's and Boys' Clothing and Accessory Stores	17597	5983	Fuel Oil Dealers	4838
5621	Women's Clothing Stores	91767	5984	Liquefied Petroleum Gas (Bottled Gas) Dealers	6837
5632	Women's Accessory and Specialty Stores	13009	5989	Fuel Dealers, Not Elsewhere Classified	1512
5641	Children's and Infants' Wear Stores	9048	5992	Florists	35803
5651	Family Clothing Stores	23799	5993	Tobacco Stores and Stands	9336
5661	Shoe Stores	29260	5994	News Dealers and Newsstands	1808
5699	Miscellaneous Apparel and Accessory Stores	32398	5995	Optical Goods Stores	23012
5712	Furniture Stores	53926	5999	Miscellaneous Retail Stores, Not Elsewhere Classified	250989

Note: This table shows the number of establishments by industry in 2014.

D Itemized Description of Taxes

To better understand the different components of the net tax, and how these components impact establishment entry, we present a break-down of each of these components in the empirical analysis. That is, instead of net tax, we include each of the individual components, such as the property tax, sales tax, corporate income tax, job creation credit, investment credit, research credit, property abatement, and job training subsidy. Most of these taxes or incentives impact the operating/fixed costs (with the exception of corporate income taxes), and none of them relate to sales taxes. We briefly describe each component below.

- *Property taxes*: Taxes firm will pay that relate to the physical properties they own.
- *Sales taxes*: Taxes firm will pay on its business inputs (e.g., initial purchase of building materials, initial purchase of machinery).
- *Corporate income taxes*: Taxes firm will pay that is based on their profits.
- *Job creation credit*: A tax credit firm receives for each job that is created.
- *Investment credit*: A tax credit that allows firms to deduct investment costs from their taxes.
- *Research credit*: A tax credit that allows firms to deduct R&D costs from their taxes.
- *Property abatement*: A subsidy offered on certain types of real estate or business opportunities
- *Job training subsidy*: A subsidy offered to help cover personnel training costs.

E Food Service Sector Results

Our main analysis has focused on the retail sector. Based on the SIC classification, many food services would not be included in the retail category, as they have SIC labels 5812 (restaurant) and 5813 (drinking). The eating and drinking establishments have in the past been studied under the context of retail entry (Blevins et al. 2018, Fang and Yang 2022, Igami and Yang 2016), so in this section, we assess the extent to which our qualitative findings hold for the food service sector as well, we repeat the main analysis in section 4, but using establishment counts (Table A2) and HHI (Table A3) measures for food services. These results confirm that the empirical patterns we uncover in section 4 also hold for restaurants and drinking establishments. In particular, increases in net tax will both lead to a reduction in food service establishment counts, as well as decreased concentration (i.e., lower HHI).

Table A2: Relationship Between Restaurant and Drinking Establishment Counts and Net Taxes

	(1) All	(2) Border	(3) Border	(4) Border	(5) Border	(6) Border
$NetTax(percent)$	-2.45	-14.76***	-15.04***	-14.96***	-14.73***	-11.54**
	(2.55)	(4.91)	(5.07)	(4.92)	(4.84)	(4.93)
$Population(10,000)$	24.62***	23.61***	23.61***	23.74***	23.76***	23.82***
	(0.46)	(1.10)	(1.11)	(1.11)	(1.13)	(1.13)
$BorderFE$	No	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes	Yes
$GeoControl$	No	No	Linear	Quadratic	Cubic	Quartic
Observations	45834	15774	15774	15774	15774	15774
R^2	0.92	0.88	0.88	0.88	0.88	0.88

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. This analysis focuses on restaurant and drinking establishments (i.e., SIC 5812 or 5813). Column (1) uses the whole sample (i.e., all bordering and non-bordering counties); Column (2) uses the specification that compares bordering counties; Columns (3)-(6) use bordering counties with linear, quadratic, cubic and quartic functions to control for geography. Standard errors are clustered by county.

