Online Appendix for

Electronic Payment Technology and Tax Compliance: Evidence from Uruguay's Financial Inclusion Reform

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This appendix contains additional information and analyses. Appendix A provides additional contextual information. Appendix B provides additional results and robustness tests for the regression discontinuity estimation. Appendix C provides additional results and robustness tests for the difference-in-difference estimation. Appendix D provides additional support for our interpretation of the results and their policy implications. Appendix E provides additional analyses of the determinants and impact of POS adoption by firms.

A Context Appendix

Table A.1: Policies Incentivizing the Use of Electronic Payment Technologies

A. VAT Rebates	
Argentina	5 percent VAT refund on debit card purchases <ARS 1000 (USD 51) [2001-2017] 3 percent VAT refund for credit cards [2003-2009]
Brazil (SP)	3 percentage points VAT rebate fore consumers requesting e-receipt [2007-]
Colombia	2 percentage points VAT rebate for card purchases [2004-2014]
Japan	2 or 5 percentage points rebates for consumers making cashless purchases at registered business [2019-]
Korea, Rep.	VAT tax credit for merchants. 0.5% of credit card sales [1994], 1% [1996-2000] and 2% [2000-], with 5 million won ceiling
Uruguay	2-4 percentage point VAT rebates for card payments [2014-]
B. Income Tax Rebates	
Colombia	Cash payments deductible only below certain thresholds
Greece	Income tax discount of up to 22% of electronic purchases, up a threshold proportional to income [2017-]
Mexico	Allowable deductions of a company's expenditure must be backed by a digital tax receipt or electronic transaction if >2000 pesos (107$)
Korea, Rep.	Share of electronic payments deductible from taxable labor income: 10% of transaction amount [1999-2002] up to a ceiling of 3 million won or 10% of total labor income; rate was revised over the years, reaching 30% for some years
C. POS Subsidies	
Argentina	Up 50% of monthly POS rental fee can be claimed as fiscal credit by merchant; no transaction fee and rental fee waver for small merchants in first two years [2016-]
Japan	Subsidies to installing cashless payment systems to 2 million eligible small and medium sized businesses [2019-]
Malaysia	Subsidized POS terminals
Mexico	Free POS installation and fixed monthly merchant fee up to certain transaction volume [2004-]; Ministry of Finance subsidized tablet equipped with MPOS
Uruguay	Eligible merchants can claim an income tax exemption of up to 100% of the value of the POS investment (subsidy rate revised over time) [2012-]
D. Lotteries	
Brazil (SP)	Lotteries for consumers requesting an e-receipt, providing national ID [2007-]
Greece	Lotteries for consumers [October 2017-]; automatic participation when paying by electronic means; tickets awarded correspond to aggregate monthly amount spent by electronic means
India	Lotteries for merchants and consumers [2016-]
Mexico	Lotteries (cars) for consumers [2004-]
Netherlands	Lotteries for merchants and consumers [2002-]
Korea, Rep.	Lotteries for merchants and consumers, one credit card invoice stub per month randomly chosen as winner

Notes: This table compiles a non-exhaustive list of countries employing incentive schemes similar to those we study in this paper. Our compilation focuses on financial and fiscal policies to incentivize the use of electronic payment technology. It is based on World Bank Group (2014), Naritomi (2019) and Nicolaides (2021). The information for Brazil is for the state of São Paulo. This table is discussed in the introduction.

Table A.2: Mandates for Payments to be Conducted Electronically

Type of Transactions	**Initial Deadline**	**Final Deadline**
Tax payments	06/01/2015	06/01/2015
Payments to service providers to the state	12/01/2014	07/01/2015
Rental payments	12/01/2014	12/01/2015
Purchase of apartments/houses, cars, any transactions > UI 160,000 (USD 20,000)	06/01/2015	12/01/2015
Payments over 60,000 UI (180,000 USD) to professional service providers	05/01/2016	05/01/2016
Wages, pensions, social security contributions	11/01/2015	05/02/2017

Notes: This table shows the types of payments which Uruguay's financial inclusion law mandated to be done through electronic payment methods, and the deadlines by which these mandates were initially meant to enter into effect, as well as the final deadlines which were ultimately applied, if applicable. Several of the deadlines had to be revised due to private sector opposition or logistical challenges. This table is discussed in Section 2.3.

Table A.3: Summary Statistics for 2013

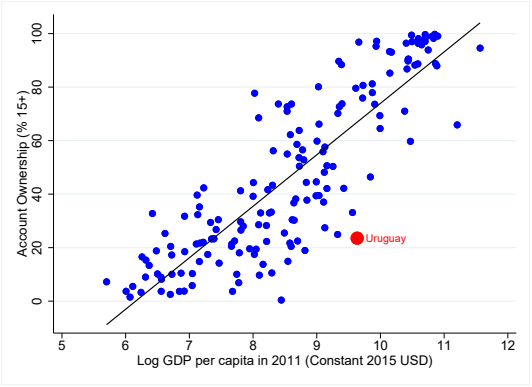
					Percentile				
		Mean	SD	Min	5th	25th	50th	75th	90th	Max
	Total Annual Sales	10,064	31,387	0	0	112	1,941	6,396	18,687	264,242
	Input VAT	863	2,392	0	0	0	134	614	1,905	18,687
	Output VAT	1,283	3,525	0	0	0	275	979	2,696	28,573
	Net VAT Liability	407	1,234	0	0	0	62	297	854	10,408
All Firms	Sole Proprietorship	0.35	0.48	0	0.03	0.06	0.33	0.39	0.37	0.35
N=69892	Corporation	0.37	0.48	0	0.77	0.74	0.44	0.35	0.35	0.37
	Has POS	0.18	0.38	0	0.00	0.01	0.08	0.14	0.17	0.18
	Number of Card Transactions	2	6	0	0	0	0	2	5	43
	Volume of Card Transactions	2,965	6,413	0	10	142	680	2,577	9,693	46,297
	Share of Electronic Sales	0.12	0.57	0.00	0.00	0.00	0.00	0.00	0.20	9.90
	Total Annual Sales	7,369	14,087	0	0	1,173	2,899	6,813	16,439	93,056
	Input VAT	813	1,728	0	0	58	281	732	1,862	11,814
	Output VAT	992	2,079	0	0	93	363	881	2,210	14,408
	Net VAT Liability	164	356	0	0	3	47	145	404	2,396
Retail Firms	Sole Proprietorship	0.60	0.49	0	0.17	0.58	0.67	0.67	0.63	0.60
No POS Pre Reform	Corporation	0.14	0.35	0	0.62	0.21	0.13	0.11	0.12	0.14
N=4761	Has POS	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00
	Number of Card Transactions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Volume of Card Transactions	0	0	0	0	0	0	0	0	0
	Share of Electronic Sales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Annual Sales	10,586	15,070	0	556	2,293	5,269	12,070	25,664	93,056
	Input VAT	1,431	2,038	0	36	290	702	1,612	3,598	11,814
	Output VAT	1,695	2,367	0	55	372	859	1,943	4,184	14,408
	Net VAT Liability	259	374	0	0	45	128	310	654	2,396
Retail Firms	Sole Proprietorship	0.41	0.49	0	0.42	0.57	0.54	0.48	0.43	0.41
POS Pre Reform	Corporation	0.20	0.40	0	0.20	0.12	0.13	0.15	0.18	0.20
N=6258	Has POS	0.96	0.21	0	0.69	0.90	0.93	0.95	0.95	0.96
	Number of Card Transactions	3	8	0	0	0	1	2	9	43
	Volume of Card Transactions	3,896	8,546	0	12	184	787	2,854	10,460	46,297
	Share of Electronic Sales	0.51	1.10	0.00	0.00	0.03	0.14	0.44	1.22	9.51
	Total Annual Sales	21,934	49,165	0	0	1,070	4,851	16,512	52,690	264,242
	Input VAT	1,995	3,997	0	0	30	420	1,749	5,642	18,687
	Output VAT	2,638	5,531	0	0	61	628	2,241	6,830	28,573
	Net VAT Liability	581	1,544	0	0	0	106	431	1,207	10,408
Wholesale Firms	Sole Proprietorship	0.25	0.43	0	0.04	0.22	0.30	0.29	0.27	0.25
N=7818	Corporation	0.46	0.50	0	0.77	0.55	0.43	0.42	0.44	0.46
	Has POS	0.17	0.38	0	0.00	0.07	0.15	0.18	0.18	0.17
	Number of Card Transactions	1	2	0	0	0	0	1	5	5
	Volume of Card Transactions	2,330	3,314	0	13	143	734	2,800	10,392	10,392
	Share of Electronic Sales	0.10	0.51	0.00	0.00	0.00	0.00	0.00	0.13	8.95

Notes: This table reports summary statistics of relevant variables for four different samples: all firms, retail firms without POS, retails firms with POS (as observed at some point before 2014), and wholesale firms. The statistics shown are for 2013. The number and volume of card transactions and the share of electronic sales are limited to firms with a POS. All monetary values and the number of card transactions are winsorized at the 99th percentile and displayed in thousands of Uruguayan pesos (1 USD= 43 UYU in July 2021). The percentiles columns for the binary outcome "Has POS" show the mean outcome across the distribution of firms based on sales size. The group of retail firms with POS includes some firms that had a POS prior to 2013 but do not register card transactions in 2013. This table is discussed in Section 2.4.

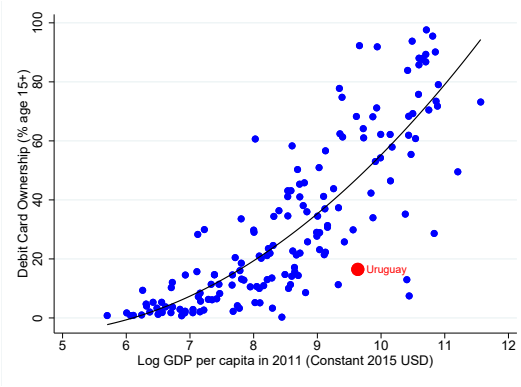
Figure A.1: Financial Inclusion and Tax Compliance
Uruguay in a Cross-Country Comparison

A. Financial Inclusion Indicators

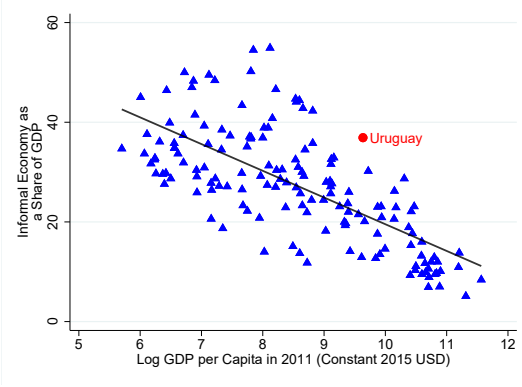
A.I: Account Ownership



A.II: Share of Population with Debit Card

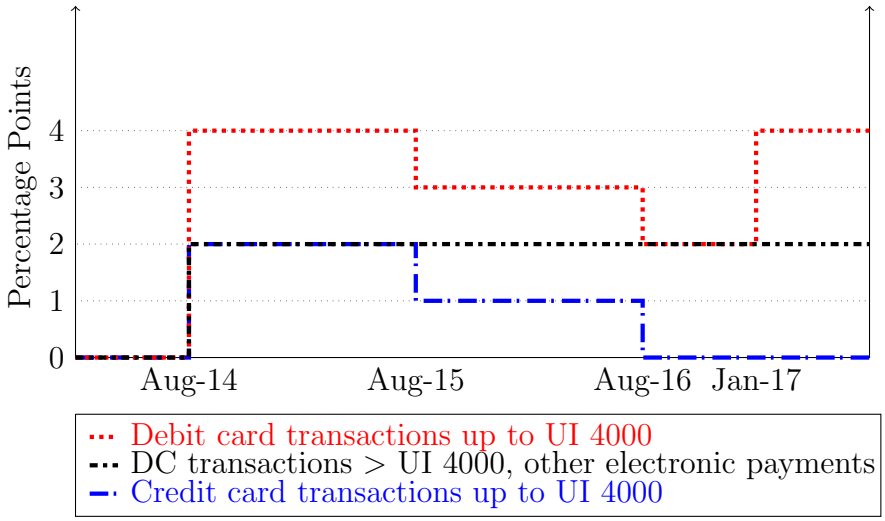


B. Size of the Informal Economy



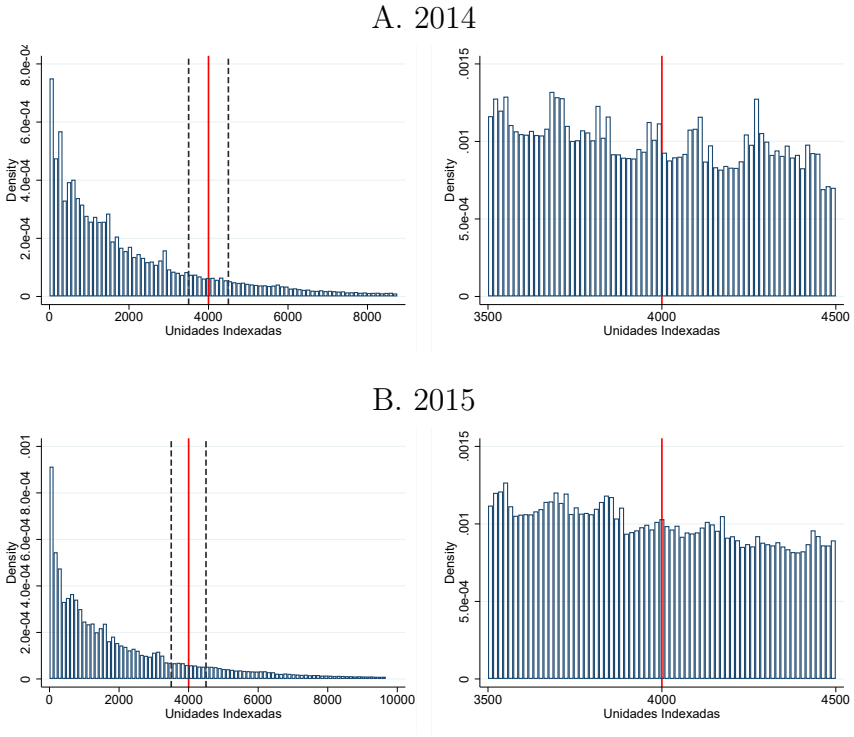
Notes: As discussed in the Introduction and in Section 2.1, Uruguay lagged behind peer countries in terms of financial inclusion. Panel A plots the cross-country relationship between financial inclusion and GDP per capita. Panel A.I display data on account ownership, as measured by the percentage of the population (15 years +) with an account at any formal financial institution in 2011. Panel A.II displays the share of the population (15 years +) that has a debit card. The GDP data is from the World Bank World Development Indicators Database. The financial inclusion indicators are from the World Bank Global Findex Database. Panel B plots the cross-country relationship between the size of the informal economy (measured as a share of GDP) and GDP per capita for 158 countries in 2011. The measure for the size of the informal economy is from Medina and Schneider (2018). The GDP data is from the World Bank World Development Indicators Database.

Figure A.2: VAT Rebates Applied to Credit/Debit Card Purchases



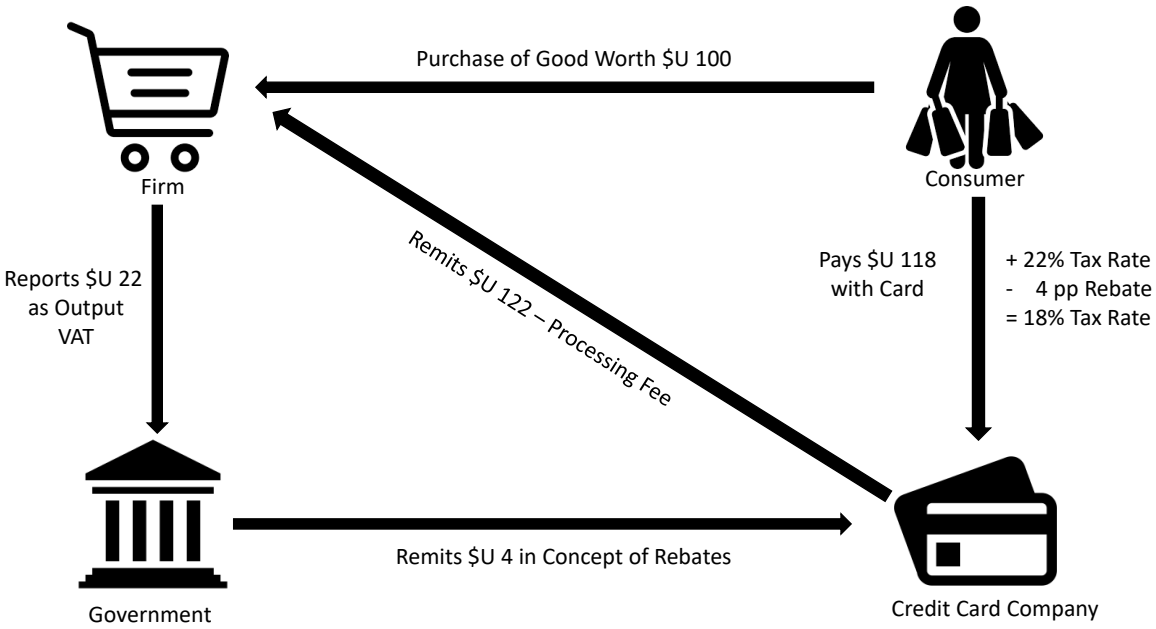
Notes: This figure displays the size of the VAT rebates (in percentage points) granted to consumers for various type of transactions with electronic payment technology. The rebate rates are differentiated by type of payment method and by transaction amount as measured in *Unidades Indexadas* (UI), a Uruguayan accounting unit. In August 2014, 4,000 UI were equivalent to approximately USD 500. The standard VAT rate in Uruguay was 22 percent during the period of the study, and the reduced rate was 10 percent. A four percentage point rebate thus implies that the consumer paid a VAT of 18 percent on standard-rated goods and a rate of 6 percent on reduced-rate goods. This Figure is discussed in Section 2.2.

