Taxpayer Responses to Third-Party Income Reporting: Preliminary Evidence from a Natural Experiment in the Taxicab Industry

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1. Introduction

The reporting by employers to the Internal Revenue Service (IRS) of the wage and salary income they paid to their employees and their withholding of the tax owed has proved to be an effective tax compliance tool. It has resulted in 99 percent of such income being properly reported and taxed, while the compliance rate for income not subject to such "third-party" reporting and withholding is only 37 percent (Internal Revenue Service (2016))[6]. To improve tax compliance of small businesses, the United States Congress enacted a law in 2008 (and implemented starting in 2011), whereby processors of credit and debit cards such as Visa and MasterCard and electronic payment systems such as PayPal were required to report to the IRS the gross receipts of businesses accepting these forms of payment. A new information report called Form 1099-K, Payment Card and Third Party Network Transactions, was introduced to facilitate reporting. However, income received in cash was not affected by the Form 1099-K, and expenses are still not reported by third parties, which leaves room for tax evasion through underreporting of cash income or overreporting of expenses.

This paper proposes a novel method of estimating the causal impact of third-party reporting on small-business tax compliance. We exploit the natural experiment created by the interaction of the introduction of Form 1099-K in 2011 and the introduction of laws requiring taxicabs to install credit card readers in various cities in the U.S. We use a difference-in-differences research design in which we compare the trends in the receipts, expenses, and the ratio of expenses to receipts of the taxi services who operate in cities with mandatory credit card laws (i.e., the treated group) to the taxi services who operate in cities without mandatory credit card laws (i.e., the control group) before and after the treatment. We combine data on the date of credit card laws implementation with administrative tax return data for the taxicab industry extracted from Form 1040 (U.S. Individual Income Tax Return) Schedule C (Profit or Loss From Business (Sole Proprietorship)) and Form 1099-K.

Our research is among one of the first to systematically evaluate the effects of the Form 1099-K on small-business tax compliance. It builds upon the work by Slemrod, Collins, Hoopes, Reck, and Sebastiani (2017) by providing causal evidence on the impact of third-party reporting.

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[5] Disclaimer: The views and opinions presented in this paper reflect those of the authors. They do not necessarily reflect the views or official position of the Internal Revenue Service.
[6] The compliance rates for information reporting without withholding typically ranges from 83% to 93%, depending on the completeness of the information reporting.

Our results are preliminary, but they suggest that taxpayers respond to third-party information reporting in offsetting ways; that is, firms reported more revenue after the introduction of Form 1099-K, but the increase in reported revenue was accompanied by an offsetting increase in reported expenses.

2. The Natural Experiment

In the last decade, more than 25 cities have passed laws requiring taxicabs to install credit card readers in their vehicles, referred to as "credit card laws." These were passed to improve the riding experience of the public. We compiled a list of all cities that introduced credit card laws from 2004 to 2016 by referring to various legal sources (e.g., Municode[7] and the American Legal Publishing Corporation[8]), local government websites, and articles from the local press. Table 1 lists the cities with credit card laws, the date of adoption, and the effective date of implementation. In 2004, New York was the first city to pass the credit card law, and Seattle and Philadelphia followed suit the following year. These credit card laws are plausibly exogenous to the introduction of Form 1099-K because they were passed as a measure to improve the quality of taxi services and not because of any fiscal or tax compliance reasons, providing a source of variation comparable to those obtained via randomization.[9]

Table 1: Adoption of Taxicab Credit Card Laws in Selected U.S. Cities

City	State	Adoption Date	Effective Date
Baltimore	Maryland	Jul 2014	Jan 2015
Boston	Massachusetts	Aug 2008	Jan 2009
Charlotte	North Carolina	Jul 2011	Jul 2012
Chicago	Illinois	Mar 2002	Jun 2004
Columbus	Ohio	Jul 2013	Jun 2014
Fort Worth	Texas	Feb 2007	Mar 2007
Houston	Texas	Dec 2007	
Indianapolis	Indiana	Aug 2002	Sep 2002
Kansas City	Missouri	Sep 2007	Jan 2009
Miami	Florida	Jan 2014	Jan 2016
Minneapolis	Minnesota	Jan 2012	Jun 2012
New Orleans	Louisiana	Apr 2012	Aug 2012
New York	New York	Mar 2004	Dec 2008
Philadelphia	Pennsylvania	2005	2006
San Francisco	California	2011	Jul 2011
Seattle	Washington	Feb 2005	Jul 2005

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[7] See https://www.municode.com/library/
[8] See http://www.amlegal.com/code-library/
[9] For instance, New Orleans implemented credit card in taxi laws in the year that they hosted the Super Bowl, so as to improve the quality of the city's taxi services.

| Washington | District of Columbia | May 2013 | Sep 2013 |

Note: N/A denotes the credit card law was adopted but the precise date could not be obtained.

