State Income Taxes and Entrepreneurship in the Gig Economy

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Abstract

This research adds a dimension of tax policy to our understanding of the "gig" economy. We investigate the effect of a state tax rate increase on pass through income in Kansas on monthly Airbnb property listing from 2014 to 2019. We distinguish between "gig" listings where owners supply spare rooms in their property and "investor" owners that use Airbnb as a reservation management system. Our findings show that the income tax elasticity of monthly supply of days available for reservation to be -1 for investor owners and -3.48 for gig owners.

JEL Codes:
Keywords: state income taxes; entrepreneurship; AirBNB

1 Introduction

Gig-economy platforms, such as Airbnb or Uber, are of considerable interest for public policy for their variety of social and regulatory implications. Fundamentally, these platforms reduce the transaction costs of contracting. For some business-type activities they offer an alternative arrangement for scheduling or delivering services, such as when a restaurant relies on Grubhub instead of a on-payroll delivery driver. In other cases, these platforms improve the allocative efficiency of capital, such as when a commuter returning home during rush hour in a passenger car can more fully utilize their capacity by finding another rider with mutually beneficial terms.

This research adds a dimension of tax policy to our understanding of the "gig" economy.[1] We investigate the effect of a state tax rate increase on pass through income in Kansas on Airbnb property listing. This tax increase occurred in 2017 when Kansas ended a controversial policy that had been enacted in 2012 which set the tax rate on income earned through pass through activities to zero as part of an effort to increase entrepreneurship and "small businesses," a topic of perennial interest to policy makers. In repealing the policy in 2017, Kansas added income earned through pass through activities to the household's ordinary income to be taxed under the usual individual income tax, with rates topping out for households over $30,000 at 4.9 percent for 2017 percent and 5.7 percent starting in 2018 (see Table 1). As Figure 1 shows, change was extremely revenue productive as income tax revenues increased by 46.5% with for the 2018 fiscal year.

To explore the effect of the tax increase, we examine the monthly number of days listed as available to rent on two subsamples of Kansas Airbnb properties: "investor" properties and "gig" properties. Investor properties we define as properties owned by hosts who are listing the entirety of multiple properties on Airbnb. We refer to properties listed as partial units from hosts with only one property to their ID as gig properties. Airbnb represents an attractive alternative for managing reservations for investor type owners, whereas gig types are renting out their excess capacity of a durable consumption good.

This paper contributes to at least two literatures. First, while there is a substantial literature in state tax policy and various effects related to economic activity, this is the first research to investigate the impact on a major gig economy platform. Second, we join a literature on the "Kansas Tax Experiment" that has investigated effects of the policy (see Goodman et al., 2018; Debacker et al., 2019). Not only was the policy unique at

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[1]There is no standardized definition of the "gig economy" and for some it is somewhat synonymous with the increased used of independent contractors rather than employees, such as when a restaurant relies on UberEats or GrubHub instead of hiring a regular delivery driver.

the time it was passed in state tax policy, but it was also controversial and informative to the federal Tax Cuts and Jobs Act of 2017 which also sought to provide favorable tax treatment to certain kinds of pass through business income.

The paper proceeds as follows. Section 2 overviews the literature on state income taxes. Section 3 explains background on the relevant history of Kansas tax policy and Airbnb. Section 4 details the data and empirical strategy employed to analyze the Airbnb data. Section 5 reports the empirical findings from the data analysis.

2   Literature Review

3   Background

3.1   The Repeal of the Kansas Tax Experiment

The 2012 Kansas tax reform was enacted under Governor Sam Brownback, and widely became known as "the Kansas Tax Cut Experiment." The reform cut the top rate of income tax by 30% and the tax rate on certain business profits to zero. The goal of the reform was to boost small business formation and employment in Kansas. There were a few main components of the 2012 tax cut. First, it would cut the income tax brackets from three groups to two, which would reduce the top rate from 6.45% to 4.9%. The most attention grabbing and exotic element, however, was exempting profits from various pass though businesses including sole proprietorships, farms, partnerships, Subchapter S corporations, and LLCs from taxation. "Pass through" income consists of profits from an entity that is not taxed at the business level, and instead added to the entity owner's ordinary income and taxed under the personal income tax schedule.