Figure A.3: Absence of Bunching in Card Transaction Amounts at 4,000 UI Threshold



Notes: This figure shows histograms of credit and debit card transaction amounts for 2014 and 2015. The left panels show the entire distribution and the right panels zoom in on the distribution around the thresholds of 4,000 Unidades Indexades (UI), the red vertical line, at which the size of the VAT rebate drops discontinuously. The conversion rate from Uruguayan pesos to UI is updated daily. This figure is mentioned in Section 2.2, footnote 10.

Figure A.4: The Implementation of VAT Rebates



Notes: This Figure illustrates the implementation of the VAT rebates for all parties involved, as discussed in Section 2.2.

Figure A.5: Purchase Receipt with VAT Rebate

Notes: This figure shows an example of a receipt where a VAT rebate ("Descuento Ley 17934") was applied. This is discussed in Section 2.2.

Figure A.6: News Coverage of the VAT Rebates

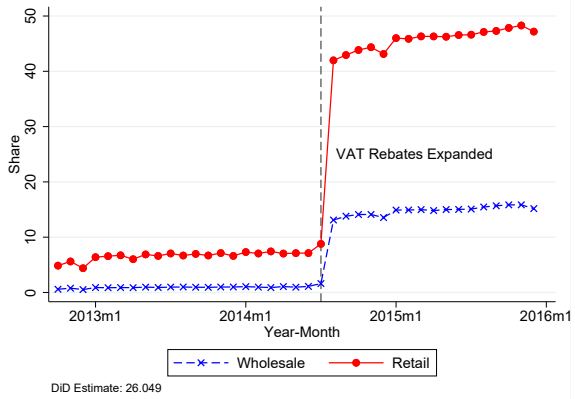
A. Information about VAT Rebate Introduction

B. Guide on How to Benefit from VAT Rebates

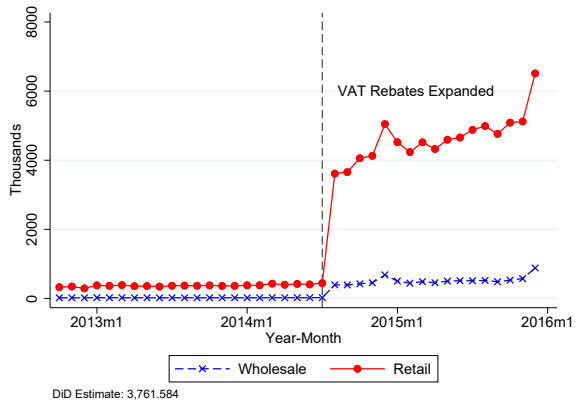
Notes: The figure displays examples of the media coverage of the VAT rebate introduction on August 1, 2014. The article in Panel A (published in June 2014) informs about the introduction on the VAT rebates, while the article in Panel B (published in August 2014) describes the steps consumers should follow to maximize their benefit from the VAT rebates. This is discussed in Section 2.2.

Figure A.7: Variation in VAT Rebates Across Sectors

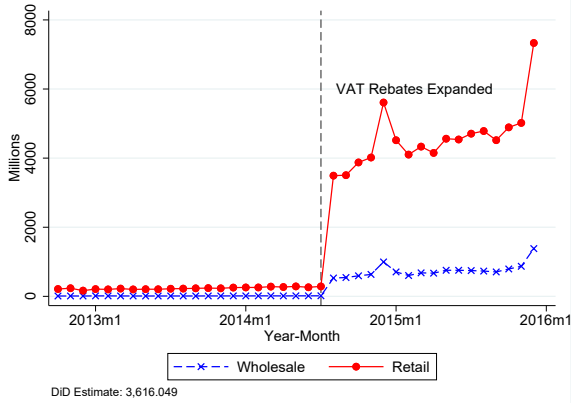
A: Share of Firms Registering any Rebate



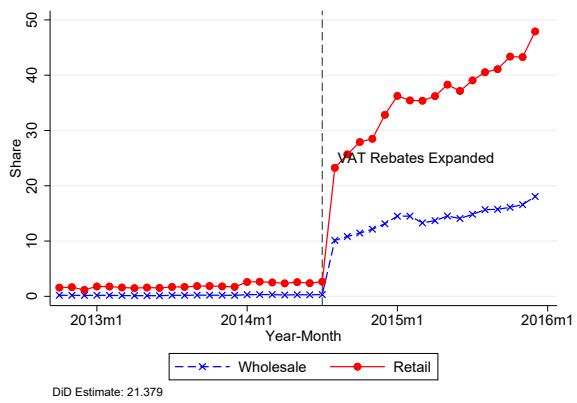
B: Number of Transactions with Rebate



C: Volume of Transactions with Rebate

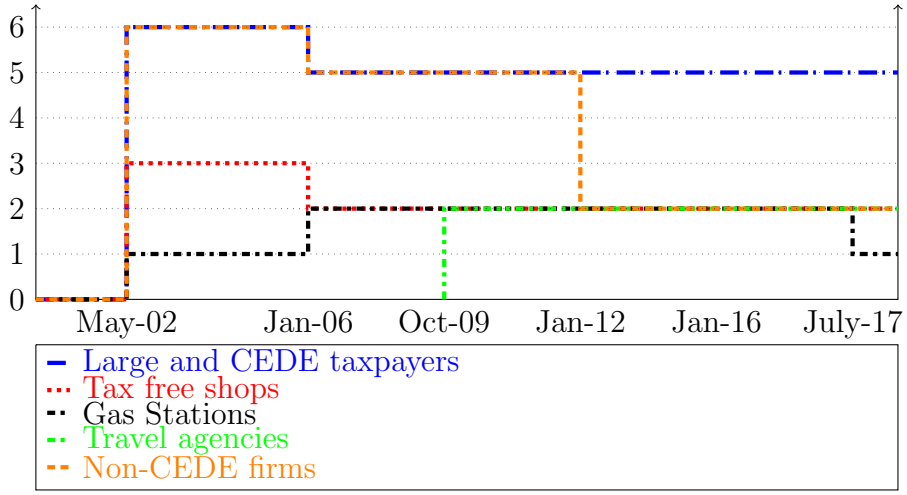


D: Volume of Rebate-Transactions/Total Sales



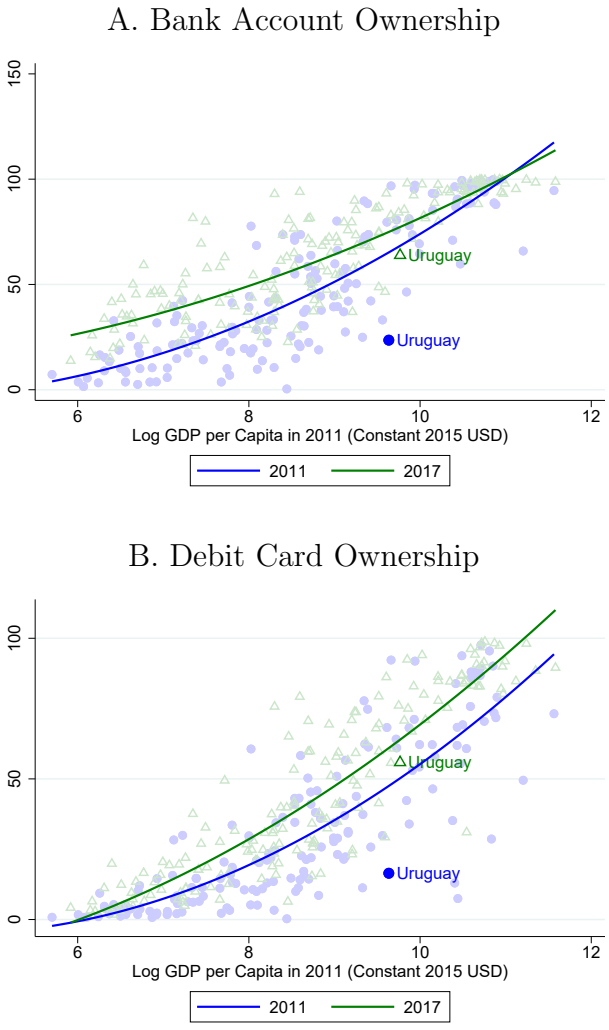
Notes: This figure shows that the VAT rebates were indeed implemented starting on August 2014, as stipulated by the Financial Inclusion Reform. The patterns are consistent with the fact that rebates were available only for business-to-consumer transactions. Panel A plots the percentage of firms registering VAT rebates for consumers paying by credit/debit card, as captured in the card transaction data. The share of firms receiving VAT rebates prior to the reform is not zero, as card purchases at hotels, restaurants and tourism businesses have been subject to a 9 ppt VAT rebate since 2006. These firms should not be part of the retail or wholesale sectors in the ISIC classification, but there is some measurement error in firms' sector classifications. Panels B and C show the aggregate number and volume of transactions with a rebate by sector. Panel D shows the volume of transactions with a rebate as a share of firms' total sales volume. This figure is discussed in Sections 2.2 and 4.1.

Figure A.8: Tax Withholding Rates Applied to Credit/Debit Card Sales



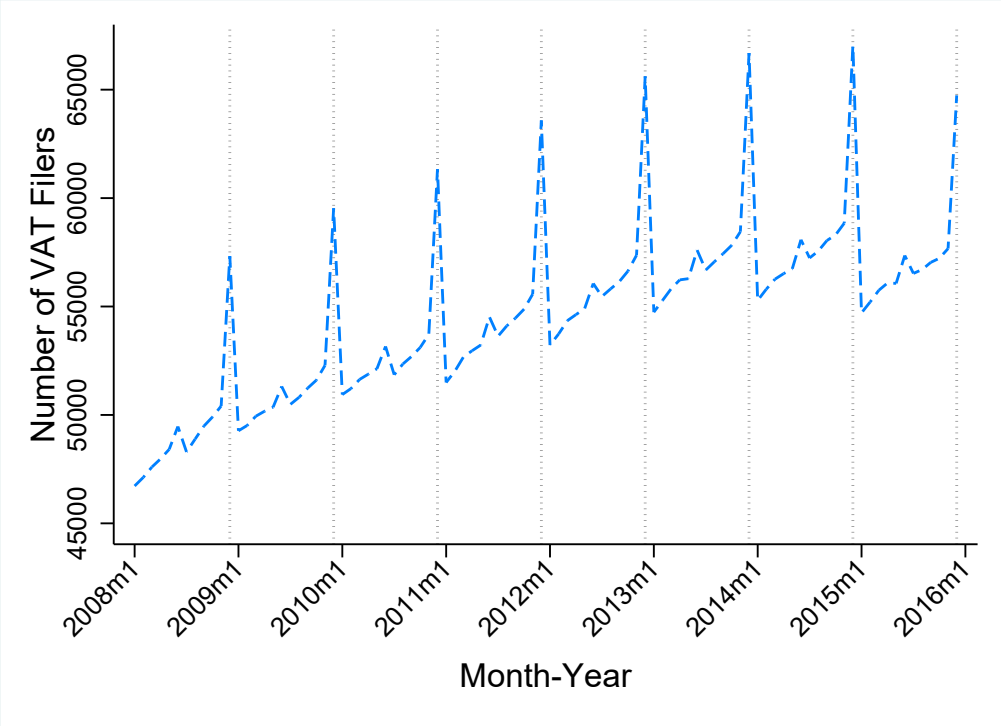
Notes: This figure displays the withholding rates applied by credit/debit card companies to firms making sales using a POS. The rates are differentiated by type of firm (receiving the income from the transaction). CEDE (*Control Especial de Empresas*) is the Uruguayan equivalent of the large taxpayer unit. This figure is discussed in Sections 2.3 and 5.

Figure A.9: Financial Inclusion in Uruguay and the World Over Time
Pace of Progress in Uruguay Relative to Other Countries



Notes: Similarly to figure A.1, this figure plots the cross-country relationship between financial inclusion indicators from the World Bank Global Findex Database and GDP per capita for 2011 and 2017. This figure is discussed in Section 2.3.

Figure A.10: Number of VAT Filers by Month



Notes: This figure plots the number of unique VAT filers in each month. The dotted vertical lines mark the month of December each year. For firms that file annually and retrospectively report output VAT and input VAT for each month, we consider that the firm filed for a particular month if it reported output VAT or input VAT for that month. This figure is discussed in Section 2.4.

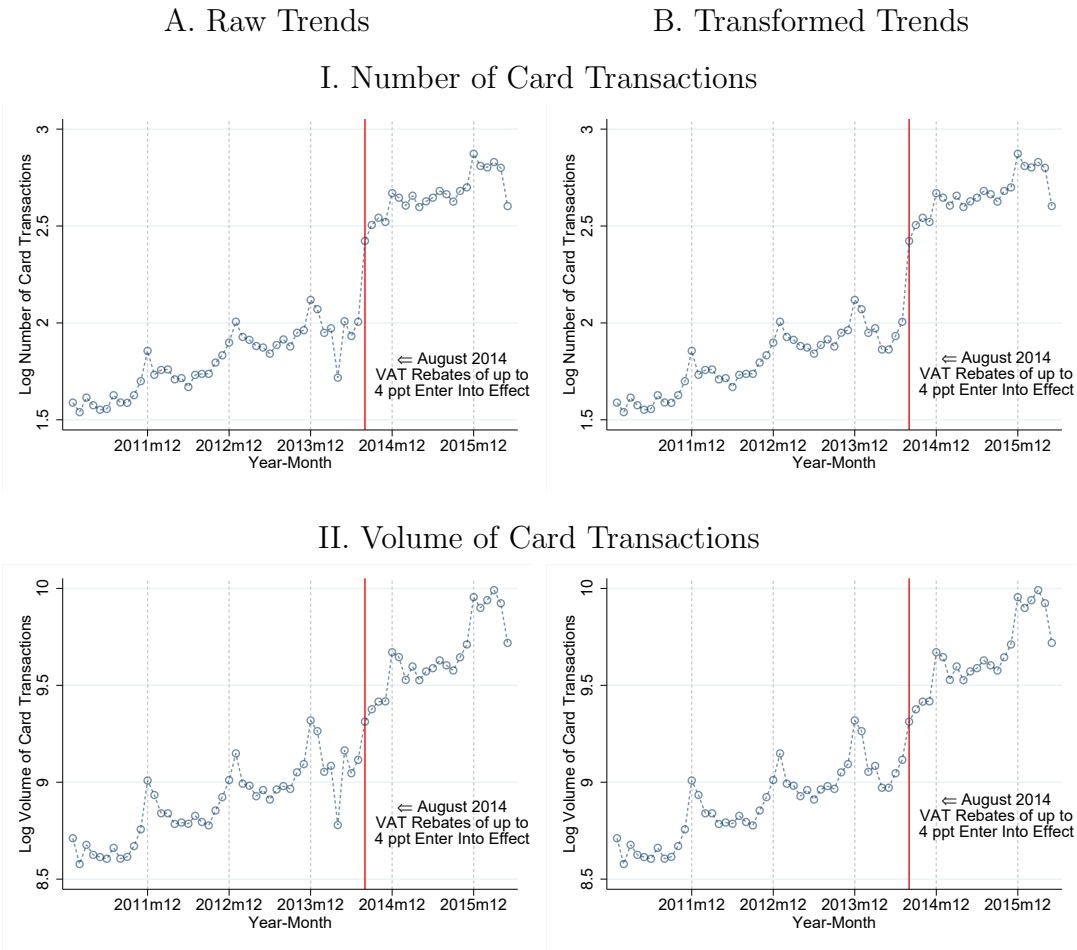
A.1 Simplified Tax Regimes

Firms below certain size thresholds can opt into a simplified tax regime. The *monotributo* regime for micro firms unifies all taxes and social security contributions. The *literal E* regime for small firms unifies the CIT and VAT into a monthly lump-sum payment and allows firms to pay social security contributions at a reduced rate. Firms in these two regimes thus do not remit VAT on their sales nor claim credit for VAT paid on their inputs. As eligibility is partly based on turnover, and credit and debit card reports can help the tax administration confirm a firm's true turnover, the financial inclusion reforms might have generated an increase in the number of firms graduating from the simplified tax regimes into the general VAT regime. However, conditional on a firm remaining in a simplified regime, its tax liability and compliance behavior should not be affected by the financial inclusion reforms. Figure A.10 shows no indication that the introduction of the VAT rebates pushed an increased number of simplified regime firms to graduate into the regular VAT regime.