3. Data, Sample Selection, and Methodology

We examine city-level aggregate data for the hundred largest cities in the U.S. from 2006 to 2014. These data come from the 1040 Schedule C and Form 1099-K filed with the IRS, which were accessed via the Compliance Data Warehouse (CDW), the IRS research repository of tax return data. The information reports from credit card and other payment processing companies were matched to the income details from 1040 Schedule C using Taxpayer Identification Numbers (TINs).

The taxicab industry was identified using the North American Industry Classification System (NAICS) code 485300. Although the tax return data from the IRS are of very high quality, there are still some issues with the data. Some errors are caused by errors in filing and others by unsuccessful matching of the TINs when combining Form 1099-K and 1040 Schedule C. Thus, we clean the data of outliers and data errors that create implausible numbers. First, the amount of receipts reported on Form 1099-K should be lower than the total receipts reported on Schedule C for most taxpayers since Form 1099-K reports only amounts received through credit card and electronic payment systems. Accordingly, we remove individual taxpayers for whom the ratio of receipts from Form 1099-K to Schedule C is greater than 1.1.[10] Second, there were some cases where the reported expenses were implausibly high, so we removed the top one percentile of filers with "excessive" expenses (or expenses exceeding roughly $124,000).

Since we do not have a direct measure of tax underreporting, we infer the effect on underreporting from the data on taxpayer reports, using a "traces-of-evasion" approach (Slemrod and Weber (2012)). To that end, we examine the changes in three important outcomes around the treatment: receipts reported, expenses reported, and the ratio of expenses to receipts.

Figure 1 presents the trends in the log of total receipts from 2006 to 2014. The horizontal axis contains relative years from treatment; that is, Year 0 indicates the first year when both Form 1099-K was implemented and the credit card law was in effect for the particular city. There is a clear jump in the receipts reported in Year 0 and forward, suggesting that the treatment increased reported revenue. Similarly, we notice a clear jump in Figure 2, which plots the trends in the log of total expenses reported. Since we find that both reported revenue and reported expenses increased after the treatment, it is difficult to separately identify whether the increase in expenses was a result of more income being reported and thus more expenses associated with the increased income or whether the taxi services shifted from understating taxes by underreporting income to overreporting expense, as expenses are not yet subject to third-party reporting. One possible way to investigate this is to examine the ratio of expenses to receipts. Figure 3 presents

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[10] There are a number of reasons why the Form 1099-K amount could exceed reported receipts. For example, consider merchandise returns or cash back services on card purchases provided by merchants. The full amounts of these transactions would be included in the payment processor and thus in the Form 1099-K amount, but these amounts would not all add to actual revenues for the merchants.

the trend in the ratio of expenses to receipts around the treatment year and suggests a modest increase in the ratio of expenses to receipts.

These simple trends suggest that Form 1099-K implementation was associated with higher reported receipts, but also higher reported expenses and higher expenses for each dollar of reported revenue. However, we need to account for omitted variables that might be correlated with the Form 1099-K introduction and taxpayer filing behavior. We also need to account for any national trends in tax filing behavior or credit card usage that may confound the results. The next section presents our framework for disentangling the impact of Form 1099-K on taxpayer behavior.