The policy received additional attention nationally during the development of the Tax Cuts and Jobs Act of 2017 (Hobson et al., 2017), which similarly sought tax preferences for pass through income sources. However, within the state the revenue losses associated with the tax cuts led to on-going political challenges, including numerous mid-year budget-cutting sessions due to repeated revenue forecast shortfalls and a 2014 downgrade in the state's bond rating (Mazerov, 2018). In February 2017 the Kansas legislature first passed a bill with bipartisan support to repeal the tax cut that was quickly vetoed by Governor Brownback. The veto was overridden by an even larger legislative majority on June 6, 2017. They repealed the business profits exemption and restored income tax rates and tax brackets with the top bracket for households over $30,000 being 4.9% in 2017 and 5.7% in 2018 (see Table 1).

3.2   Airbnb

Airbnb is a vacation rental online marketplace where independent contractors can rent out their home for short periods of time. Airbnb provides some guidance about applicable tax collection on their website, all the while emphasizing the importance for hosts to ensure their own tax compliance. Hosts have to fill out certain tax forms for Airbnb. If you don't fill out a W-9 form that most vacation rental sites require at the beginning of operation, you are subject to lose 28% of your rental income (Nagy, 2020). The 1099 form includes the amount of service fees accrued in addition to rental income for the year, hosts can deduct the host service fees if they rented out their space more than 14 days during the year and filled this out (Nagy, 2020).

The easiest way for an Airbnb host to avoid income taxes is by knowing the 14 Day Rule. If you rent out a dwelling unit (a residence you live at longer than 14 days/year or at least 10% of the days you rent it to others at a fair rental price) through an online service, and the amount of days rented out equals 14 or less, you don't have to report any of the rental income (but nor can you deduct expenses as rental expenses) (Nagy, 2020). This same 14-day rule applies the same if you only rent out one room of your dwelling unit. If you rent out for more than 14 days, you gain the opportunity to deduct ordinary and necessary expenses from your rental income, such as: towels, toiletries, ten-dollar bottles of wine to greet your guests upon arrival (Nagy, 2020). The more detailed a host is at keeping records, the less they have to scramble to get proof to the IRS.

It is also noteworthy that other taxes can apply to Airbnb rentals. Currently, in Kansas Airbnb has 3 different taxes involved with renting an Airbnb. Kansas Retailers' Sales Tax is 6.5% of the listing price including any cleaning fee for all reservations (Airbnb, 2021). Whether tax is collected depends on the number of bedrooms in a listing. The Local Sales Tax varies by city and county. The rate is typically 1-7% of the listing price including any cleaning fee for all reservations (Airbnb, 2021). Whether tax is collected depends on the number of bedrooms in a listing. The Transient Guest Tax also varies by city and county. In cities or counties levying a transient guest tax, the tax rate is typically 2-9% of the listing price including any cleaning fee for reservations 28 nights and shorter (Airbnb, 2021). Whether tax is collected depends on the number of bedrooms in a listing. At the time of this writing, we do not have this local excise tax data.

4   Framework and Empirical Model

We treat a "gig" property owner to be one that considers leasing out housing capital that they would otherwise consume. Let their utility be a function of consuming leisure (ι), housing (h), and numeraire goods (c) from a budget constraint where disposable income

is generated from wage labor and rent on unconsumed housing from a given stock of H.

$$\max_{c,\iota,h} \quad U(c,\iota,h) \quad s.t. \quad (T-\iota)w(1-\tau_l) + (H-h)r(1-\tau_h) = c$$

In this model, like the labor supply decision, they sacrifice some marginal utility from housing consumption in exchange for gains from rent that can be used to purchase more leisure or private consumption. Increasing the tax rate for income from leasing h diminishes the intensive margin of h^* and the extensive margin as the household is less likely to have $h^* > 0$.