B Regression Discontinuity Appendix

B.1 Robustness Tests

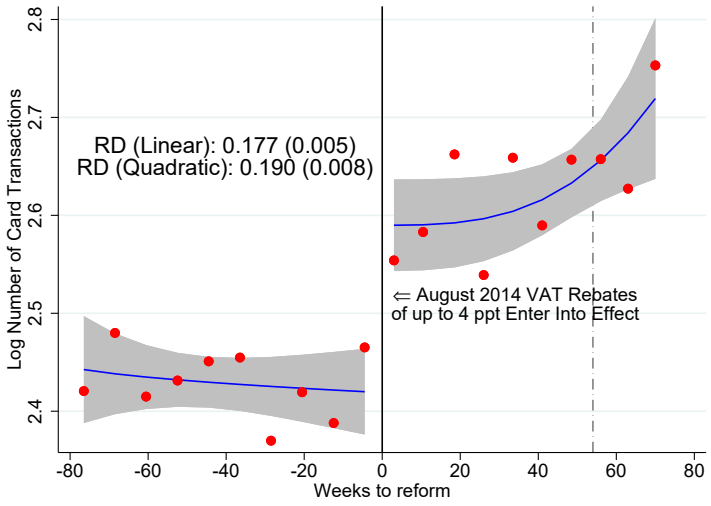
Figure B.1: Raw Data with Outlier in April 2014



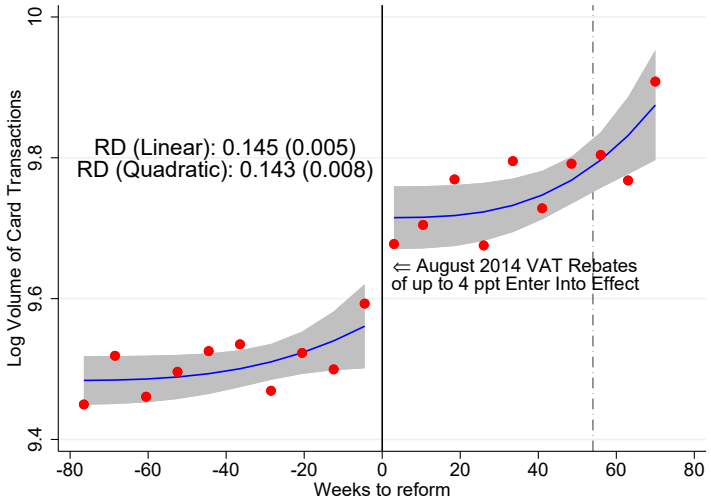
Notes: This figure shows that the months of April and May 2014 constitute outliers in terms of the number of card transactions and the volume of transactions, with a short-lived drop in both outcomes in April 2014 and a strong recovery in May 2014. We hypothesize that this might be due to consumers temporarily postponing purchases in anticipation of the passage of the financial inclusion reform. The VAT rebate provisions were indeed widely debated in the media and consumers might have falsely expected those provisions to enter into effect imminently. After realizing that the rebates would not enter into effect until August, they conducted in May the purchases they had initially postponed in April. To account for this, we average these two outcomes over April and May 2014 in Figure 1. No change is applied to the data used in the regression discontinuity estimations, as these are run on weekly data.

Figure B.2: The Effect of VAT Rebates on the Use of Electronic Payment Technology
RD Estimates Based on Firm-Level Data

A. Log Number of Card Transactions



B. Log Volume of Card Transactions

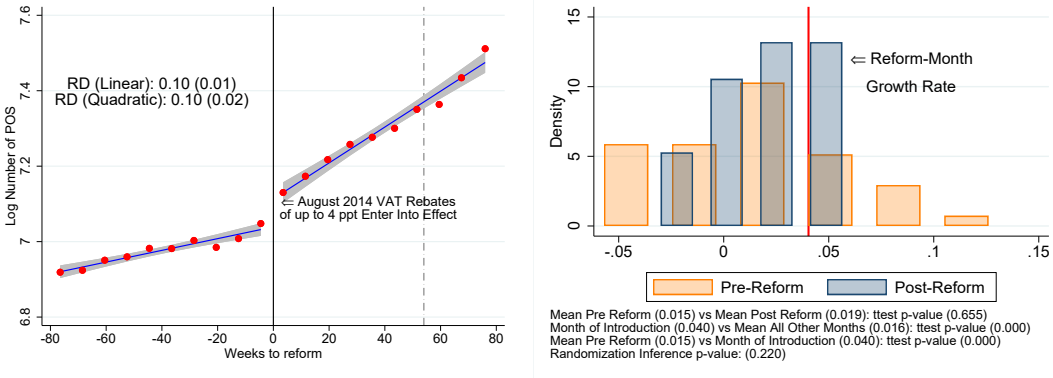


Notes: This figure is similar to Figure 2, Panels AI and AII, but relies on firm-level data to conduct the RD estimation. The estimation uses the firm-level version of equation 1 and controls for firm fixed effects. The estimate hence captures the average response to the VAT rebate introduction, weighing all firms equally. This figure is discussed in Section 3.2.

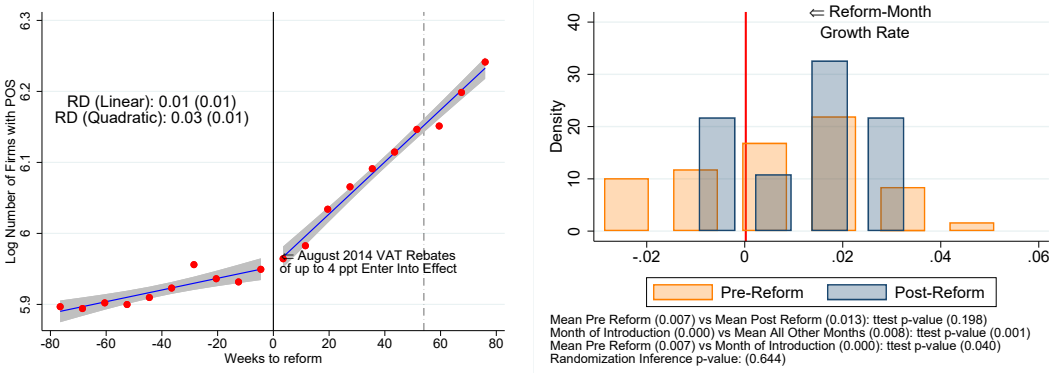
Figure B.3: The Effect of VAT Rebates on the Use of Electronic Payment Technology
RD Estimates and Month-on-Month Growth Rates for Sectors with Low POS Adoption

A. RD Estimation B. Month-on-Month Growth Rates

I. Log Number of Card Transactions

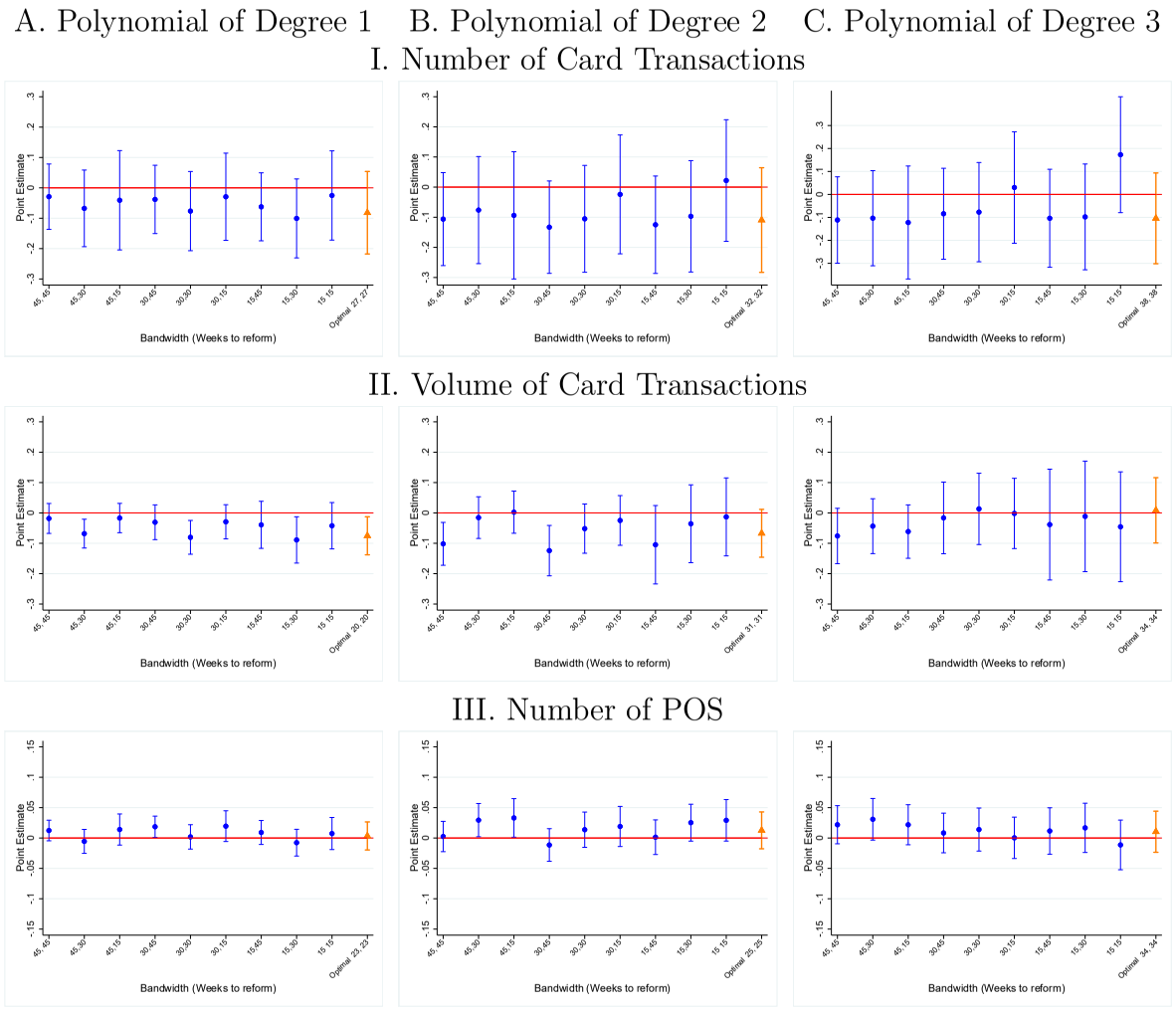


II. Log Volume of Card Transactions



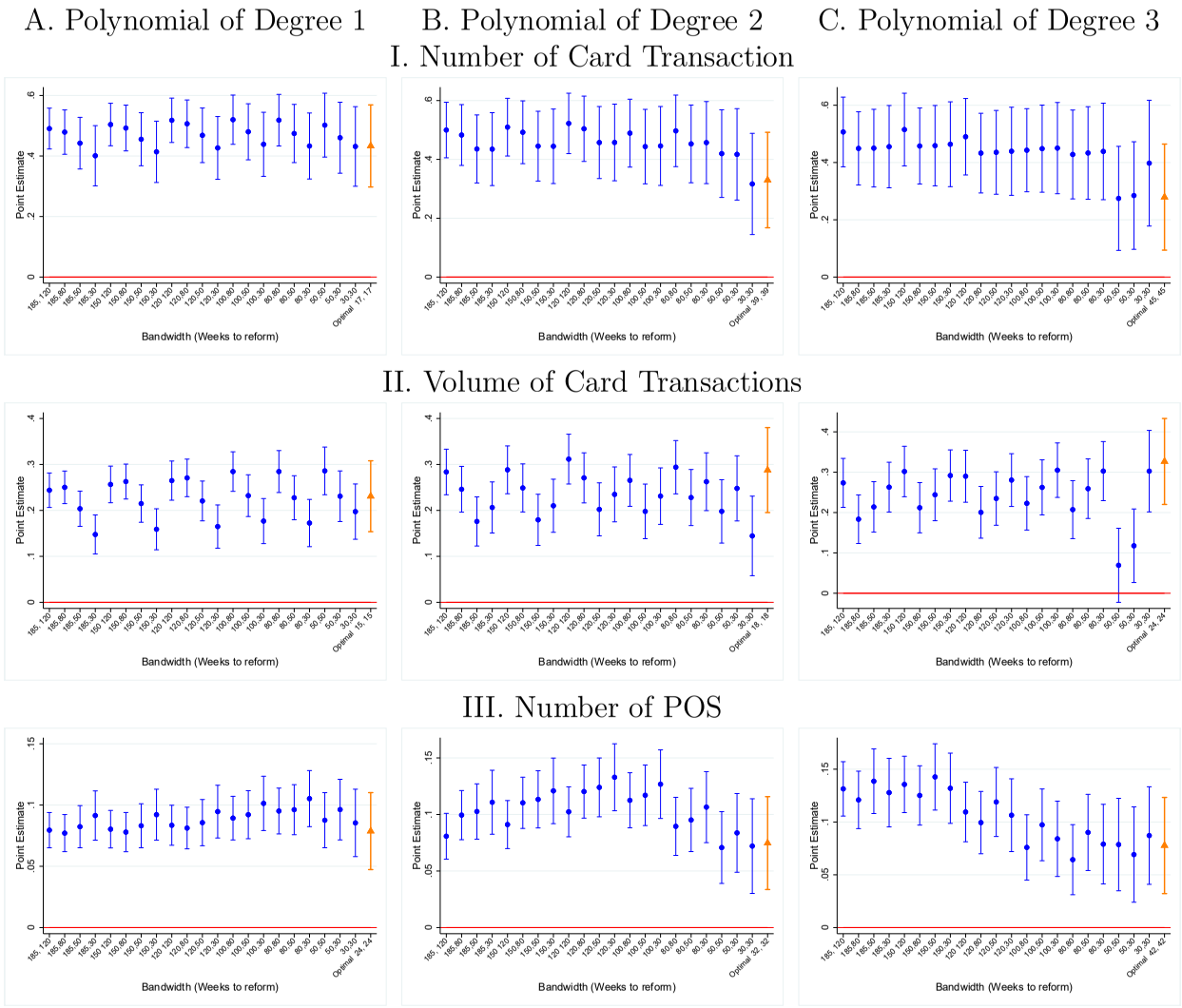
Notes: This figure is similar to Figure 2 but zooms in on retail firms in four-digit subsectors with low POS adoption prior to the reform (in 2013). Low POS adoption is defined as having a below-median share of firms with a POS. This figure is discussed in Section 3.2.

Figure B.4: The Effect of the Reduction of VAT Rebates in August 2015 - RD Estimates



Notes: This Figure is similar to Figure B.5, but documents the RD estimates around the reduction of the VAT rebates in August 2015, showing that the reduction did not have a statistically significant effect on any of the outcomes. Each panel plots the RD estimate γ_0 from equation 1 and the 95 percent confidence intervals, for different bandwidth values (weeks to reform). Each row reports results for a different outcome, and each column presents the estimates for a different order of polynomial. The orange triangle marker indicate the result from an RD estimation with optimal bandwidth as in (Calonico et al., 2014). This figure is discussed in Section 3.2.

Figure B.5: Robustness of RD Estimates to Different Bandwidths and Degrees of Polynomial

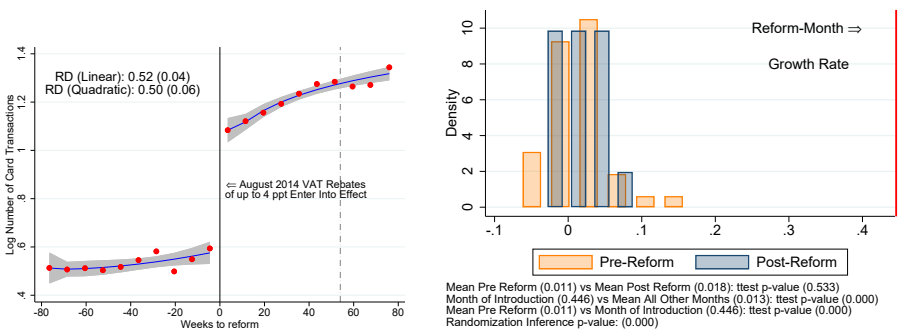


Notes: This figure documents the robustness of the RD estimations displayed in Figure 1. Each panel plots the RD estimate γ_0 from equation 1 and the 95 percent confidence intervals, for different bandwidth values (weeks to reform). Each row reports results for a different outcome, and each column presents the estimates for a different order of polynomial. The orange triangle marker indicate the result from an RD estimation with optimal bandwidth as in (Calonico et al., 2014). This figure is discussed in Section 3.3.