Figure 1: Trend in Log of Total Receipts of Taxi Services in the Treated Cities Around the Treatment Year
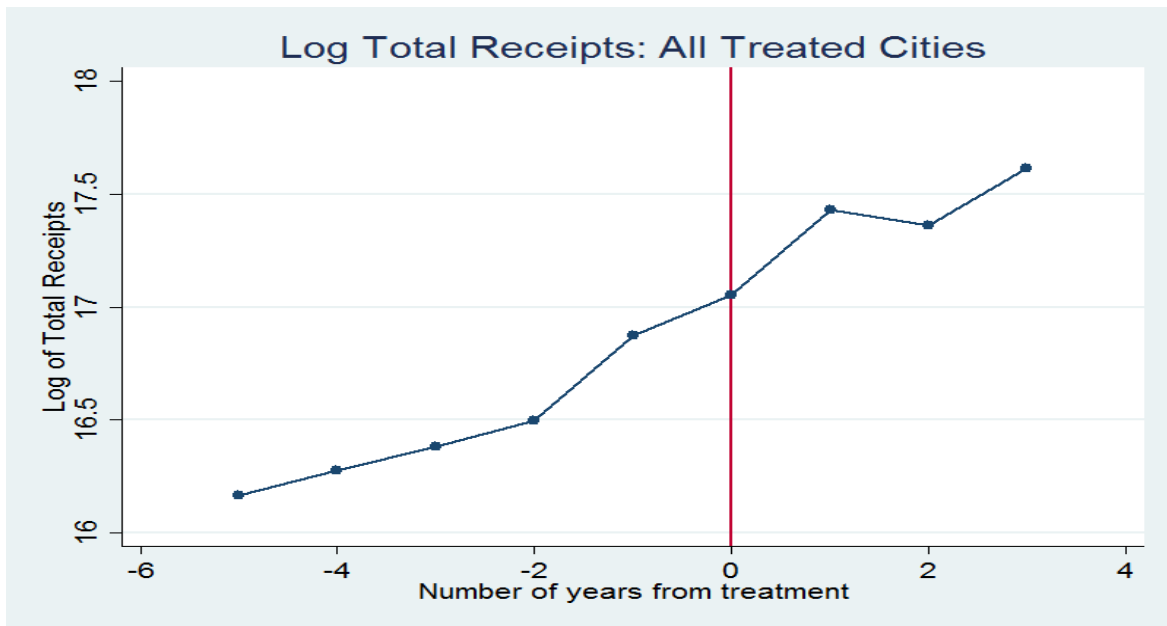
Figure 2: Trend in Log of Total Expenses of Taxi Services in the Treated Cities Around the Treatment Year
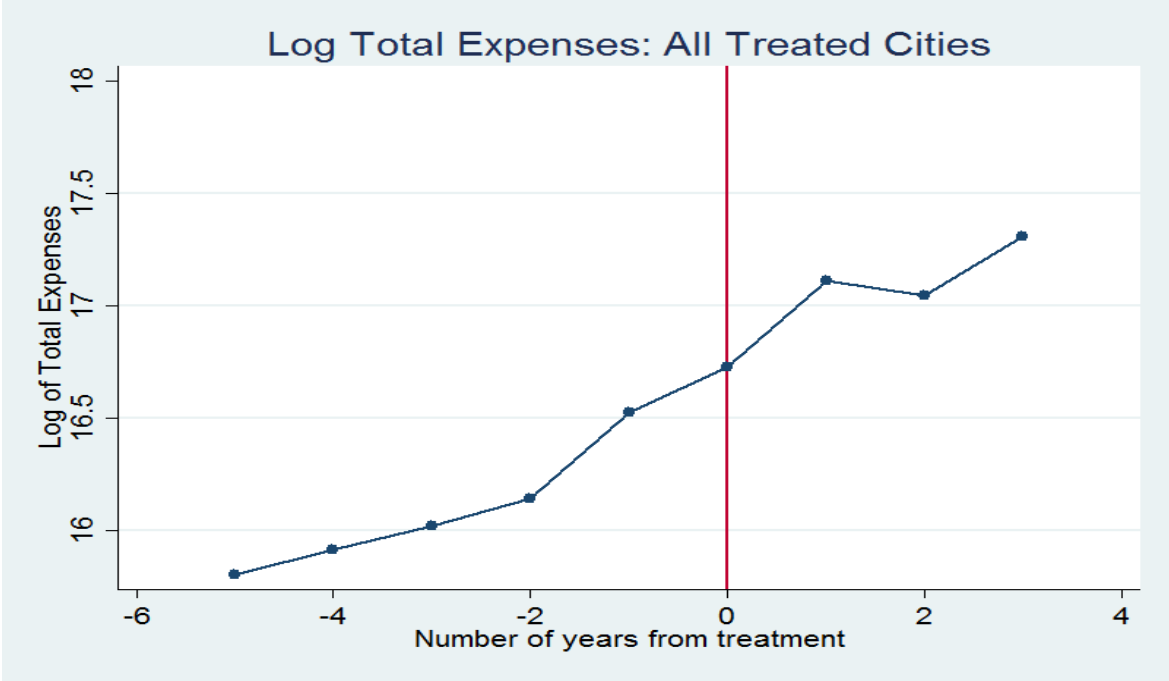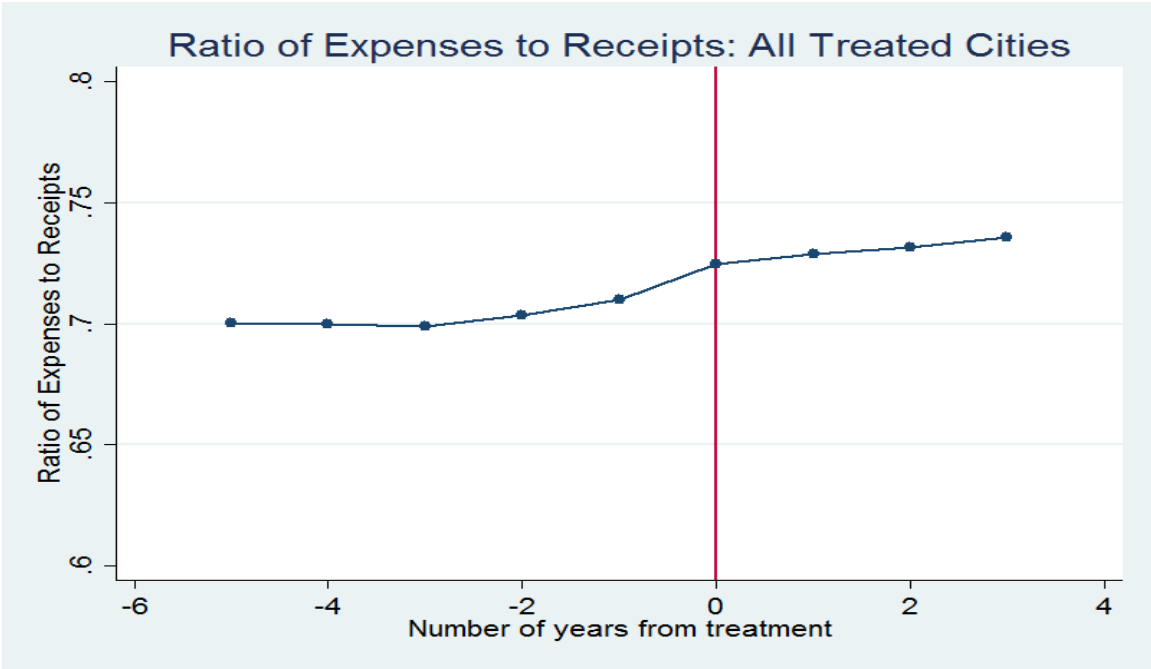