Table A3: Relationship HHI and Net Taxes for Food Establishments

	(1) All	(2) Border	(3) Border	(4) Border	(5) Border	(6) Border
Eating places						
$NetTax(percent)$	-64.29***	-87.17**	-84.70**	-86.47**	-84.91**	-104.48***
	(24.27)	(35.18)	(33.99)	(33.87)	(34.12)	(34.47)
$Population(10,000)$	-3.53***	-3.55**	-3.52**	-3.48**	-3.56**	-4.01**
	(1.15)	(1.66)	(1.76)	(1.68)	(1.65)	(1.80)
$BorderFE$	No	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes	Yes
$GeoControl$	No	No	Linear	Quadratic	Cubic	Quartic
Observations	45813	15772	15772	15772	15772	15772
R^2	0.03	0.16	0.17	0.18	0.18	0.18
Drinking places						
$NetTax(percent)$	-602.69***	-369.54***	-388.07***	-394.06***	-403.73***	-421.18***
	(60.33)	(99.81)	(96.48)	(94.78)	(93.48)	(91.54)
$Population(10,000)$	-14.78***	-14.74**	-14.90**	-14.38**	-14.50**	-14.71**
	(4.64)	(6.79)	(6.48)	(6.58)	(6.88)	(6.86)
$BorderFE$	No	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes	Yes
$GeoControl$	No	No	Linear	Quadratic	Cubic	Quartic
Observations	39367	13626	13626	13626	13626	13626
R^2	0.09	0.34	0.34	0.35	0.35	0.35

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. This analysis focuses on restaurant and drinking establishments (i.e., SIC 5812 or 5813). Column (1) uses the whole sample (i.e., all bordering and non-bordering counties); Column (2) uses the specification that compares bordering counties; Columns (3)-(6) use bordering counties with linear, quadratic, cubic and quartic functions to control for geography. Standard errors are clustered by county.

F Sensitivity Analysis for Firm Size Cut-Offs

Here, we replicate our main findings about the differential impact of taxes for large and small firms using alternative cut-off thresholds. In particular, the specifications that use alternative cut-offs are presented in Table A4. This sensitivity analysis illustrates that the noticeable net tax effects for big chains (and not small chains) holds for all alternative cut-offs we consider.

Table A4: Relationship Between Establishment Counts and Net Taxes for Different Cut-offs

	(1)	(2)	(3)	(4)	(5)
	Big Chains				
$NetTax(percent)$	-4.73**	-4.72**	-4.67**	-4.77**	-4.82**
	(2.19)	(2.18)	(2.15)	(2.13)	(2.11)
$Population(10,000)$	7.54***	7.25***	7.08***	6.94***	6.84***
	(0.41)	(0.39)	(0.37)	(0.35)	(0.34)
	Small Chains				
$NetTax(percent)$	1.82	1.81	1.76	1.86	1.91
	(1.36)	(1.43)	(1.48)	(1.52)	(1.55)
$Population(10,000)$	3.51***	3.80***	3.97***	4.11***	4.21***
	(0.20)	(0.22)	(0.24)	(0.25)	(0.26)
$BorderFE$	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes
$GeoControl$	Cubic	Cubic	Cubic	Cubic	Cubic
Cut-off	10	15	20	25	30
Observations	15794	15794	15794	15794	15794

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Each column provides the results from a specification using a different cut-off for labeling retailers as being large chains. In particular, we consider cut-offs of 10 (Column 1), 15 (Column 2), 20 (Column 3), 25 (Column 4), and 30 (Column 5) establishments nationwide for retailer to be considered large. Moreover, we use the specification that involves bordering counties with cubic functions to control for geography. Standard errors are clustered by county.

G Potential Impact of State Tax Policies on Migration

This section explores potential confounds associated with demographic shifts in light of state tax policies. It seems plausible that changes in policies might make certain states more attractive to work in. For example, a reduction of sales taxes on fixed costs might give retail firms more financial resources to pay their managers and employees. This potential confound might matter for our research design, which requires that neighboring counties on each side of the state border be good control groups of each other; at a minimum, county characteristics (observed or unobserved) would ideally be continuous across the state border. For a typical regression discontinuity design (RDD), one could examine the density of observations at the cutoff to see if there is bunching; however, in a spatial RDD design, bunching tests are not practical as additional counties will not emerge in response to state tax policies.