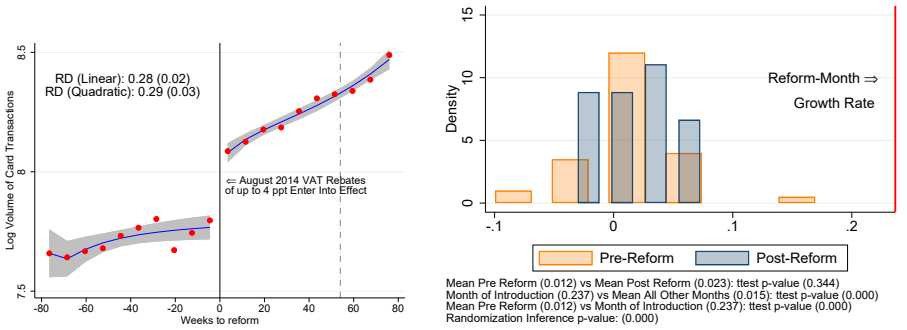
Figure B.6: Robustness of RD Estimates to Controlling for POS Subsidy Roll-Out

A. RD Estimates B.Month-on-Month Growth Rates

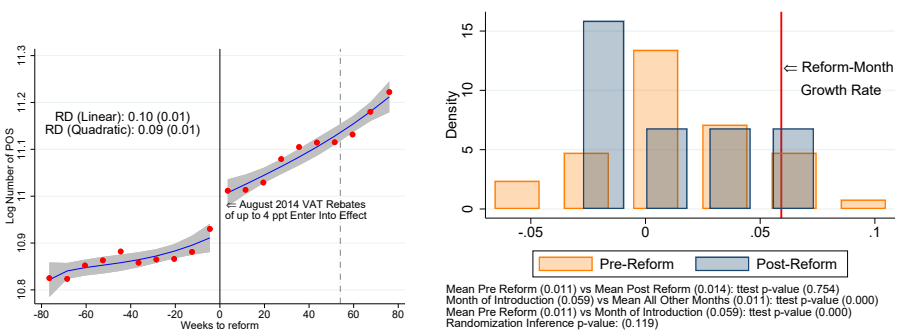
I. Number of Card Transactions



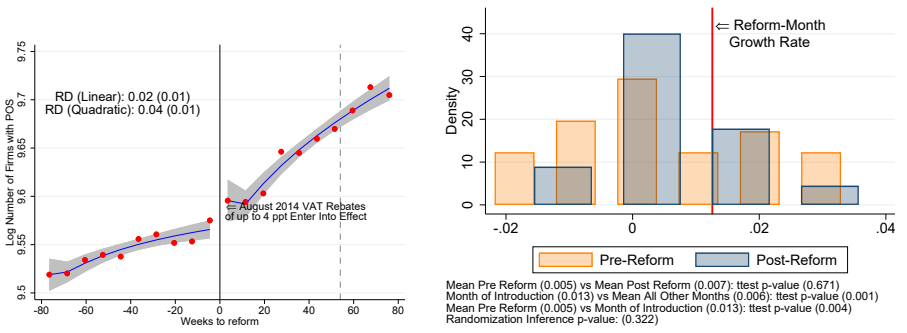
II. Volume of Card Transactions



III. Number of POS

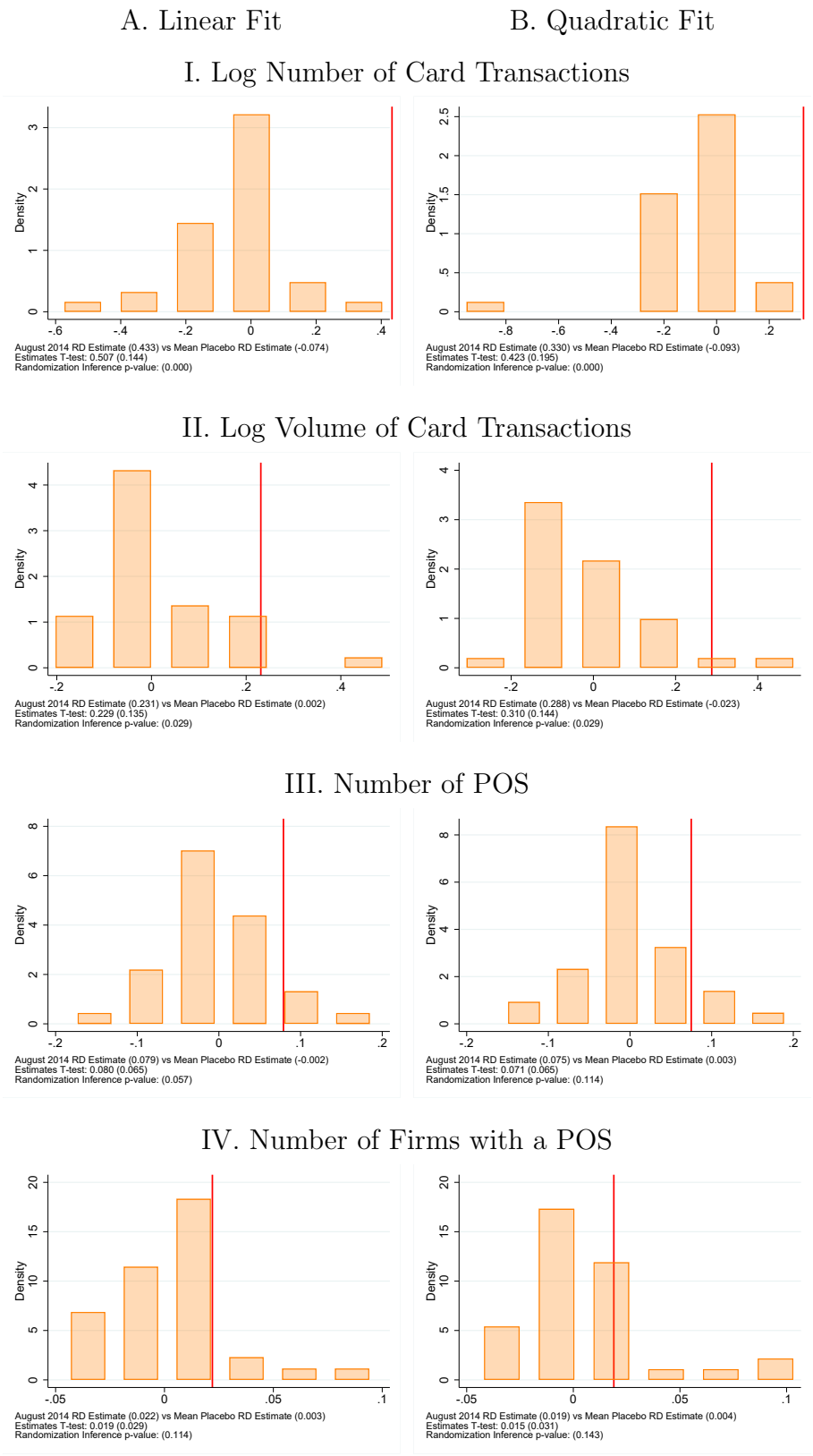


IV. Number of Firms with a POS



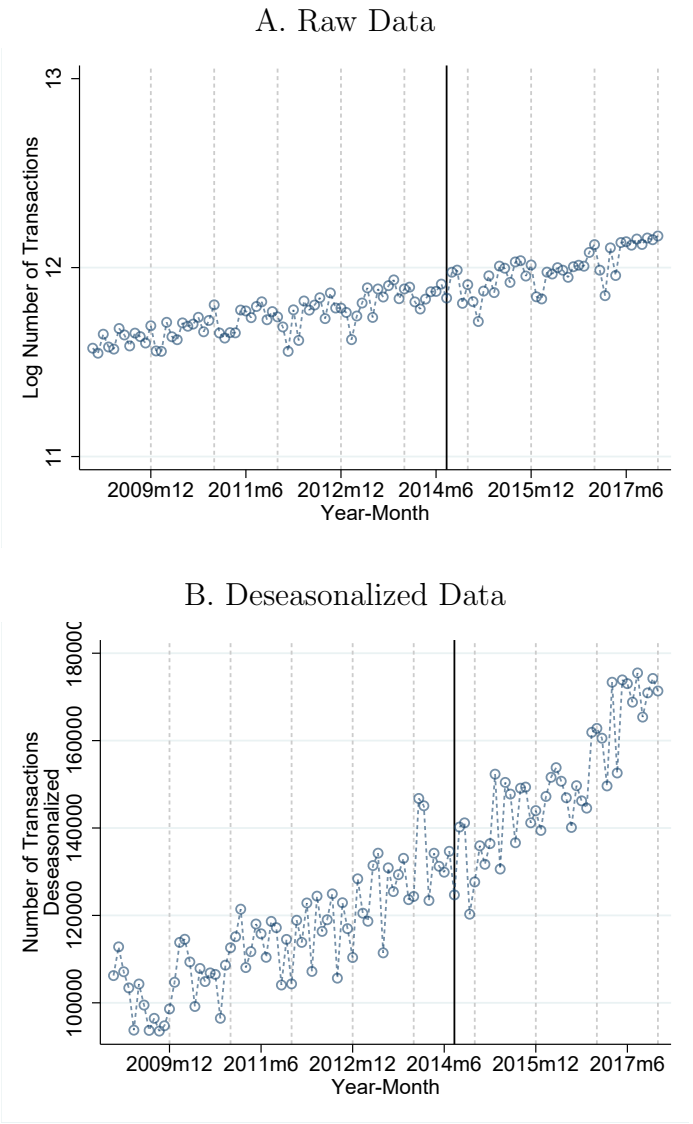
Notes: This Figure is similar to Figure 2, except that, when de-seasonalizing the data and estimating the RD and month-on-month growth rates, we include an additional term that allows for a trend break in January 2013, when the roll-out of the POS subsidies for firms began. This additional control does not substantially alter our results compared to our main specification. This figure is discussed in Section 3.3.

Figure B.7: Distribution of Placebo RD Estimates and Randomization Inference P-Values



Notes: This figure shows the distribution of estimates from placebo RD estimations, using equation 1 with optimal bandwidths as per Calonico et al. (2014) and pretending the reform happened in a month other than August 2014 (one estimation per month, using all months between January 2013 and December 2015). The vertical red line shows the estimate for August 2014. We report the point estimate and standard error on a t-test comparing the August 2014 estimate to the placebo estimates, and randomization inference p-values. This figure is discussed in section 3.3.

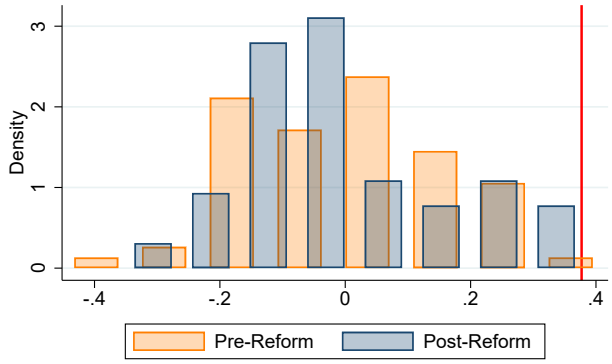
Figure B.8: Number of Electronic Payment Transactions in Argentina (Placebo)



Notes: This figure plots the log number of transactions with electronic payment technology in Argentina between 2009 and 2017. The data is obtained from the Central Bank of Argentina. Panel A plots the raw monthly aggregate values. Panel B plots the the de-seasonalized series after taking out month-of-year fixed effects, as per equation 1 (linear specification). The vertical line marks August 2014, when the VAT rebates in Uruguay entered into effect. This figure is discussed in Section 3.3.

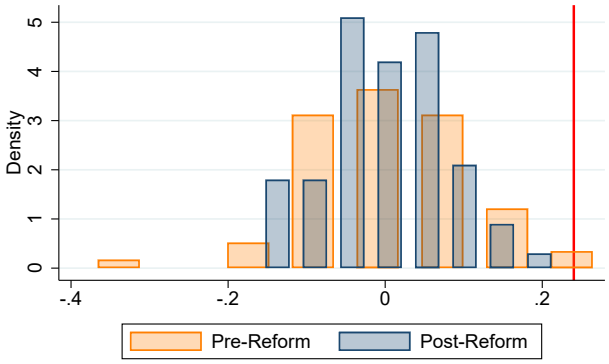
Figure B.9: Week-on-Week Growth Rates in Key Outcomes

A. Number of Card Transactions



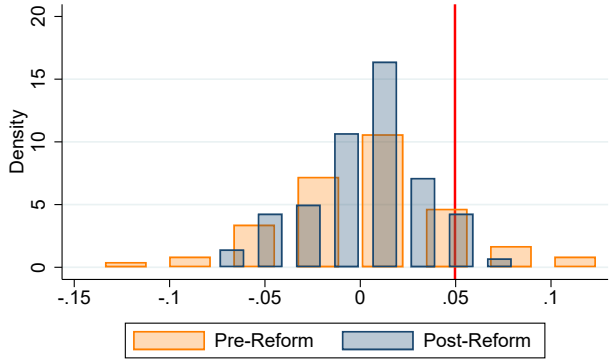
Mean Pre Reform (0.000) vs Mean Post Reform (0.001): ttest p-value (0.984)
Week of Introduction (0.377) vs Mean All Other Weeks (0.001): ttest p-value (0.000)
Mean Pre Reform (0.000) vs Week of Introduction (0.377): ttest p-value (0.000)
Randomization Inference p-value: (0.014)

B. Volume of Card Transactions



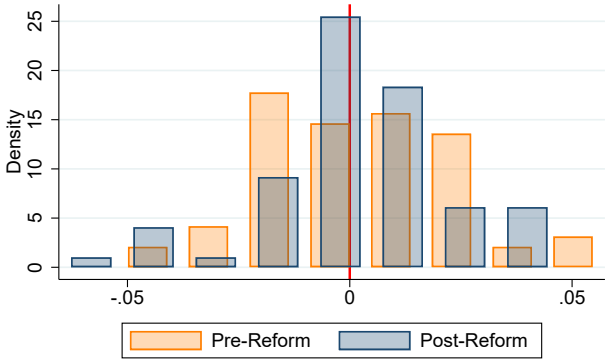
Mean Pre Reform (0.002) vs Mean Post Reform (0.004): ttest p-value (0.900)
Week of Introduction (0.240) vs Mean All Other Weeks (0.003): ttest p-value (0.000)
Mean Pre Reform (0.002) vs Week of Introduction (0.240): ttest p-value (0.000)
Randomization Inference p-value: (0.014)

C. Number of POS



Mean Pre Reform (0.002) vs Mean Post Reform (0.003): ttest p-value (0.917)
Week of Introduction (0.050) vs Mean All Other Weeks (0.003): ttest p-value (0.000)
Mean Pre Reform (0.002) vs Week of Introduction (0.050): ttest p-value (0.000)
Randomization Inference p-value: (0.078)

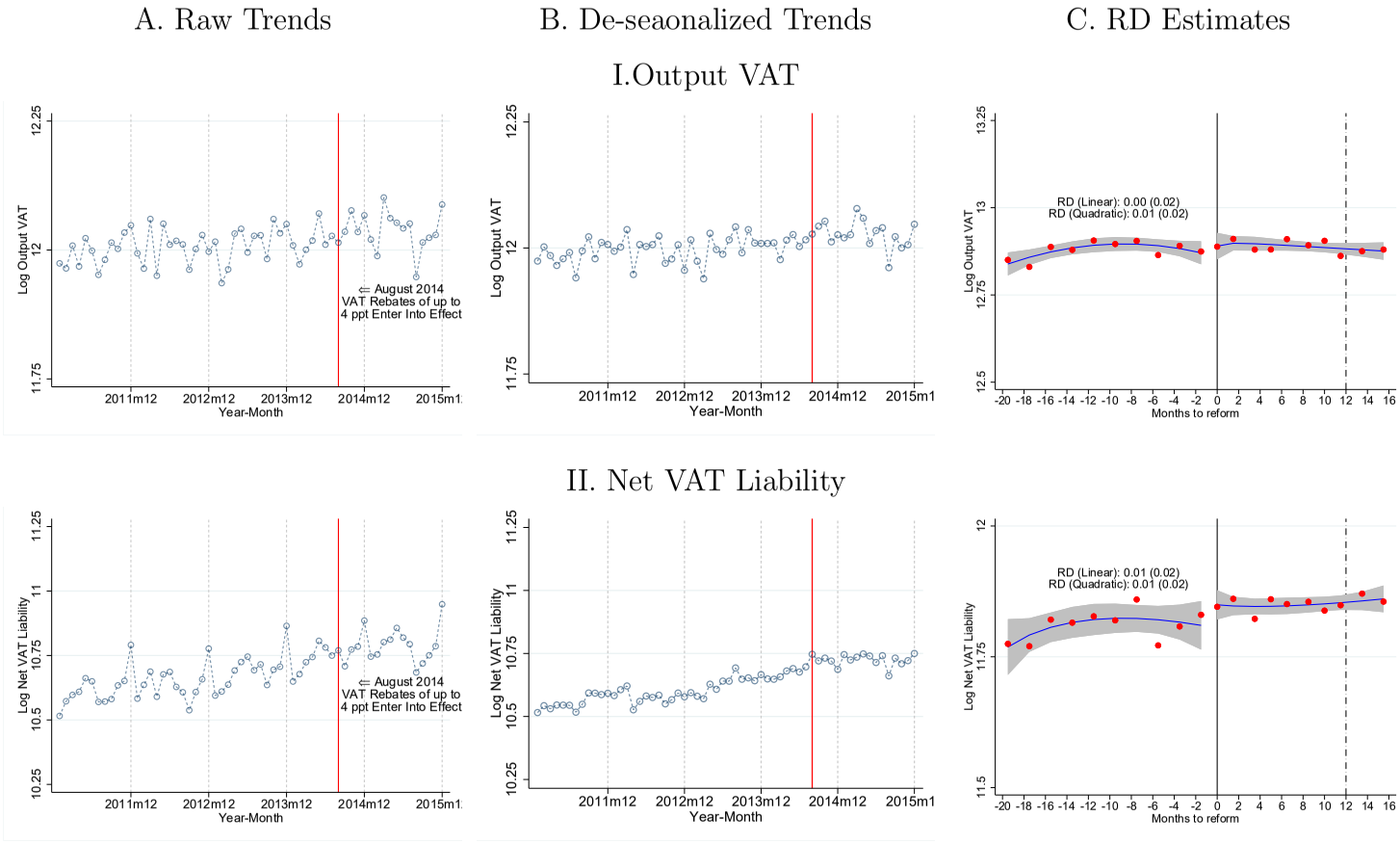
D. Number of Firms with a POS



Mean Pre Reform (0.001) vs Mean Post Reform (0.002): ttest p-value (0.830)
Week of Introduction (-0.000) vs Mean All Other Weeks (0.001): ttest p-value (0.405)
Mean Pre Reform (0.001) vs Week of Introduction (-0.000): ttest p-value (0.670)
Randomization Inference p-value: (0.525)

Notes: This figures is similar to Figure 2, but plots the distribution of weekly instead of monthly growth rates. This figure is mentioned in Section 3.2.