For the investor owner type, the decision is based on the calculus from profit maximization by selecting h to maximize profit:

$$\max_h \quad \pi = (rh - k(h))(1-\tau_h) - v$$

In the profit equation there is a convex cost k that is a function of h that increases at an increasing rate as more available days of supply are squeezed out of a property over a finite time period. These costs are included in the framework as deductible from revenues in calculating the after tax income from reservation. An additional non-tax deductible costs (opportunity costs, stress, effort, etc.) is included as v. The investor chooses $h* > 0$ on the basis of marginal analysis and operates the property so long as $\pi(h^*) > 0$. An increase in tax rate here reduces investor supply by dropping their after-tax return below cost v, but does not reduce its intensity of use should they keep the property available for rent.

In the context of the Kansas policy, the pre-treatment period was characterized by $\tau_h = 0$, which it then increased to about 5 percent in the post-period. The household is influenced at both extensive and intensive margins through relative price effects to reduce the supply of h, whereas the investor type is only influenced if their rate of return is near the shut-down threshold.

For the empirical investigation, we employ a differences-in-differences approach to causal inference by treating Kansas as a treatment intervention on properties. Letting h_{it} represent the number of days available for reservation by property i in month-year t, the model is specified as

$$h_{it} = \tau + \delta KS_i \times \tau + \mu_i + \varepsilon_{it}. \tag{1}$$

T is a vector of month-year specific fixed effects and KS is the treatment indicator for the property being located in Kansas. Property level fixed effects (μ_{it}) otherwise subsume individual time-invariant factors, leaving only idiosyncratic error in ε. Robust standard

errors are clustered at the state-level.

The key parameters of interest are the vector of δ estimates for the interaction of Kansas with each periods from October 2014 to December 2019. The control set of properties come from collapsing the data to the state level and using synthetic control to pick states from a donor pool that best matched the Kansas pre-treatment period.[2] The states selected by the synthetic control for a synthetic Kansas are employed as the control group for estimating equation (1) and include Oklahoma, Wyoming, North and South Dakota. The validity of this control group is evaluated by the δ coefficients for the Kansas pre-trend interactions.

The model in equation (1) will be estimated separately for the gig and investor sub-samples. The panel of properties is balanced by treating any period in which a listed property does not appear as being available for zero days. This is a possible source of measurement error for cases in which the property might be reserved outside of the Airbnb platform, resulting in the true supplied days being under counted. Table **??** provides the means and standard deviations of the available supply of days by subsample type, which will also be employed when calculating elasticities.

5 Results

For the main results, we condition the samples of gig and investor owned properties on those which had their first listing in 2016 or earlier. Each Figure produces the 95 percent confidence intervals for all Kansas time period interactions, i.e. the 63 δ estimates from equation (1). In each figure of regression results, distinguish the pre-period as prior to the first passage of the tax policy (February 2017) by the legislature, which was vetoed by the governor. As was widely expected, the legislature overturned the veto in June 2017, which we indicate with the second red vertical line. Generally, we regard the passage as the "post" period and the period between the first passage and final passage as a "transitory" period where a higher future tax rate was likely to be anticipated.

Figure 2 provides the regression results for available days a property is rentable on Airbnb from a gig owner. The pre-trends in Figure 2 generally look pretty good, oscillating around and not statistically distinguishable from zero. During the transitory period while the legislation was being passed and vetoed, it would seem that gig owners increased their available days on Airbnb. Ultimately, the final version of the bill passed took the somewhat unusual form of being retroactive, so all pass through income earned in 2017

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[2]Excluded from the possible donor pool were any states that changed any income tax rate by at least 0.1 percentage point during the program period, which resulted in the omission of Arkansas, Missouri, District of Columbia, Illinois, and North Carolina. The specific methodology was the Synthetic Control Using Lasso Regression developed in Hollingsworth and Wing (2020).

was taxable at the new higher rate. As time progresses into 2018, gig properties seem to move to a rather permanently lower steady level than the pre-trend that is about -2.5 days per month lower on average after November 2017, an effect size that is about two-thirds of the mean. It also implies an tax elasticity of -3.48.[3]