Log Total Expenses: All Treated Cities

Figure 3: Trend in the Ratio of Total Expenses to Total Receipts for Taxi Services in the Treated Cities Around the Treatment Year

Ratio of Expenses to Receipts: All Treated Cities

Our methodology exploits the natural experiment created by the interaction of the introduction of Form 1099-K in 2011 and the introduction of laws requiring taxicabs to install credit card readers in various cities in the U.S. We use a difference-in-differences research design where we compare the trends in the receipts, expenses, and the ratio of expenses to receipts of the taxi services who operate in cities with mandatory credit card laws (i.e., treated group) and the taxi services who operate in cities without mandatory credit card laws (i.e., control group) before and after the treatment. Our rationale is that the introduction of credit card machines in taxicabs discontinuously increases the share of revenue from credit cards reported in the Form 1099-K. Thus, taxi services operating in cities with such laws will be affected by the third-party reporting more than those operating in cities without such laws. The baseline difference-in-differences specification is given by:

$$Y_{ict} = \alpha + \beta_0 Treatment_{ct} + \sum_{j=1}^{J} \beta_j X_{ict} + \beta_i FE_i + \beta_c FE_c + \beta_t FE_t + \varepsilon_{ict}$$

where the dependent variables are receipts, expenses, and net income for taxi service i in city c and year t. We are interested in estimating the coefficient on the indicator variable $Treatment_{ct}$, which equals one if cities have implemented mandatory credit card laws and if Form 1099-K is effective (i.e., Tax Year $\geq$2011). The vector $\sum X_{ict}$ includes time-varying controls. Taxi service fixed effects, city fixed effects, and year fixed effects will control for unobserved time-invariant taxi service characteristics, time-invariant city characteristics and national time trends respectively. Standard errors are clustered at the city level.

As an intermediate step in our planned analysis, this version of the paper uses the city-level aggregate data with the baseline specification given by:

$$Y_{ct} = \alpha + \beta_0 Treatment_{ct} + \beta_c FE_c + \beta_t FE_t + \varepsilon_{ct},$$

where Y_{ct} represents the dependent variable (e.g., receipts, expenses, or the ratio of expenses to receipts for taxi services) in city c and year t, city fixed effects are represented by FE_c to capture time-invariant differences across cities, and year fixed effects are represented by FE_t to capture changes common to all cities in the same year. We are interested in estimating the coefficient on the indicator variable $Treatment_{ct}$, which equals one if cities have implemented mandatory credit card laws and if Form 1099-K is effective (i.e., Tax Year $\geq$2011). Standard errors are clustered at the city level.