Figure B.10: The Effect of VAT Rebates on VAT Compliance
Raw Data, De-seaonalized Data and Regression Discontinuity Estimates for Monthly Aggregate VAT Outcomes



Notes: This figure examines the effect of the VAT rebate introduction on aggregate reported output VAT and net VAT liability. Note that the rebates are disbursed directly to consumers, with no change to how firms file their VAT declaration. The rebates should therefore affect VAT liability only through a compliance channel. Panel A plots the monthly aggregate values for each of the outcomes. Panel B plots the de-seasonalized trends of monthly outcomes as per equation 1 (with $p = 1$, i.e. a linear time trend). Panel C implements the RD estimation similar to equation 1 but using monthly aggregated data, and month to reform as a running variable. This Figure is discussed in Section 4.

Table B.1: Robustness of RD Estimates to Varying the Level of Aggregation of Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
A: Log Total Number of Transactions						
Point Estimate	0.518	0.497	0.524	0.515	0.499	0.440
SE	(0.043)	(0.062)	(0.035)	(0.041)	(0.044)	(0.065)
B: Log Volume of Card Transactions						
Point Estimate	0.285	0.294	0.268	0.300	0.283	0.238
SE	(0.023)	(0.030)	(0.045)	(0.049)	(0.037)	(0.053)
Frecuency	Weekly	Weekly	Bi-weekly	Bi-weekly	Daily	Daily
Model Fit	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic

Notes: This table shows the robustness of our main RD estimates to different ways of aggregating the outcome data. The table displays the estimate γ_0 from equation 1 for an RD in time around August 2014. Columns 1 and 2 reproduce estimates from our preferred specification, using weekly aggregation, as shown in Figure 2. Results for data aggregated at the bi-weekly and daily level are shown in columns 3-4 and 5-6 respectively. This table is discussed in Section 3.3.

Table B.2: Robustness of RD Estimates to Short-run Selection — Donut RD

	(1)	(2)	(3)	(4)
	All Weeks	Cut 2 Weeks	Cut 4 Weeks	Cut 8 Weeks
	I. Number of Card Transactions			
i. 80 Weeks BW	0.518	0.561	0.542	0.571
	(0.043)	(0.049)	(0.051)	(0.054)
ii. 40 Weeks BW	0.473	0.556	0.492	0.617
	(0.060)	(0.077)	(0.083)	(0.086)
iii. Optimal BW	0.442	0.469	0.370	0.107
	(0.071)	(0.098)	(0.189)	(0.302)
	II. Volume of Card Transactions			
i. 80 Weeks BW	0.285	0.296	0.312	0.333
	(0.023)	(0.027)	(0.029)	(0.036)
ii. 40 Weeks BW	0.249	0.245	0.279	0.380
	(0.028)	(0.038)	(0.039)	(0.059)
iii. Optimal BW	0.239	0.191	0.283	-0.433
	(0.039)	(0.094)	(0.097)	(0.250)

Notes: This table displays the results of "donut RD" estimations that account for potential selection into treatment (in our case: retiming of purchases), as suggested by Hausman and Rapson (2018). The table shows treatment effect estimates for our two main outcomes, the number of card transactions (Panel I) and the volume of card transactions (Panel II) using either an 80-week or a 40-week bandwidth or the optimal bandwidths for each outcome as per Calonico et al. (2014). Column 1 displays our baseline estimates from equation 1 (linear specification). In columns 2-4, we exclude from the estimation 2, 4 or 8 weeks, both before and after the reform (in addition to the reform week itself). Note that the optimal bandwidth for the number (volume) of card transactions is estimated to be 17 (15). This table is discussed in Section 3.3.

Table B.3: Comparison of One-Step and Two-Step RD Estimations

		A. One-Step Estimation	B. Two-Step Estimation
I. Number of Card Transactions			
Linear	80 Weeks BW	0.518	0.504
		(0.043)	(0.044)
	Optimal BW	0.442	0.417
		(0.071)	(0.081)
Quadratic	80 Weeks BW	0.497	0.481
		(0.062)	(0.063)
	Optimal BW	0.328	0.377
		(0.083)	(0.084)
II. Volume of Card Transactions			
Linear	80 Weeks BW	0.285	0.281
		(0.023)	(0.024)
	Optimal BW	0.239	0.268
		(0.039)	(0.039)
Quadratic	80 Weeks BW	0.294	0.296
		(0.030)	(0.030)
	Optimal BW	0.286	0.322
		(0.047)	(0.047)

Notes: Column A displays our main (benchmark) RD estimates obtained from equation 1. Column B displays estimates from a two-step procedure. We first estimate equation 1 on the full 2010-2016 data to estimate the month-of-year fixed effects with the highest possible degree of precision. We then recover the de-seasonalized outcomes $log(\tilde{Z}_t) = log(Z_{t,m}) - \hat{g}_m$ and estimate the regression discontinuity with a shorter data set (bandwidth) around the reform. In this second step, we estimate equation 1 without the month-of-year fixed effects g_m and use the de-seasonalized outcomes as dependent variable. The standard errors from this procedure would need to be adjusted for the fact that we use a predicted outcome in the second-stage estimation. For both methods (columns), the table displays the estimates for our preferred specification using an 80-week bandwidth and for the optimal bandwidth as in Calonico et al. (2014) and shown in Figure B.5. This table is discussed in Section 3.3.

Table B.4: Robustness of RD Estimates to Accounting for Autocorrelation - First Lag

	Prefered Specification		Control: Lag 1	
	(1)	(2)	(3)	(4)
A: Bi-weekly Specification				
Number of Card Transactions	0.411	0.304	0.411	0.354
	(0.311)	(0.193)	(0.311)	(0.218)
Volume of Card Transactions	0.180	0.250	0.189	0.259
	(0.081)	(0.122)	(0.086)	(0.124)
Number POS	-0.017	-0.037	-0.016	-0.038
	(0.054)	(0.083)	(0.056)	(0.088)
Number of Firms with a POS	0.009	0.003	0.008	0.004
	(0.024)	(0.034)	(0.026)	(0.034)
B: Weekly Specification				
Number of Card Transactions	0.430	0.328	0.486	0.285
	(0.069)	(0.083)	(0.068)	(0.086)
Volume of Card Transactions	0.239	0.286	0.292	0.283
	(0.039)	(0.047)	(0.035)	(0.048)
Number POS	0.078	0.075	0.042	0.047
	(0.016)	(0.021)	(0.019)	(0.024)
Number of Firms with a POS	0.023	0.019	0.018	0.014
	(0.009)	(0.011)	(0.011)	(0.013)
C: Daily Specification				
Number of Card Transactions	0.361	0.316	0.401	0.330
	(0.091)	(0.105)	(0.087)	(0.103)
Volume of Card Transactions	0.144	0.206	0.178	0.251
	(0.071)	(0.097)	(0.061)	(0.085)
Number POS	0.042	0.047	0.059	0.059
	(0.043)	(0.051)	(0.033)	(0.041)
Number of Firms with a POS	0.012	0.010	0.021	0.017
	(0.069)	(0.080)	(0.055)	(0.065)
Model Fit	Linear	Quadratic	Linear	Quadratic

Notes: This table demonstrates the robustness of our results to controlling for the lagged dependent variable. In columns 1-2 we reproduce our main RD estimates using the optimal bandwidth as per Calonico et al. (2014) and showing results for different ways of aggregating the dependent variable, as per the panel titles. Column 1 is for the linear fit and column 2 for the quadratic fit. In columns 3-4, we control for the first lag of the dependent variable in the estimation. This table is discussed in Section 3.3.

Table B.5: Robustness of RD Estimates to Accounting for Autocorrelation - First Two Lags

	Prefered Specification		Control: Lag 2	
	(1)	(2)	(3)	(4)
A: Bi-weekly Specification				
Number of Card Transactions	0.411	0.304	0.409	0.359
	(0.311)	(0.193)	(0.317)	(0.207)
Volume of Card Transactions	0.180	0.250	0.201	0.249
	(0.081)	(0.122)	(0.076)	(0.098)
Number POS	-0.017	-0.037	0.029	0.007
	(0.054)	(0.083)	(0.030)	(0.058)
Number of Firms with a POS	0.009	0.003	0.039	0.026
	(0.024)	(0.034)	(0.017)	(0.025)
B: Weekly Specification				
Number of Card Transactions	0.430	0.328	0.490	0.317
	(0.069)	(0.083)	(0.068)	(0.083)
Volume of Card Transactions	0.239	0.286	0.289	0.277
	(0.039)	(0.047)	(0.034)	(0.045)
Number POS	0.078	0.075	0.047	0.047
	(0.016)	(0.021)	(0.020)	(0.026)
Number of Firms with a POS	0.023	0.019	0.018	0.013
	(0.009)	(0.011)	(0.010)	(0.014)
C: Daily Specification				
Number of Card Transactions	0.361	0.316	0.431	0.338
	(0.091)	(0.105)	(0.083)	(0.101)
Volume of Card Transactions	0.144	0.206	0.195	0.272
	(0.071)	(0.097)	(0.058)	(0.080)
Number POS	0.042	0.047	0.072	0.068
	(0.043)	(0.051)	(0.029)	(0.037)
Number of Firms with a POS	0.012	0.010	0.036	0.029
	(0.069)	(0.080)	(0.044)	(0.053)
Model Fit	Linear	Quadratic	Linear	Quadratic

Notes: This table is identical to Table B.4, but controls for the first two lags of the dependent variable in columns 3 and 4. This table is discussed in Section 3.3.

Table B.6: Robustness of RD Estimates to Prais-Winsten Correction for Autocorrelated Errors

	Prefered Specification		Prais-Winsten Correction	
	(1)	(2)	(3)	(4)
A: Bi-weekly Specification				
Number of Card Transactions	0.411	0.304	0.453	0.311
	(0.311)	(0.193)	(0.041)	(0.086)
Volume of Card Transactions	0.180	0.250	0.212	0.388
	(0.081)	(0.122)	(0.057)	(0.128)
Number POS	-0.017	-0.037	-0.047	-0.060
	(0.054)	(0.083)	(0.038)	(0.064)
Number of Firms with a POS	0.009	0.003	0.015	0.006
	(0.024)	(0.034)	(0.025)	(0.036)
B: Weekly Specification				
Number of Card Transactions	0.430	0.328	0.385	0.377
	(0.069)	(0.083)	(0.074)	(0.079)
Volume of Card Transactions	0.239	0.286	0.231	0.356
	(0.039)	(0.047)	(0.056)	(0.090)
Number POS	0.078	0.075	0.068	0.081
	(0.016)	(0.021)	(0.021)	(0.032)
Number of Firms with a POS	0.023	0.019	0.009	0.012
	(0.009)	(0.011)	(0.017)	(0.017)
C: Daily Specification				
Number of Card Transactions	0.361	0.316	0.350	0.376
	(0.091)	(0.105)	(0.079)	(0.085)
Volume of Card Transactions	0.144	0.206	0.104	0.166
	(0.071)	(0.097)	(0.069)	(0.090)
Number POS	0.042	0.047	0.056	0.089
	(0.043)	(0.051)	(0.047)	(0.049)
Number of Firms with a POS	0.012	0.010	0.050	0.037
	(0.069)	(0.080)	(0.077)	(0.079)
Model Fit	Linear	Quadratic	Linear	Quadratic

Notes: This table is similar to Table B.4, but shows in columns 3 and 4 the robustness of our results to controlling for autocorrelation in the error term via the Prais and Winsten (1954) procedure. For details, see Judge et al. (1985) and Davidson and MacKinnon (1993). This table is discussed in Section 3.3.

B.2 Exploiting Variation in Rebate Rates Across Firms

Figure A.2 shows how rebate rates vary by payment card type and transaction amount. In this section, we exploit this variation in heterogeneity analyses. The hypothesis is that higher rebate rates may generate a larger consumer response and potentially a tax compliance impact. In what follows, we first explain how we calculate the rebate rate for each transaction. We then calculate the average rebate rate for each firm, and divide the sample into firms with high vs low rebate rates. We then conduct RD estimations for each subsample.[33]

As a first step, we calculate the rebate rate on each transaction as (rebate amount/VAT inclusive transaction amount)*122, i.e. assuming that the VAT rate is 22 percent. Figure B.11, Panel A, shows the distribution of estimated rebate rates for August 2014 with this method. The figure suggests that our implicit assumption on the VAT rate is correct for most transactions. We then round the estimated rebate rate to obtain rates that correspond to the statutory rebate rates. This rounding also ensures that we do not overestimate rebate rates for transactions taxed at 10 percent. As Panel B shows, most transactions obtain a 2 ppt rebate, 30 percent receive no rebate (i.e. are firm-to-firm transactions) and 15 percent of transactions obtain a rebate of 4 ppt or higher.[34] Given that few transactions are above the threshold value of 4,000 UI where the rebate rate drops (see Figure A.3), the variation in rebate rates is primarily driven by the type of payment card used, with most transactions conducted by credit card.

We then calculate the average rebate rate at the firm level, taking a simple average over the firms' card transactions. The resulting distribution is displayed in Panel C. The distribution features a mass point at zero, indicating that over 40 percent of firms register no rebates,[35] while the other firms provide rebates on part of their transactions, with a majority of firms providing the 2 ppt rebate on a large share but not on all transactions.

We can now divide the sample into firms that provide a higher vs a lower rebate rate on average.[36] Low-rebate firms sell a larger fraction of their output to other firms and/or to consumers using a credit card. Figure B.12 shows RD estimations of the reform impact on

[33] A caveat is that we have to use post-reform data to estimate rebate rates, as the type of payment method (credit or debit card) was not captured before the reform. The post-reform distribution of transactions (and rebates) is of course endogenous to consumer responses to the rebates.

[34] Recall that transactions at hotels or restaurants — some of which might be misclassified as retail — receive a 9 ppt rebate and transactions with a BPS social security card receive a full VAT waiver, i.e. et 10 or 22 ppt rebate.

[35] Recall that purchases by firms, purchases with foreign payment cards and credit card purchases of a value above 4,000 UI are not eligible for any VAT rebates.

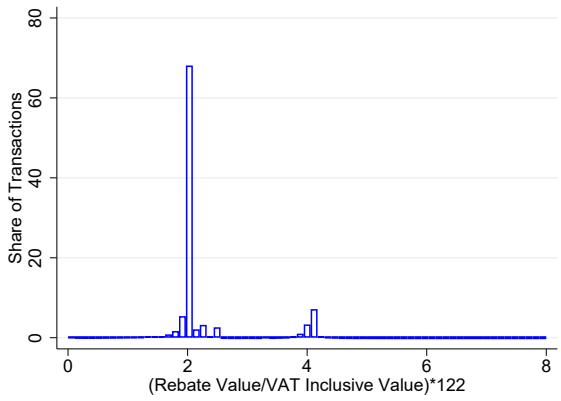
[36] When constructing this sample split, we ignore transactions with rebate rates above 5 ppt, as these rebates existed prior to the reform we study and did not vary with the reform.

the number and volume of card transactions, splitting the sample either by the mean or the median of the distribution of firm-level average rebate rates. We observe a significant increase in card transactions in all samples. The increase in the transaction volume is larger among firms with a below-average or below-median rebate rate. Similarly, the increase in the number of card transactions is larger among firms with a below-average or below-median rebate rate. The results are similar when we use a weighted average to construct the firm-level average rebate rates based on which we divide the sample. A possible explanation for the results is that firms providing lower average rebate rates serve customers who did not have the habit of using their payment cards prior to the reform and hence had more scope for increasing the use of this technology. The results are also consistent with the idea that consumers increased their use of electronic payment technologies overall, without necessarily targeting this behavioral change to specific retailers/transactions that provided high(er) rebate rates.