Figure 3 proceeds to the results for the investor owners. It is worth noting that the scale on the y-axis is narrower than in Figure 2 due to greater precision. The trends are not as tightly wound around zero in the pre-treatment period as in the case of the gig owners, but generally Kansas seems to generally trend similar to the control group. Like the gig owners, in the transitory period it seems as though investors may have increased their supply, but this increase is not statistically distinguishable from zero. Eventually, starting around June 2018 there is a persistent negative effect that is statistically significant from zero. If we consider the entire post June 2017 period the average of these coefficients is about -0.45; whereas if we take the mean coefficient after the persistent negative effect, it is about -0.95 days per month. As an upper bound, the latter estimate implies a tax elasticity for investors that is approximately unitary elastic at -0.98.[4]

The results in Figures 2 and 3 imply that the gig users of the Airbnb service or more tax sensitive than the investors, both measured as the number of available days per month listed on the platform and in terms of tax elasticity.

5.1 Alternative Estimations

The main results were conditioned on the property appearing on the Airbnb platform prior to 2017. Figure 4 provides the equivalent results if the sample is extended to include those who appear in 2017 and later. These remain intensive margin results on the presumption that they could have participated in the pre-treatment period, but those in the Kansas may be less likely to join with as many available days in the post period. While the general patterns are similar to the main results, including these late arrivals shrinks the point estimates in both sets of regressions and makes post-period noisier with no clear positive or negative effect.

Figure 5 replicates the main results but uses the inverse hyperbolic sine transformation of the outcome variable. Like the traditional log transformation, this reduces the influence of properties with large numbers of days and allows for an interpretation in percentage terms. We include this because it is a conventional strategy for presenting elasticities, however it is worth noting that in this case the transformation exaggerates the percentage increase for the many properties that go to listing zero to 1 or 2 days on the market.

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[3]Tax elasticity calculation: $\frac{\Delta Q_s}{\Delta \tau} \frac{\tau}{Q_s} = -2.5(5.2/3.8) = -3.48$.

[4]Tax elasticity calculation: $\frac{\Delta Q_s}{\Delta \tau} \frac{\tau}{Q_s} = -0.95(5.2/5.0) = -0.98$.

Consequently, the finding for gig properties that available days decreases by about 0.25 log points in the post period for a 5.2 percent tax increase implies an elasticity of about -50. Similarly, the investor property log point change implies a tax elasticity of -19. These values, while implausibly large in their absolute value, nevertheless depict the same fluctuations and are similar in size relative to one another as the linear results in the main section.

5.2 Speculations on the Transitory Period

The timing and directions of the responses to the tax are worth some extended discussion. In each case, a negative effect emerged in the second half of 2017 after a few months delay. In the case of the gig owners there is a positive increase in supply between the bill's first passing of the legislature and the final veto-overriding passage in June. Yet, the first negative effect for gig owners is in November 2017 and then seems to mostly remain at this lower level. We offer some speculations on the reasons for these effects.

- **Income Effects Dominate in Transition.** The increase in taxation of pass through income incentivized gig workers reduced the reward of forgoing private housing consumption, but the income effect might have initially dominated this substitution effect. An example illustrating this story is that Airbnb gig owners in 2017 fully expect that the legislature will pass and override the governor's veto, but they've already earmarked some earnings within the household for some planned expenditure. Knowing their after tax income is lower, they make-up for the lost income with additional intensity in supplying available days for reservations.

- **Some Gig Owners Thought Tax Rate Would Rise in the Future.** Gig owners were anticipating a future tax increase sought to increase their supply of available reservations immediately, but did not realize the legislature would take the unusual step of making the tax retroactive to January 2017. In this story, a group of gig owners are quasi-informed in that they are aware that future profits on room reservations will be diminished but not informed enough to realize retroactive taxation eliminates this incentive.

- **Some Gig Owners Learn of the Tax Increase With Tax Filings.** After the passage in June, accounting firms and other tax information sources would advise their clients that estimated tax payments for the remainder of the year would need to account for the applicability of income tax on pass through income. At the latest, gig owners working their taxes in early 2018 would learn of the new higher state tax rates.