Note that we also evaluate the dynamic nature of the treatment effects by running an event study difference-in-differences methodology, given by:

$$Y_{ict} = \alpha + \sum_{T=-5}^{T=4} \beta_T \, Years \, around \, Treatment_{cT} + \sum_{j=1}^{J} \beta_j X_{ict} + \beta_i FE_i + \beta_c FE_c + \beta_t FE_t + \varepsilon_{ict}$$

where $\sum_{T=-5}^{T=4} Years \, around \, Treatment_{cT}$ denotes five lags before the treatment, and four leads after the treatment. This specification will allow us to test for the "parallel trends" assumption, which is the identifying assumption of difference-in-differences research design. If

the coefficients on all leads are zero, then we conclude that there is no endogeneity problem. However, if the coefficients are statistically significant, then this implies that our estimates of the treatment effect are biased due to endogeneity. Also, if coefficients on the leads are significantly different from zero, then this might indicate the failure of the difference-in-difference approach to create a comparison group with counterfactual trends similar to the treatment group. The coefficient on lags describes the transition, capturing the average effect of 1099-K in a year following adoption relative to the effect before the adoption. In all specifications, the standard errors are clustered at the city level.

However, this intermediate version of the paper uses the city-level aggregate data with the baseline specification given by:

$$Y_{ct} = \alpha + \sum_{T=-5}^{T=4} \beta_T \, Years \, around \, Treatment_{cT} + \beta_c FE_c + \beta_t FE_t + \varepsilon_{ct} \, ,$$

where $\sum_{T=-5}^{T=4} Years \, around \, Treatment_{cT}$ denotes five leads before the treatment and four lags after the treatment.

4. Preliminary Results

Table 2 presents an estimate of the impact of Form 1099-K on receipts, expenses, and the expenses to receipts ratio from our basic difference-in-differences specification. We find an economically meaningful and statistically significant impact on all of the outcomes. The total receipts reported increased by 16 percentage points in the cities with credit card in taxicab laws compared to similar cities without such laws, and the estimate is significant at the one percent level. We find even larger and statistically significant responses for expenses (20 percentage points). Although expenses increased by a greater percentage than receipts, this does not necessarily imply that Form 1099-K was unsuccessful in improving overall tax compliance in the taxicab industry. Expenses are usually lower than receipts for a profitable business, so even if they grow more than receipts in percentage terms, the level increase may be smaller, leading to higher reported profits and tax. Similarly, we find that the ratio of expenses to receipts increased by two percentage points in cities with credit card laws compared to similar cities without such laws. This represents a shift in the share of expenses for each dollar in receipts after Form 1099-K was introduced.

Table 2: Difference-in-Differences Results for Taxicab Services in the Top 100 U.S. Cities

	Receipts	Expenses	Expenses to Receipts Ratio
Treatment (Post-1099K X Post-2011)	0.160***	0.198***	0.024*
	(0.03)	(0.04)	(0.01)

Notes: All specifications included year and city fixed effects. Standard errors are in parenthesis and are clustered at the city level. * p < 0.1 and *** p < 0.01.

Table 3 presents the dynamic effects of 1099-K on receipts, expenses, and expenses to receipts ratio and Figures 4-6 plot them. We again find that 1099-K impacted both the reported revenue and reported expenses. The estimates before the treatment (i.e., Year < 0) are all close to zero and they are statistically insignificant at the five percent level, which supports the parallel

trend assumption of the difference-in-differences models. Thus, we are more confident that the statistically significant estimates we find after the treatment are caused by the treatment itself and not by other unobserved confounders. All the estimates from year 0 and forward are positive and statistically significant. The estimates for the log of total receipts range from eight percent higher in the treated cities compared to the control cities in the year of treatment to 26 percent higher at the end of the sample. All estimates are significant at the conventional level. As before, the estimates for log of expense are even higher, ranging from ten percent at the treatment year to 29 percent by the end of the sample. The estimates of the ratio of expenses to receipts are positive but not significant at the convention level, suggesting that on a year-by-year basis, the expenses per dollar of receipts did not increase by the significant amount.