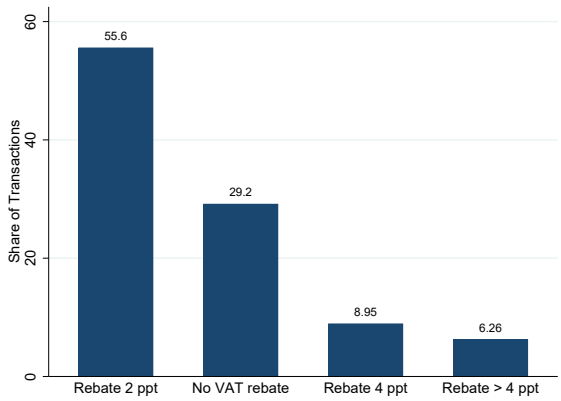
If a larger increase in (the volume of) card transactions was associated with a larger increase in tax compliance, we should observe this by comparing low-rebate retailers (treated) to high-rebate retailers (control) in a difference-in-difference analysis. Figures B.13 and B.14 show that there is no indication that an increase in tax compliance materialized. While the standard difference-in-difference estimation suggests that the treatment and control group have slightly different trends prior to the reform (columns A. and B.), re-weighting the control group in the synthetic difference-in-difference estimation achieves parallel trends and suggests precisely estimated zero effects on the outcomes of interest (column C.).

Figure B.11: Distribution of the Rebate Rates, September 2014

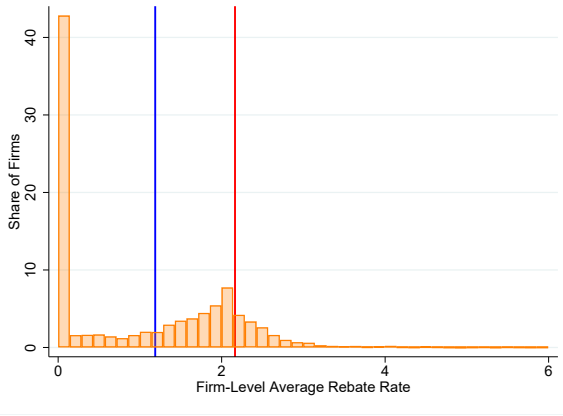
A: Distribution of Estimated Rebate Rates



B: Distribution of Rebate Rates



C: Distribution of Firm-Level Average Rebate Rate

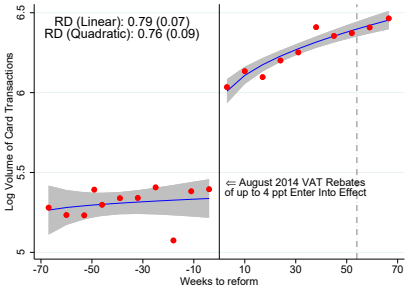


Notes: Panel A shows the distribution of rebate values as a share of the VAT-inclusive purchase price. We include all transactions with non-zero rebate value, for all firms, in September 2014. The results are very similar for August or October 2014. Panel B shows the distribution of the rounded rebate rates for September 2014. Panel C shows the distribution of the average rebate rate at the firm level. We take a simple average across all transactions of each firm in September 2014. The distribution is very similar when using the transaction amount as weight when averaging. The blue and red vertical lines indicate the median and the mean of the distribution. Panel C is for all firms with a POS, while panel B is for all card transactions.

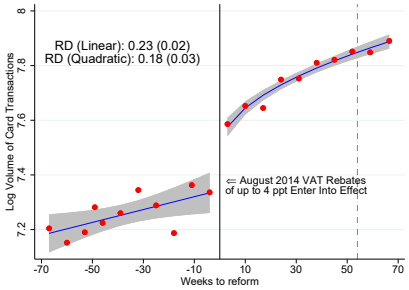
Figure B.12: The Effect of VAT Rebates on the Use of Electronic Payment Technology
Heterogeneity of RD Estimates by Firm-Level Average Rebate Rate

A. Volume of Card Transactions

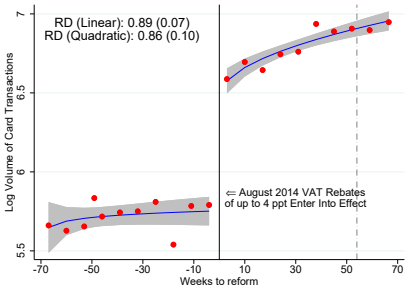
1. Firm Rebate < Mean



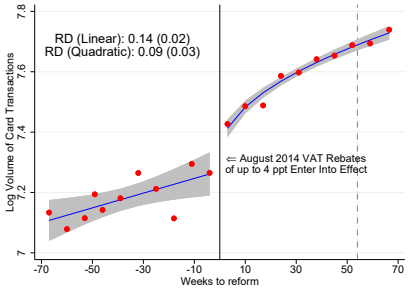
2. Firm Rebate ≥ Mean



3. Firm Rebate < Median

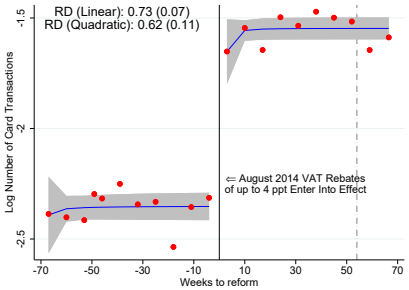


4. Firm Rebate ≥ Median

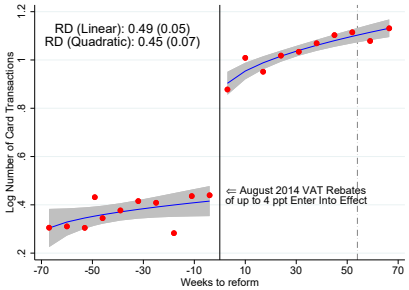


B. Number of Card Transactions

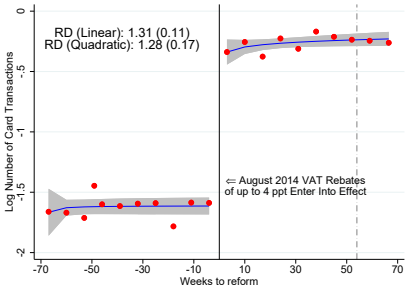
1. Firm Rebate < Mean



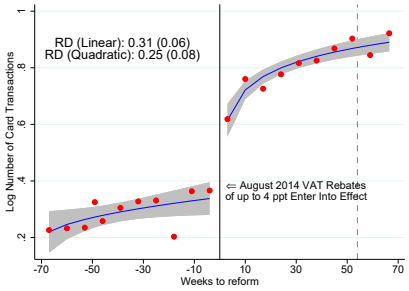
2. Firm Rebate ≥ Mean



3. Firm Rebate < Median



4. Firm Rebate ≥ Median

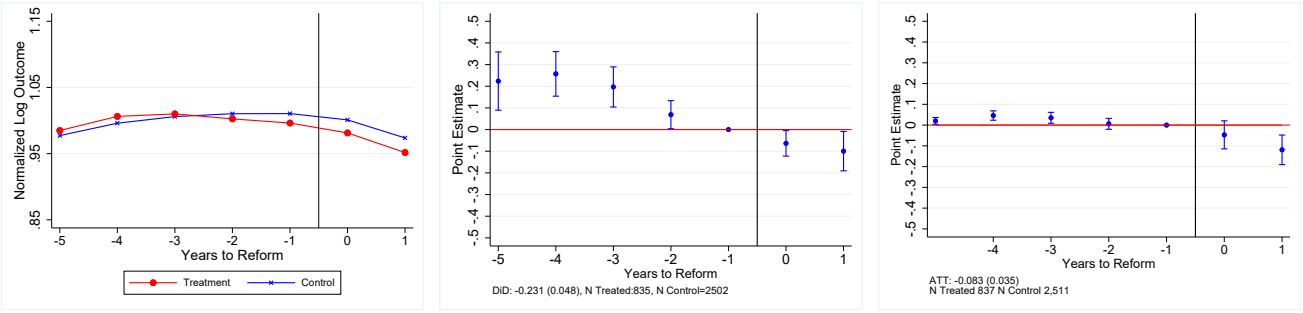


Notes: This figure shows the response of the volume and number of card transactions to the introduction of VAT rebates, studying heterogeneity by the firm-level average rebate rate, calculated in September 2014. We limit the analysis to firms with card transactions and divide the sample by the mean/median of the distribution of firm-leverage average rebate rates in this sample. Everything else is as in Figure 2.

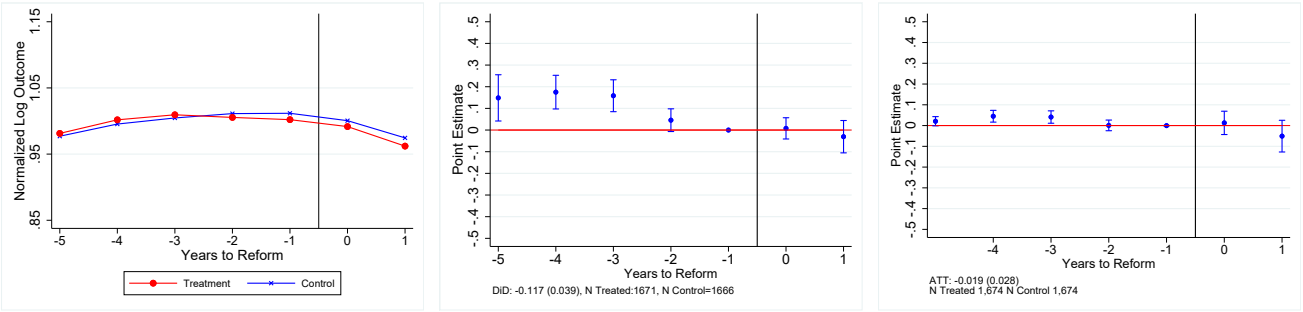
Figure B.13: The Effect of VAT Rebates on Tax Compliance
DiD Estimations Exploiting Variation in Firm-Level Average Rebate Rate (1/2)

A. Trends B. Standard DiD C. Synthetic DiD

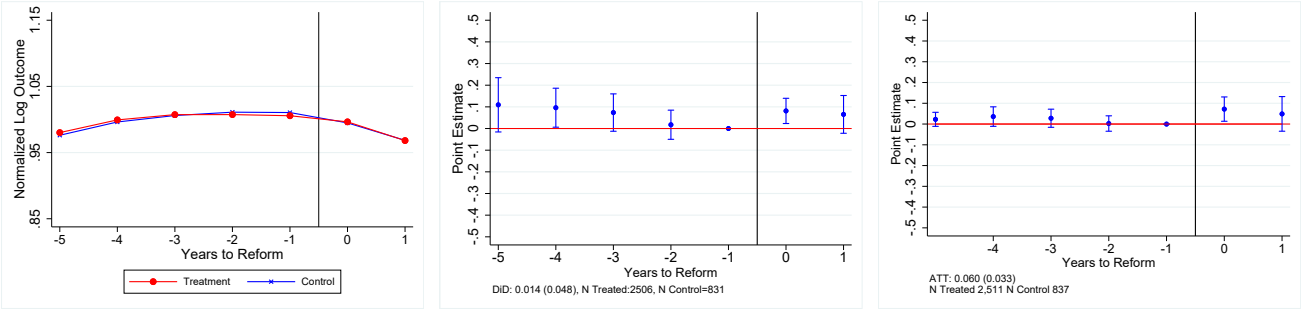
I. Treated: Firm-level Average Rebate Rate < p25



II. Treated: Firm-level Average Rebate Rate < p50



III. Treated: Firm-level Average Rebate Rate < p75

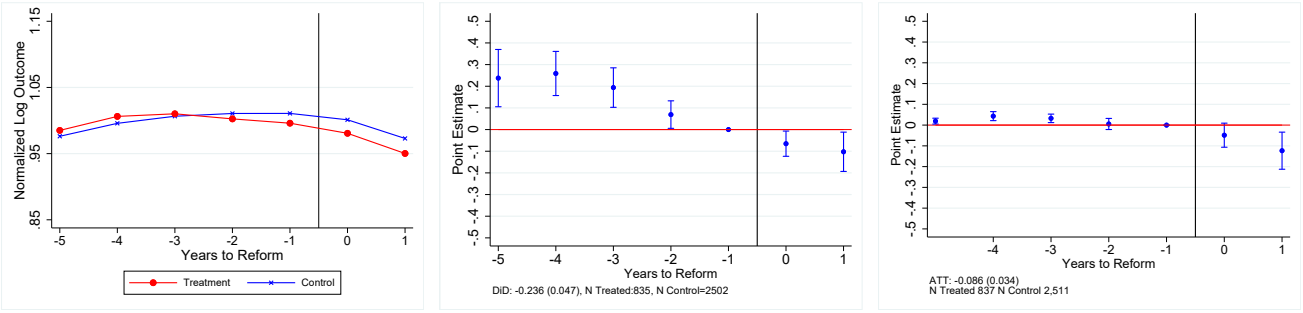


Notes: This figure shows difference-in-difference estimations for retail firms, comparing firms with low firm-level average rebate rates (treated) to firms with high firm-level average rebate rates (control), ignoring firms that register no rebates. The outcome variable is taxable sales. The low/high division is as per the panel titles. The designation of firms with relatively lower rebate rates as treated is motivated by Figure B.12 which shows that the post-reform jump in the volume and number of card transactions is larger among firms with lower average rebate rates. The specifications are otherwise the same as in Figure 3. Column A. shows time trends in the treatment and control group. Column B. shows event-study coefficients from a standard difference-in-difference estimation. Panel C. shows event-study coefficients from a synthetic difference-in-difference estimation.

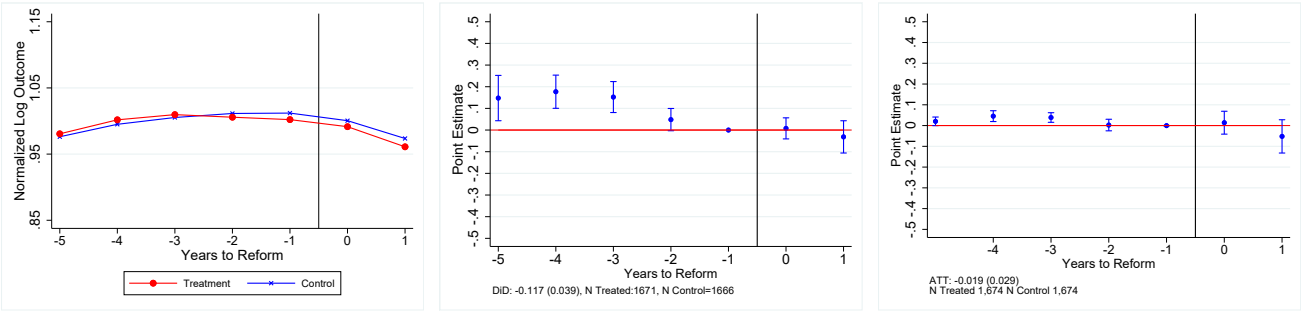
Figure B.14: The Effect of VAT Rebates on Tax Compliance
DiD Estimations Exploiting Variation in Firm-Level Average Rebate Rate (2/2)

A. Trends B. Standard DiD C. Synthetic DiD

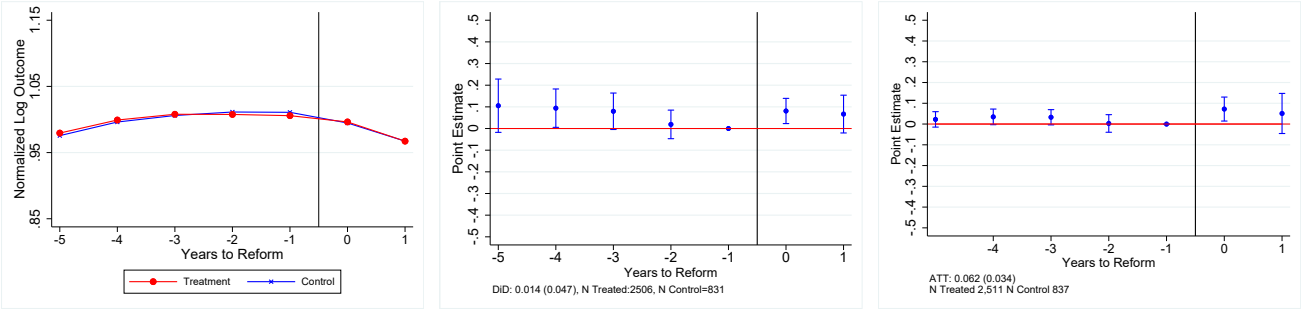
I. Treated: Firm-level Average Rebate Rate < p25



II. Treated: Firm-level Average Rebate Rate < p50



III. Treated: Firm-level Average Rebate Rate < p75



Notes: This figure is identical to figure B.13, except that the outcome variable here is output VAT.