6   Conclusion

This paper studied the impact of a major state income tax policy on the market suppliers in a gig platform. Using Airbnb data from October 2014 to December 2019, we estimate income tax supply elasticities for different subsamples of the platform economy. Specifically, our findings show that the income tax elasticity of monthly supply of days available for reservation to be -1 for investor owners and -3.48 for gig owners.

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Table 1: Kansas Bracket and Rate Tax Information for Pass Through Income Pre-and Post-Repeal

| Taxable Income[1]	Pre-Period 2014-2017[2]	Post-Period 2017	Post-Period 2018-2019
$0	0%	2.9%	3.1%
>$15,000 ($30,000)	0%	4.9%	5.25%
>$30,000 ($60,000)	0%	5.2%	5.7%

Note: 1) Indicates the starting amount of each taxable income bracket for single earners, with the amount for married filing jointly appearing in parentheses. 2) For 2017, the pre-period rates are those that were defined for 2017 until the repeal of the pass through exemption passed in June 2017 changed the rates to the post-period, with retroactive application to January 2017.

Table 2: Sample Statistics by Airbnb Property Type

Sample	Mean	Std. Dev.	N	n
Gig properties (Kansas)	3.80	9.01	101,556	1,612
Gig properties (Control)	3.87	8.97	1,268,379	20,133
Gig properties (Full Sample)	3.87	8.97	1,369,935	21,745
Investor properties (Kansas)	4.89	10.01	104,391	1,657
Investor properties (Control)	4.99	10.18	716,877	11,379
Investor properties (Combined)	4.98	10.16	821,268	13,036

Note: T=63

Figure 1: Individual Income Tax Amount to the State General Fund
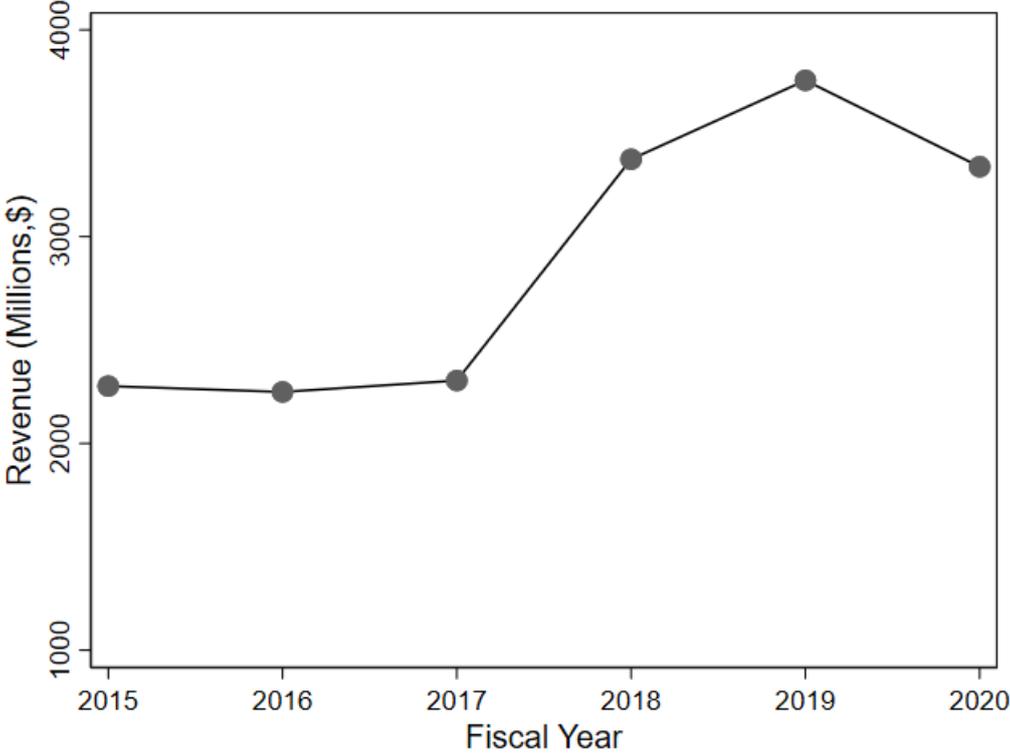