To assuage our concerns about this potential confound, we investigate observed demographics of bordering counties to see if they are highly correlated with state tax policies. In particular, we consider an alternative specification with population as the main outcome of interest. Table A5 summarizes these results. We see here that in all of the specifications, there is no statistically significant effect of net taxes on the population.

Table A5: Relationship Between Population and Net Taxes

	(1) All	(2) Border	(3) Border	(4) Border	(5) Border	(6) Border
$NetTax(percent)$	0.43	0.67	0.65	0.50	0.71	0.15
	(0.67)	(0.90)	(0.85)	(0.70)	(0.80)	(0.70)
$BorderFE$	No	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes	Yes
$GeoControl$	No	No	Linear	Quadratic	Cubic	Quartic
Observations	45956	15794	15794	15794	15794	15794
R^2	0.00	0.20	0.20	0.22	0.23	0.26

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is $Population(10,000)$. Column (1) uses the whole sample (i.e., all bordering and non-bordering counties); Column (2) uses the specification that compares bordering counties; Columns (3)-(6) use bordering counties with linear, quadratic, cubic and quartic functions to control for geography. Standard errors are clustered by county.

Moreover, we show using an alternative proxy for market size (i.e., income), that net taxes do not appear to be highly correlated with income. So income demographics are unlikely to be directly impacted by tax policies for firms. The results from this specification are summarized in Table A6.

Table A6: Relationship Between Income and Net Taxes

	(1) All	(2) Border	(3) Border	(4) Border	(5) Border	(6) Border
$NetTax(percent)$	129.95	-84.01	-97.92	-146.22	-68.67	-265.62
	(228.47)	(265.77)	(249.56)	(210.45)	(238.45)	(213.00)
$BorderFE$	No	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes	Yes
$GeoControl$	No	No	Linear	Quadratic	Cubic	Quartic
Observations	45956	15794	15794	15794	15794	15794
R^2	0.01	0.22	0.22	0.23	0.24	0.25

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is log(Income). Column (1) uses the whole sample (i.e., all bordering and non-bordering counties); Column (2) uses the specification that compares bordering counties; Columns (3)-(6) use bordering counties with linear, quadratic, cubic and quartic functions to control for geography. Standard errors are clustered by county.

Therefore, we have some reason to believe that tax-induced shifts in demographics (at least in the short-term) are unlikely to bias our main findings about the relationship between net taxes and establishment entry.

H Additional Analysis with Sector-Specific Heterogeneity

To control for sector-specific heterogeneity, we consider a specification that includes sector fixed effects. The results are summarized in Table A7. This robustness check confirms that the inferred tax effects on retail entry are preserved even when retail sector fixed effects are included in the specification; thus, it does not appear that the impact of taxes is concentrated towards a small set of retail sectors. However, the magnitude of the tax effects are dampened though, as compared with our analysis summarized in Table 3.

Table A7: Relationship Between Establishment Counts and Net Taxes

	(1) All	(2) Border	(3) Border	(4) Border	(5) Border	(6) Border
$NetTax(percent)$	-0.23**	-0.39***	-0.38***	-0.36***	-0.38***	-0.35***
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
$Population(10,000)$	1.18***	0.97***	0.97***	0.97***	0.97***	0.97***
	(0.17)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
$BorderFE$	No	Yes	Yes	Yes	Yes	Yes
$YearFE$	Yes	Yes	Yes	Yes	Yes	Yes
$SectorFE$	Yes	Yes	Yes	Yes	Yes	Yes
$GeoControl$	No	No	Linear	Quadratic	Cubic	Quartic
Observations	2849272	979228	979228	979228	979228	979228
R^2	0.41	0.40	0.40	0.40	0.40	0.40

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Column (1) uses the whole sample (i.e., all bordering and non-bordering counties); Column (2) uses the specification that compares bordering counties; Columns (3)-(6) use bordering counties with linear, quadratic, cubic and quartic functions to control for geography. Standard errors are clustered by sector.