C Difference-in-Difference Appendix

C.1 Dealing with Zeros in the Outcome Variables

Table C.1: Robustness of Difference-in-Difference Estimates to Varying the Value Attributed to Extensive Margin Changes

	Taxable Sales				Output VAT				Net Liability			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post · Treated	-0.0505	-0.0504	-0.0505	-0.0521	-0.0459	-0.0459	-0.0460	-0.0471	0.0354	0.0349	0.0358	0.0483
	(0.0480)	(0.0478)	(0.0483)	(0.0557)	(0.0395)	(0.0392)	(0.0397)	(0.0470)	(0.0519)	(0.0515)	(0.0523)	(0.0639)
ϵ	0.1	0	0.2	3	0.1	0	0.2	3	0.1	0	0.2	3
N Treated (Retailers w/ POS)	4985	4985	4985	4985	4985	4985	4985	4985	4985	4985	4985	4985
N Control (Wholesalers)	6118	6118	6118	6118	6118	6118	6118	6118	6118	6118	6118	6118

Notes: This table documents the robustness of our main DiD results shown in Table 1 to varying the value ϵ we attribute to extensive margin changes of the outcomes. Columns 1, 5 and 9 show our preferred estimates from columns 1, 5, and 9 of Table 1. The other columns vary ϵ to 0, 0.2 and 3, as indicated. Everything else is as in Table Table 1 and Figure 3. This table is discussed in Section 4.3.

Table C.2: The Effect of VAT Rebates on Tax Compliance
Difference-in-Difference Estimates for the Extensive Margin

	Taxable Sales				Output VAT				Net Liability		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Post · Retailer	-0.056	-0.056	-0.266	0.124	-0.039	-0.039	-0.257	0.142	0.445	0.445	1.143
	(0.284)	(0.284)	(0.276)	(0.264)	(0.283)	(0.283)	(0.276)	(0.263)	(0.437)	(0.437)	(0.561)
Balanced Sample	Y	Y	-	-	Y	Y	-	-	Y	Y	Y
Unbalanced Sample	-	-	Y	Y	-	-	Y	Y	-	-	-
Winsor at p99	Y	-	Y	Y	Y	-	Y	Y	Y	-	Y
Winsor at p95	-	Y	-	-	-	Y	-	-	-	Y	-
Includes 2016 data	-	-	-	Y	-	-	-	Y	-	-	Y
N Treated (Retailers)	4985	4985	6906	6819	4985	4985	6906	6819	4985	4985	2321
N Control (Wholesalers)	6118	6118	9044	9340	6118	6118	9044	9340	6118	6118	3721

Notes: This table is identical to Table 1, except that the outcome variable here is a dummy taking value 1 if the outcome is positive, and value 0 otherwise. This table is discussed in Section 4.3.

Table C.3: The Effect of VAT Rebates on Tax Compliance
Difference-in-Difference Estimates for the Intensive Margin

	Taxable Sales				Output VAT				Net Liability		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Post · Retailer	-0.004	0.002	0.009	0.003	-0.003	0.002	0.009	0.002	-0.000	0.001	-0.102
	(0.019)	(0.018)	(0.018)	(0.018)	(0.019)	(0.018)	(0.018)	(0.018)	(0.021)	(0.020)	(0.029)
Balanced Sample	Y	Y	-	-	Y	Y	-	-	Y	Y	Y
Unbalanced Sample	-	-	Y	Y	-	-	Y	Y	-	-	-
Winsor at p99	Y	-	Y	Y	Y	-	Y	Y	Y	-	Y
Winsor at p95	-	Y	-	-	-	Y	-	-	-	Y	-
Includes 2016 data	-	-	-	Y	-	-	-	Y	-	-	Y
N Treated (Retailers)	4763	4763	6800	6711	4765	4765	6801	6712	3904	3904	1900
N Control (Wholesalers)	4694	4694	7316	7451	4696	4696	7316	7450	3619	3619	2299

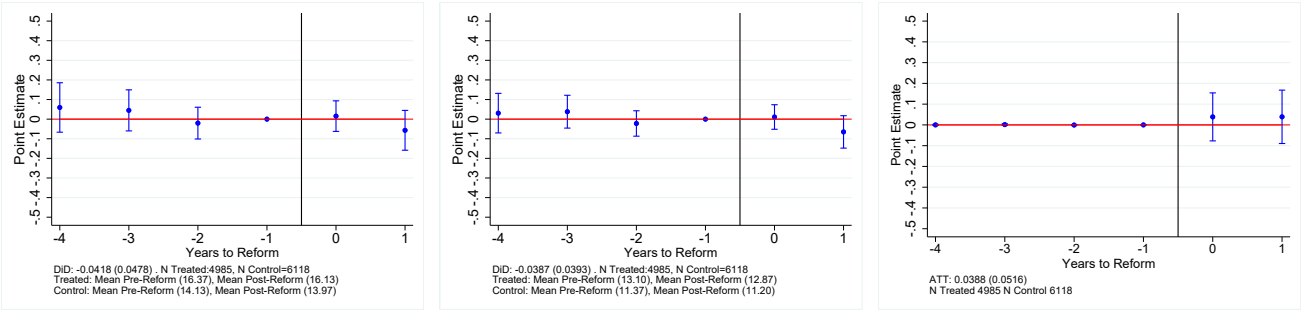
Notes: This table is identical to Table 1, except that we restrict the sample to a balanced panel of firms that report a non-zero outcome in each year during the period of analysis, 2010-2015. This table is discussed in Section 4.3.

C.2 Robustness Tests

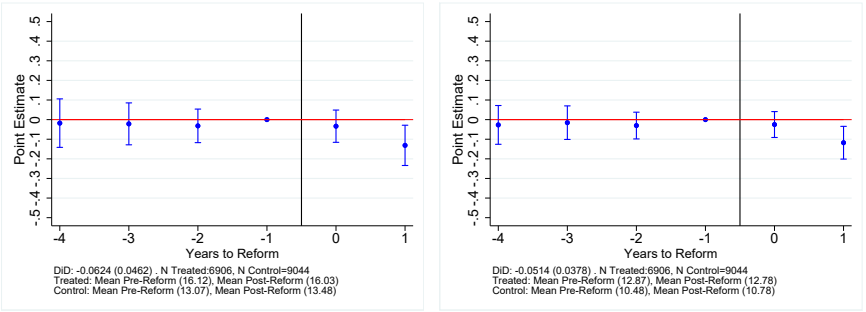
Figure C.1: Robustness of Difference-in-Difference Estimations to Alternative Specifications

A. Total Taxable Sales | B. Output VAT | C. Net VAT

I. Balanced sample, winsorizing at p95, excludes 2016 data

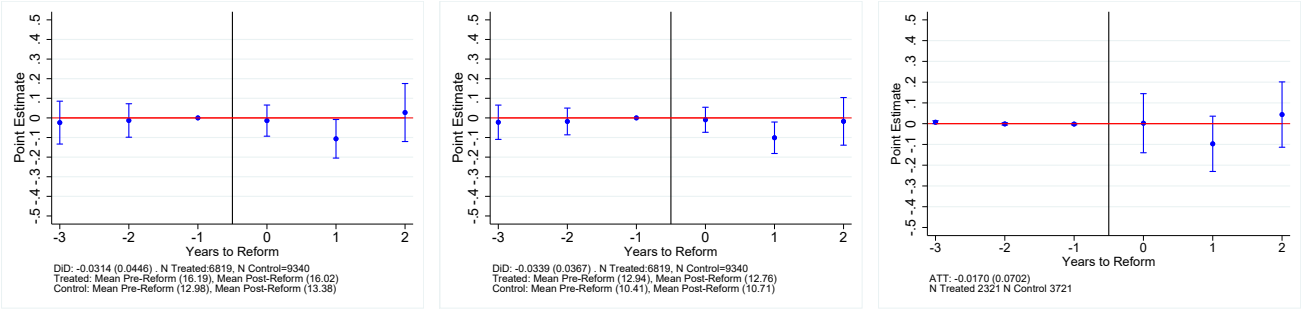


II. Unbalanced sample, winsorizing at p99, excludes 2016 data



III. Including 2016 data, winsorizing at p99

Unbalanced | Unbalanced | Balanced



Notes: This figure is similar to Figure 3. It provides the graphical representation of the robustness tests presented in Table 1 and discussed in Section 4.4.

Table C.4: Robustness of Difference-in-Difference Estimates to Controlling for Differential Trends and Varying Balancing of Panel - Annual Data

(a) Annually Sample

	Taxable Sales			Output VAT		
	(1)	(2)	(3)	(4)	(5)	(6)
Post · Treated	-0.051	-0.056	-0.069	-0.046	-0.047	-0.068
	(0.048)	(0.050)	(0.050)	(0.040)	(0.041)	(0.041)
Incorporation_Year*Year	Y	Y	Y	Y	Y	Y
State*Year	-	Y	Y	-	Y	Y
Firm_Size_Decile*Year	-	-	Y	-	-	Y
N Treated (Retailers w/ POS)	4985	4985	4985	4985	4985	4985
N Control (Wholesalers)	6118	6118	6118	6118	6118	6118

(b) Quarterly Balanced Sample

	Taxable Sales			Output VAT		
	(1)	(2)	(3)	(4)	(5)	(6)
Post · Treated	0.010	0.020	-0.099	0.013	0.023	-0.097
	(0.028)	(0.029)	(0.027)	(0.028)	(0.029)	(0.027)
Incorporation_Year*Year	Y	Y	Y	Y	Y	Y
State*Year	-	Y	Y	-	Y	Y
Firm_Size_Decile*Year	-	-	Y	-	-	Y
N Treated (Retailers w/ POS)	4329	4329	4329	4329	4329	4329
N Control (Wholesalers)	4353	4353	4353	4353	4353	4353

(c) Unbalanced Sample

	Taxable Sales			Output VAT		
	(1)	(2)	(3)	(4)	(5)	(6)
Post · Treated	-0.069	-0.086	-0.042	-0.059	-0.070	-0.046
	(0.046)	(0.049)	(0.049)	(0.038)	(0.040)	(0.040)
Incorporation_Year*Year	Y	Y	Y	Y	Y	Y
State*Year	-	Y	Y	-	Y	Y
Firm_Size_Decile*Year	-	-	Y	-	-	Y
N Treated (Retailers w/ POS)	6906	6906	6906	6906	6906	6906
N Control (Wholesalers)	9044	9044	8964	9044	9044	8964

Notes: This table examines the robustness of the DiD estimates from equation 2. We start with the baseline specification from column (1) in Table 1 and then vary the fixed effects we control for, as explained in the row titles, and the data we use, as explained in the panel titles. The firm-size deciles are constructed using the average annual sales during the pre-reform period. Outcome variables are winsorized at the 99th percentile. We focus on total taxable sales and output VAT as key outcomes for this table, as we used the synthetic difference-in-difference estimation for the net liability outcome, which makes the addition of more flexible fixed effects redundant. Standard errors are robust to heteroskedasticity and clustered at the firm level. This table is discussed in Section 4.4.

Table C.5: Robustness of Difference-in-Difference Estimates to Controlling for Differential Trends and Varying Balancing of Panel - Monthly Data

(a) Annually Balanced Sample

	Taxable Sales			Output VAT		
	(1)	(2)	(3)	(4)	(5)	(6)
Post · Treated	-0.023	-0.011	-0.020	-0.023	-0.010	-0.019
	(0.014)	(0.015)	(0.016)	(0.014)	(0.015)	(0.015)
N Treated (Retailers w/ POS)	6203	6203	6203	6203	6203	6203
N Control (Wholesalers)	7278	7278	7278	7278	7278	7278
Incorporation Year*Month FE	Y	Y	Y	Y	Y	Y
Region*Month FE	-	Y	Y	-	Y	Y
Large Firm*Month FE	-	-	Y	-	-	Y

(b) Quarterly Balanced Sample

	Taxable Sales			Output VAT		
	(1)	(2)	(3)	(4)	(5)	(6)
Post · Treated	-0.010	0.004	0.002	-0.010	0.004	0.002
	(0.014)	(0.015)	(0.016)	(0.014)	(0.015)	(0.015)
N Treated (Retailers w/ POS)	5424	5424	5424	5424	5424	5424
N Control (Wholesalers)	5747	5747	5747	5747	5747	5747
Incorporation Year*Month FE	Y	Y	Y	Y	Y	Y
Region*Month FE	-	Y	Y	-	Y	Y
Large Firm*Month FE	-	-	Y	-	-	Y

(c) Unbalanced Sample

	Taxable Sales			Output VAT		
	(1)	(2)	(3)	(4)	(5)	(6)
Post · Treated	-0.027	-0.014	-0.024	-0.027	-0.014	-0.023
	(0.014)	(0.015)	(0.015)	(0.014)	(0.015)	(0.015)
N Treated (Retailers w/ POS)	6809	6809	6809	6809	6809	6809
N Control (Wholesalers)	9414	9414	9414	9414	9414	9414
Incorporation Year*Month FE	Y	Y	Y	Y	Y	Y
Region*Month FE	-	Y	Y	-	Y	Y
Large Firm*Month FE	-	-	Y	-	-	Y

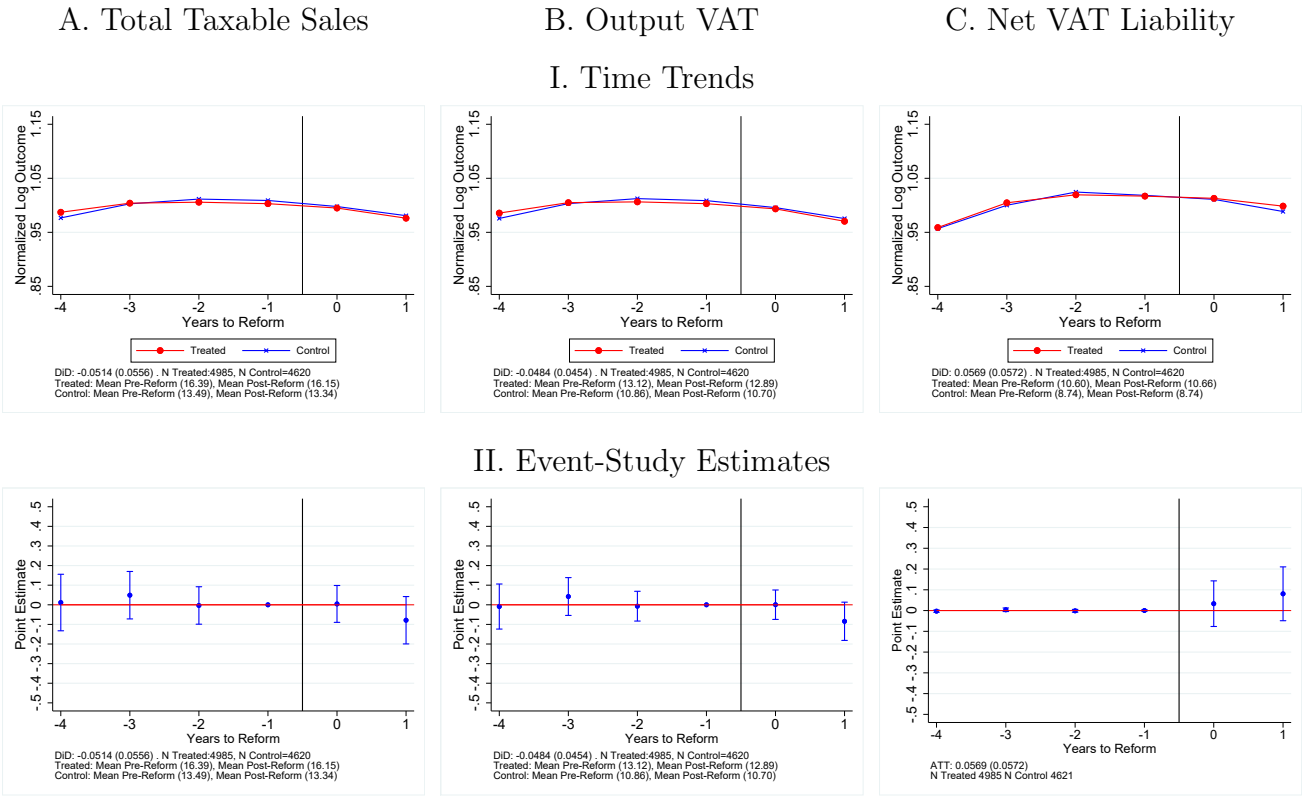
Notes: This table is similar to Table C.4 but uses monthly data for the period August 2013 to August 2015. This table is discussed in Section 4.4.

Table C.6: Robustness of Difference-in-Difference Estimations to Varying the Panel Length

	Taxable Sales			Output VAT			Net Liability		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post · Treated	-0.051	-0.017	-0.051	-0.046	-0.019	-0.046	0.035	0.075	0.027
	(0.048)	(0.050)	(0.045)	(0.040)	(0.041)	(0.037)	(0.052)	(0.054)	(0.050)
Balanced Sample	Y	Y	Y	Y	Y	Y	Y	Y	Y
Winsor at p99	Y	Y	Y	Y	Y	Y	Y	Y	Y
Start in 2010	Y	-	-	Y	-	-	Y	-	-
Start in 2009	-	Y	-	-	Y	-	-	Y	-
Start in 2011	-	-	Y	-	-	Y	-	-	Y
N Treated (Retailers w/ POS)	4985	4717	5241	4985	4717	5241	4985	4717	5241
N Control (Wholesalers)	6118	5629	6699	6118	5629	6699	6118	5629	6699

Notes: This table documents the robustness of our main DiD results shown in Table 1 to varying the length of the panel we use for estimation. Columns 1, 4 and 7 reproduce our preferred estimates from Figure 3. The remaining columns show estimates for a longer and shorter panel. Everything else is as in Table 1 and Figure 3. This table is discussed in Section 4.4.