Note: Source: Kansas Department of Revenue, 2020 Annual Report

Figure 2: Effect of Kansas Income Tax Increase on the Supply of Available Days from Gig Owned Properties
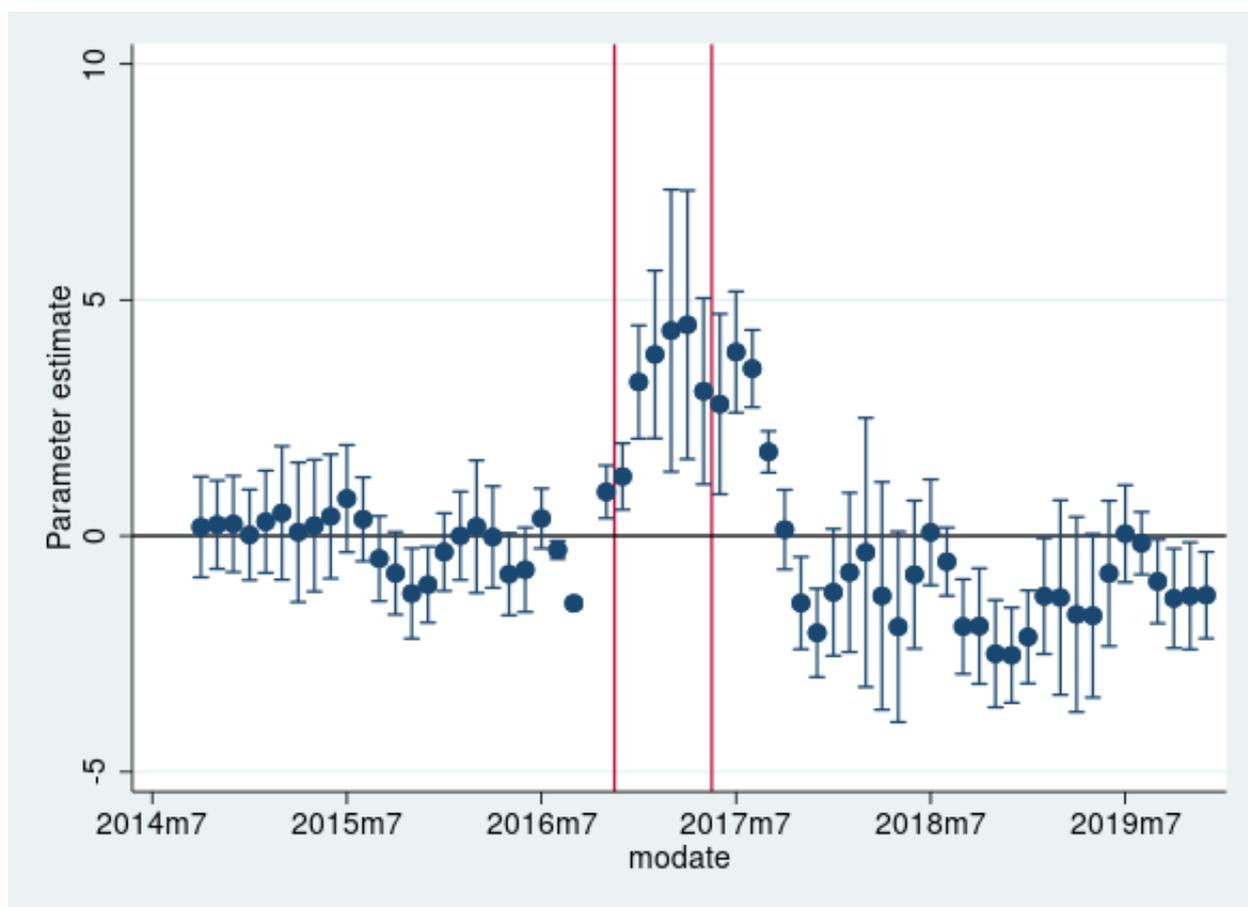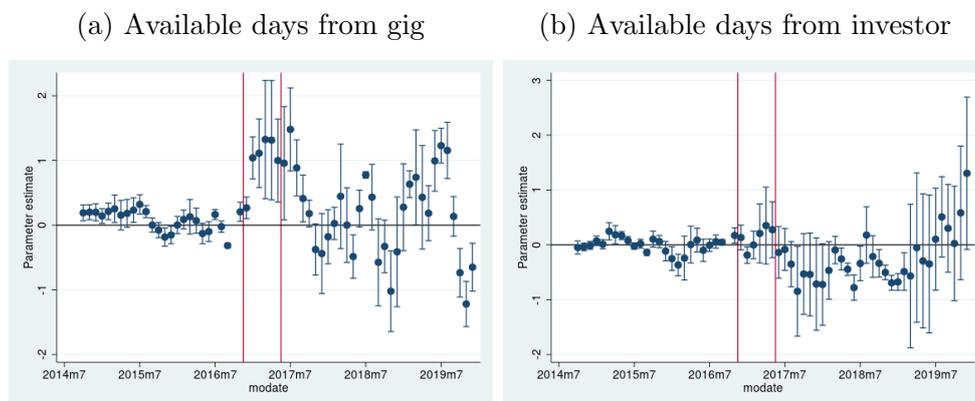