Table 3: Event Study Difference-in-Differences Results for the Taxicab Services in Top 100 U.S. Cities

	Log Total Receipts	Log Total Expenses	Ratio of Expenses to Receipts
Year = -5	-0.049	-0.059	-0.007
	(0.04)	(0.05)	(0.01)
Year = -4	-0.042	-0.054	-0.008
	(0.03)	(0.04)	(0.01)
Year = -3	-0.022	-0.034	-0.008
	(0.03)	(0.04)	(0.01)
Year = -2	-0.016	-0.021	-0.004
	(0.03)	(0.04)	(0.01)
Year = 0	0.083*	0.107*	0.017
	(0.03)	(0.04)	(0.01)
Year = 1	0.147***	0.177***	0.023
	(0.04)	(0.05)	(0.01)
Year = 2	0.172**	0.193***	0.016
	(0.06)	(0.05)	(0.01)
Year = 3	0.257**	0.289***	0.023
	(0.08)	(0.08)	(0.01)

Notes: All specifications included year and city fixed effects. Year = -1 is omitted. The standard errors, in parentheses, are clustered at the city level. * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Figure 4: Event Study Difference-in-Differences Results for the Log of Total Receipts for Taxicab Services in Top 100 US Cities
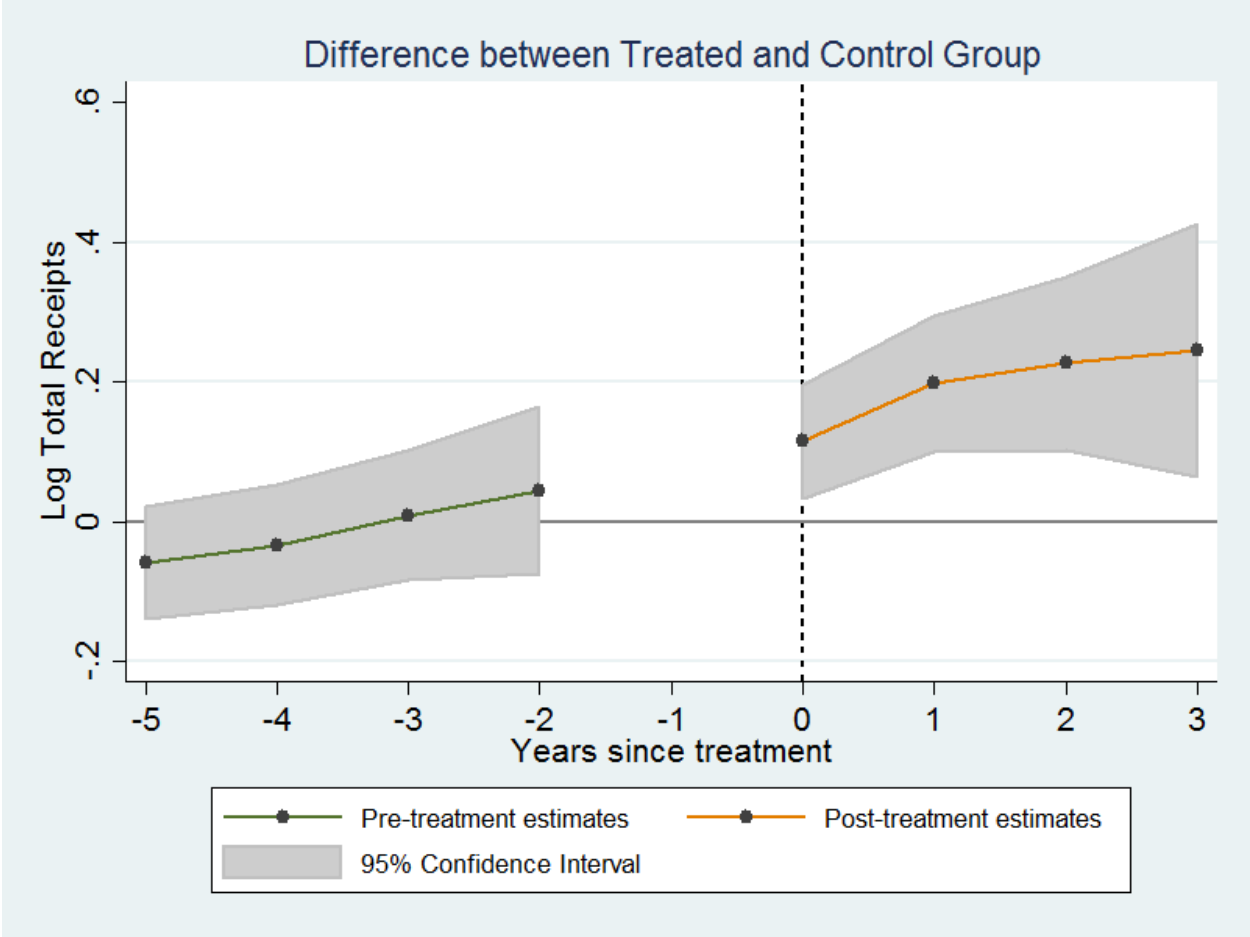