Note: Plotted are the point estimates and 95% confidence intervals for the 63 Kansas by month-year interactions from equation (1). The red vertical bars indicate the first passage of the policy by the state legislature (vetoed by governor) in February 2017 and the effective passage (veto override) in June 2017. Confidence intervals based on standard errors clustered by state. Sample is conditioned on properties being listed on Airbnb prior to 2017.

Figure 3: Effect of Kansas Income Tax Increase on the Supply of Available Days from Investor Owned Properties
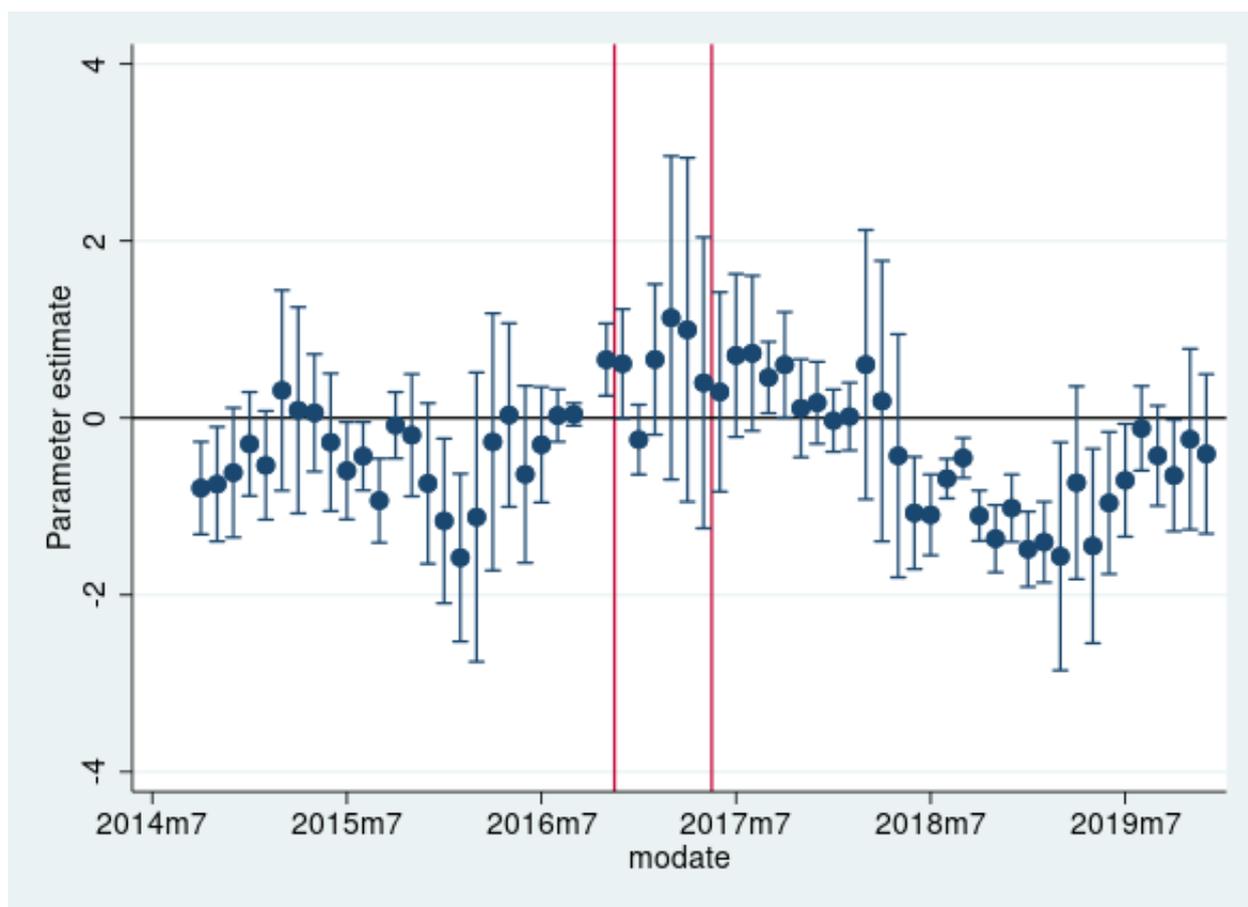
Note: Plotted are the point estimates and 95% confidence intervals for the 63 Kansas by month-year interactions from equation (1). The red vertical bars indicate the first passage of the policy by the state legislature (vetoed by governor) in February 2017 and the effective passage (veto override) in June 2017. Confidence intervals based on standard errors clustered by state. Sample is conditioned on properties being listed on Airbnb prior to 2017.