Figure 5: Event Study Difference-in-Differences Results for the Log of Total Expenses for Taxicab Services in Top 100 U.S. Cities
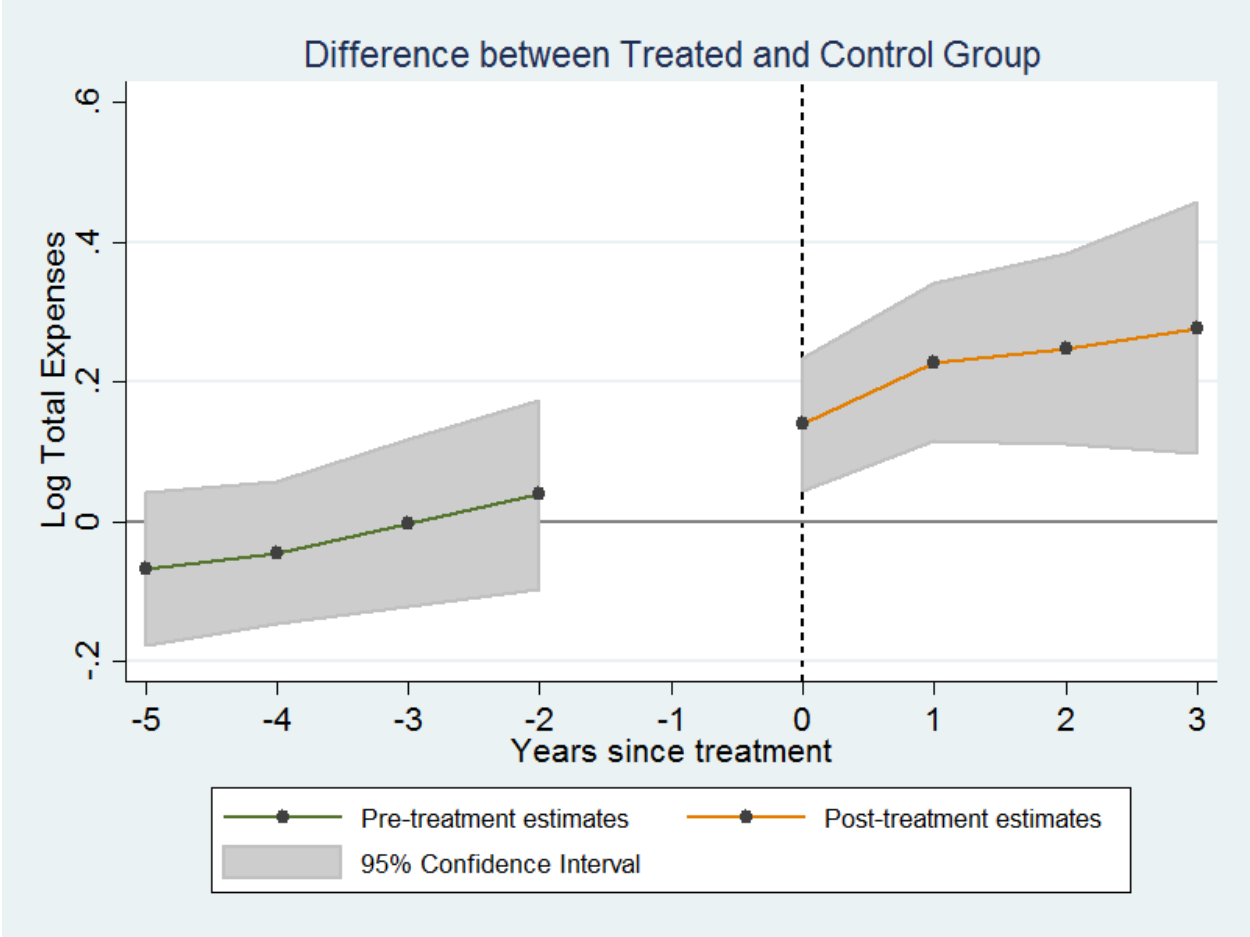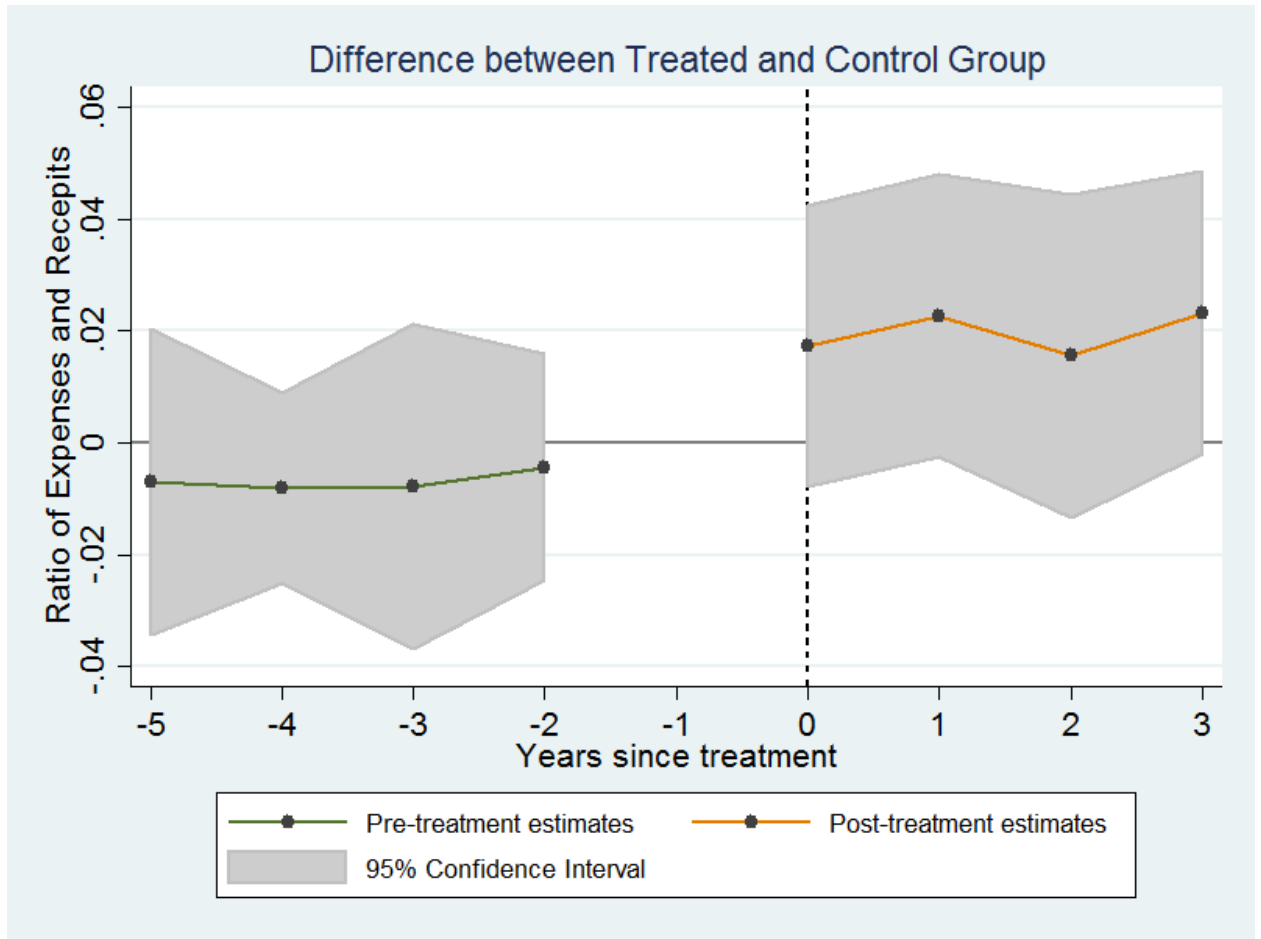
Figure 6: Event Study Difference-in-Differences Results for the Ratio of Expenses to Receipts for Taxicab Services in Top 100 U.S. Cities

5. Conclusions

In this paper we analyze taxpayer responses to the introduction of Form 1099-K. We exploit a unique natural experiment in the taxicab industry using a difference-in-differences research design, where we compare the trends in the receipts, expenses, and the ratio of expenses to receipts of taxi services that operate in cities with mandatory credit card laws (i.e., the treated group) to the taxi services that operate in cities without mandatory credit card laws (i.e., the control group) before and after the treatment. We find that firms report more receipts after the introduction of Form 1099-K. However, we also find that the increase in reported revenues was accompanied by a partially offsetting increase in expenses. Thus, we conclude that taxpayers respond to information reporting, but in offsetting ways. Businesses' ability to shift their reporting in this way may limit the overall compliance impact of the 1099-K program, which partially covers revenue but provides no additional information on expenses. Even companies that are required to accept credit cards may still transact some of their business in cash, which

remains uncovered by any third-party information reporting and provides room for them to underreport income.

Ongoing analysis for this project involves expanding our data to include non-Schedule C taxi businesses filing corporate or partnership returns, analyzing the impact on taxable income and profit or loss, and applying models at the individual business level in addition to the aggregated city-level analysis presented here.

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