Figure 4: Effect of Kansas Income Tax Increase on the Supply by Owner Type

(a) Available days from gig

(b) Available days from investor

Note: Plotted are the point estimates and 95% confidence intervals for the 63 Kansas by month-year interactions from equation (1). The red vertical bars indicate the first passage of the policy by the state legislature (vetoed by governor) in February 2017 and the effective passage (veto override) in June 2017. Confidence intervals based on standard errors clustered by state.

Figure 5: Effect of Kansas Income Tax Increase on the Supply by Owner Type (logged)
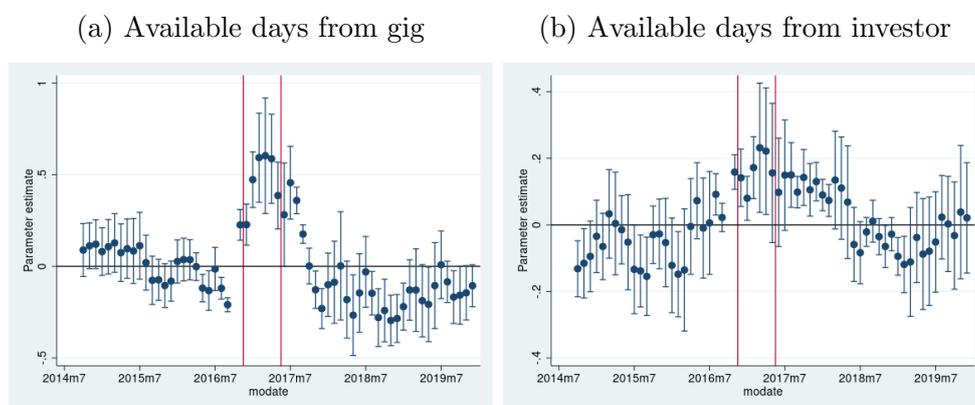
(a) Available days from gig

(b) Available days from investor

Note: Plotted are the point estimates and 95% confidence intervals for the 63 Kansas by month-year interactions from equation (1). The red vertical bars indicate the first passage of the policy by the state legislature (vetoed by governor) in February 2017 and the effective passage (veto override) in June 2017. Confidence intervals based on standard errors clustered by state. Sample is conditioned on properties being listed on Airbnb prior to 2017. The dependent variable is log-transformed using the inverse hyperbolic sine function.