Figure C.2: Robustness of Difference-in-Difference Estimates to Excluding Wholesale Firms With POS



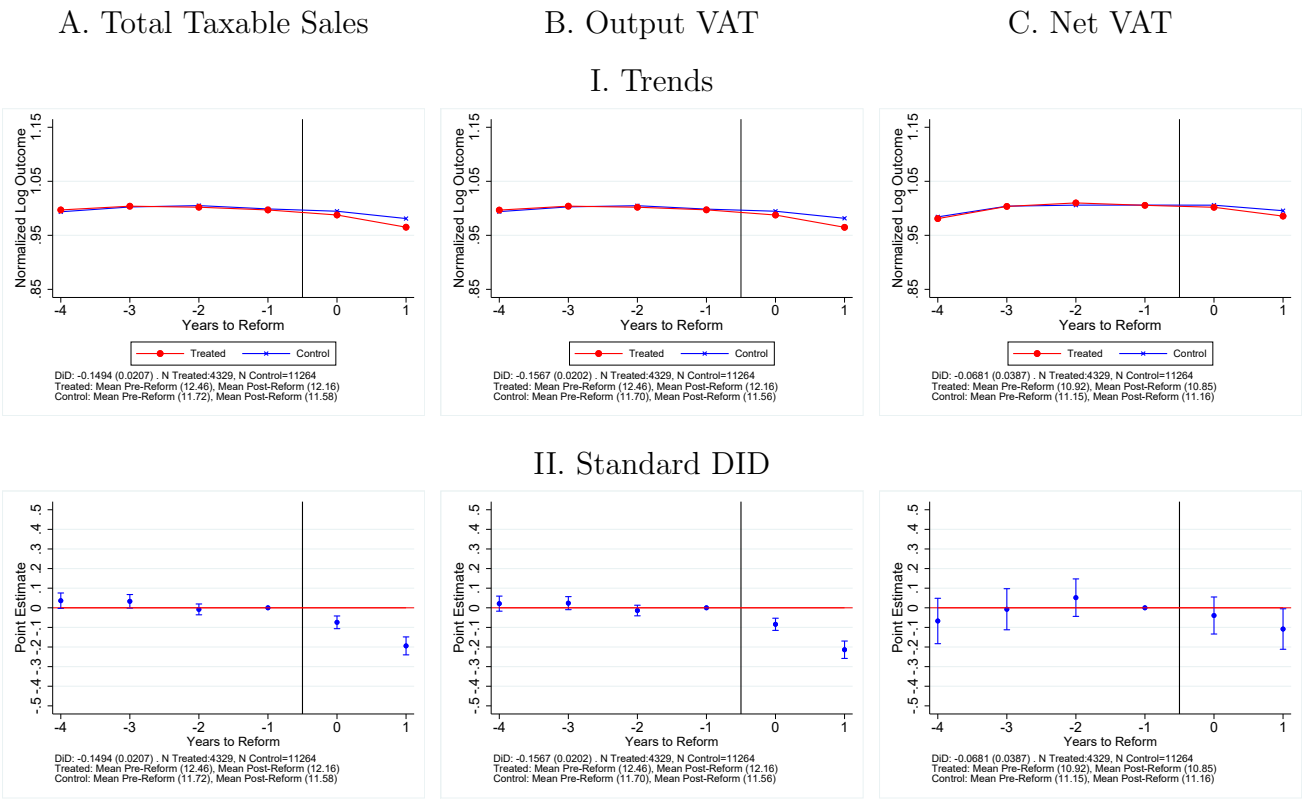
Notes: This Figure is identical to Figure 3, except that we exclude from the control group all wholesale firms that ever used a POS. This figure is discussed in Section 4.4.

Table C.7: Robustness of Difference-in-Difference Estimates to Excluding Wholesale Firms With POS

	Taxable Sales				Output VAT				Net Liability		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Post · Treated	-0.051	-0.046	-0.054	-0.008	-0.048	-0.043	-0.049	-0.017	0.057	0.060	0.050
	(0.056)	(0.055)	(0.053)	(0.051)	(0.045)	(0.045)	(0.043)	(0.042)	(0.057)	(0.057)	(0.078)
Balanced Sample	Y	Y	-	-	Y	Y	-	-	Y	Y	Y
Unbalanced Sample	-	-	Y	Y	-	-	Y	Y	-	-	-
Winsor at p99	Y	-	Y	Y	Y	-	Y	Y	Y	-	Y
Winsor at p95	-	Y	-	-	-	Y	-	-	-	Y	-
Includes 2016 data	-	-	-	Y	-	-	-	Y	-	-	Y
N Treated (Retailers w/ POS)	4985	4985	6906	6819	4985	4985	6906	6819	4985	4985	2321
N Control (Wholesalers)	4620	4620	7052	7310	4620	4620	7052	7310	4621	4621	2682

Notes: This Table is identical to Table 1, except that we exclude from the control group all wholesale firms that ever used a POS. This table is discussed in Section 4.4.

Figure C.3: Robustness of Difference-in-Difference Estimates to Using the Service Sector as an Alternative Control Group



Notes: This figure is similar to Figure 3 but uses the service sector as a control group, excluding hotels and restaurants, which benefited from a 9 percentage point VAT rebate since 2006. We use the standard difference-in-difference estimation for all outcomes. We focus on firms that report non-zero sales at least once every quarter, to avoid the results being affected by firms with highly seasonal activity. This figure is discussed in Section 4.4.

C.3 Exploiting Variation Across Subsectors and Across Regions

This section exploits variation across subsectors and across regions in the context of DiD and interaction designs to examine whether there are any detectable effects of the introduction of VAT rebates on tax compliance. If a tax compliance impact exists, we should expect it to be larger in subsectors/regions with a larger first stage, i.e. a larger impact of VAT rebates on the volume of card transactions. This is because an impact on VAT compliance must be driven by increased usage of existing POS.[37]

We start by documenting the variation in the size of the first-stage estimates across regions and sectors in Figure C.4. The variation across regions is most striking, with the volume of card transactions increasing by over 45 percent in some regions, which contrasts with insignificant or even slightly negative point estimates in other regions. The capital region Montevideo is in the middle of the range of estimates. The variation of estimates across sectors is less extreme, as many sectors experience increases in the volume of transactions around 20-30 percent, but other subsectors experience changes that are both economically and statistically insignificant.[38] Variation across subsectors/regions in the RD coefficient for total sales is somewhat but not perfectly correlated with the RD coefficient for the number of card transactions.

How to divide retail firms (with POS) into more and less intensely treated groups based on the size of the first stage is hence not obvious, as we have two outcome variables in the RD (the volume and number of card transactions) and could consider several cutoffs. We consider various different specifications in Figure C.5, focusing on output VAT as our outcome of interest. In the first four panels, we consider firms as treated if they are in a region for which the RD jump in the volume of card sales is above the 50th or above the 75th percentile of the distribution across regions (panels I.A. and I.B.) or if the RD jump in the number of card transactions is above the 50th or above the 75th percentile of the distribution respectively (panels I.C. and I.D.). In panel I.E., we compare retailers firms in Montevideo (treated) to retailers in all other regions in the country. This is motivated by the fact that the RD estimate for Montevideo is the most precise. The second row of the figure shows similar cuts applied across subsectors. Not all of the subsector-specific RD coefficients are statistically significant. In panel II.E., we hence consider firms as treated if they operate in a subsector with a statistically significant RD jump in either total sales or the number of transactions.

The figures show precisely estimated zero effects in all specifications except in panel II.A.

[37] We exploit variation either across subsectors or across regions, rather than across subsector*region cells, as the latter cells exhibit large variation in size, and because spillovers across subsectors and across regions are limited, but spillovers across subsector*region cells are harder to trace and therefore harder to exclude.

[38] We focus on sectors with at least 50 firms.

However, the significant point estimate in this panel is due to a pre-existing trend, and driven by firms in the middle of the treatment distribution, as the point estimate becomes much smaller and insignificant when we cut by the 75th percentile of the distribution of RD coefficients (panel II.B.), and even smaller when cutting the sample by the size of the effect on the number of card transactions (panels II.C. and II.D). Furthermore, most of the estimates are closer to zero when estimating a synthetic difference-in-difference model, as shown in Figure C.6. We hence consider that these analyses confirm our main result of no significant effect of the VAT rebates on tax compliance.[39]

Finally, Table C.8 shows results from an alternative way of conducting this analysis, interacting the treatment in our main difference-in-difference estimations with an indicator for treatment intensity based on the size of the first stage effect. Concretely, we estimate

$$\begin{aligned} y_{ist} = a_i + g_t + \beta_1 \cdot PostReform_t \cdot Treated_i + \beta_2 \cdot PostReform_t \cdot Intensity_s \\ + \beta_3 \cdot PostReform_t \cdot Treated_i \cdot Intensity_s + \gamma \cdot X_{it} + u_{it}, \end{aligned} \tag{C.1}$$

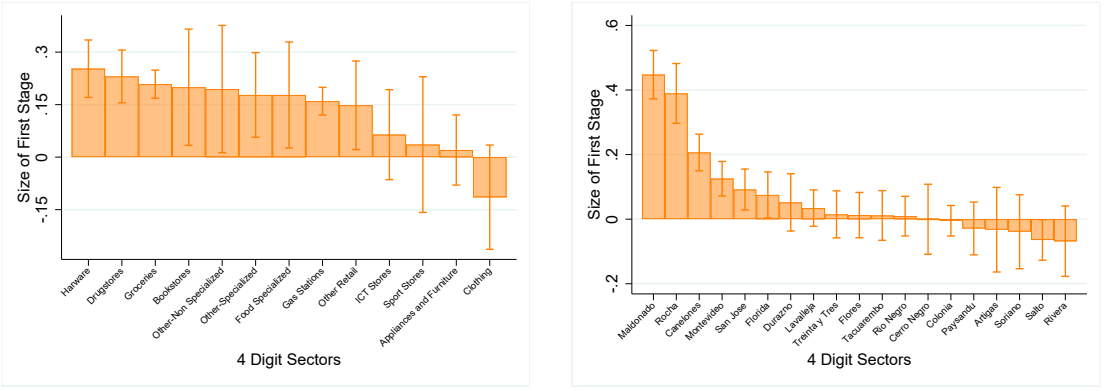
where s indexes groups (either subsectors or regions), and we use indicators for an above-median first stage coefficient in the group as an intensity measure. Everything else is as in Equation 2 in the paper. The interaction effects displayed in the table are all either statistically insignificant or negative, hence corroborating our main finding of no tax compliance impact of the reform.

[39] These results hold also for the other outcome variables.

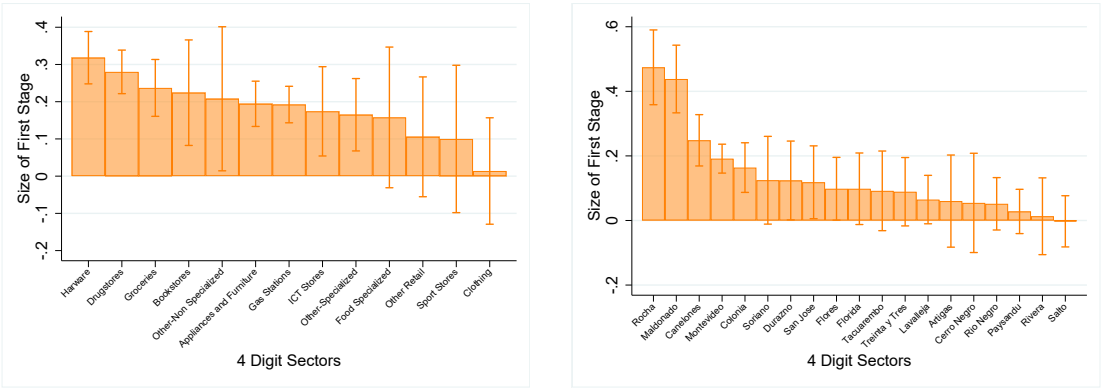
Figure C.4: Variation in the Size of the First-Stage Effect (RD Coefficient) on Card Usage

A. Across Four-Digit Subsectors B. Across Departments (Among Retailers)

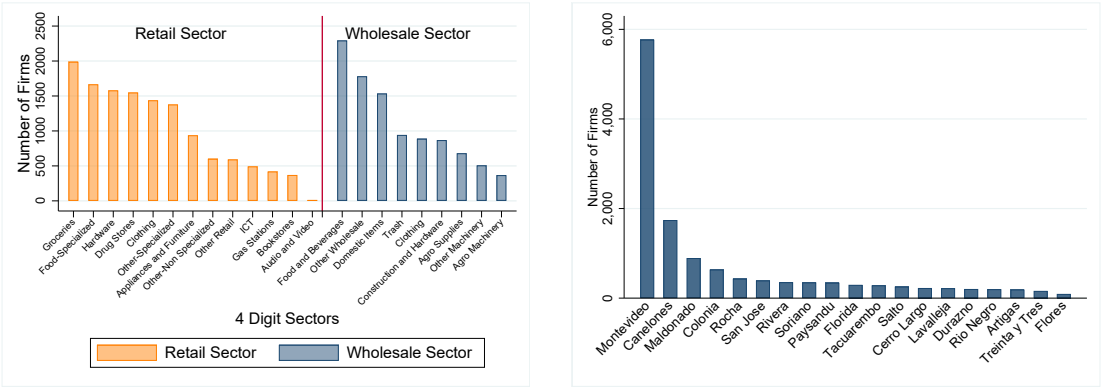
I. RD Point Estimates - Volume of Card Transactions



II. RD Point Estimates - Number of Card Transactions



III. Number of Firms

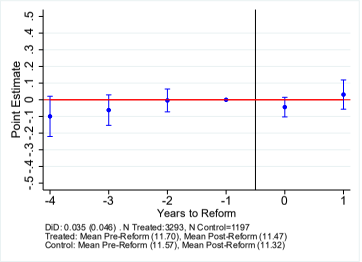


Notes: Panels A.I. and B.I. show variation in the size of the first stage effect (RD coefficient) for the volume of card transactions across 4-digit subsectors and across departments (among retailers). Panels A.II. and B.II. show variation in the size of the first stage effect (RD coefficient) for the number of card transactions. For context, Panels A.III. and B.III. show the number of firms by subsector and by department. This Figure is discussed in Section 4.4.

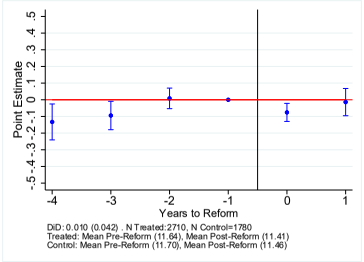
Figure C.5: The Impact of VAT Rebates on Tax Compliance
DiD Estimates Exploiting Variation in RD Estimates to Capture Treatment Status (1/2)

I. Across regions

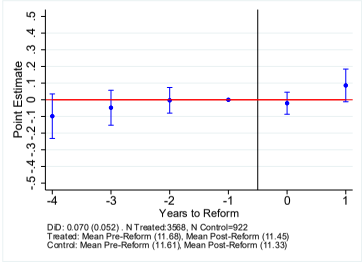
A. P50 sales



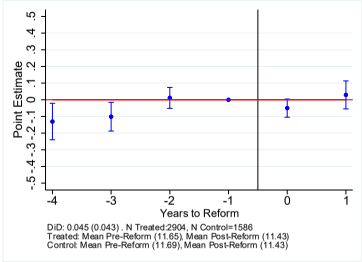
B. P75 sales



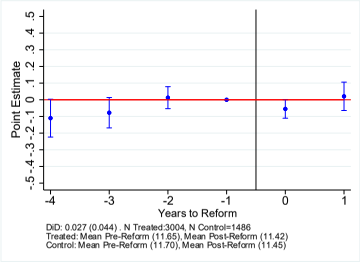
C. P50 N Transactions



D. P75 N Transactions

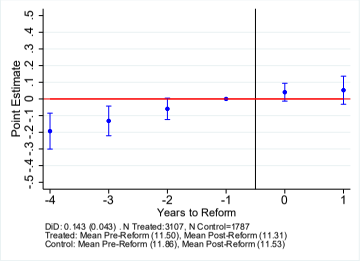


E. Montevideo

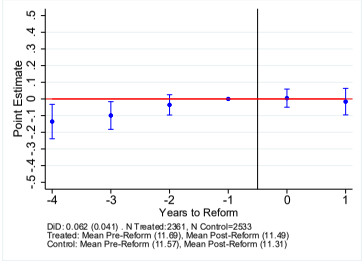


II. Across sectors

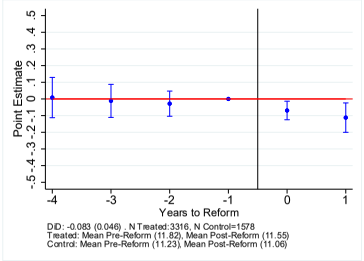
A. P50 sales



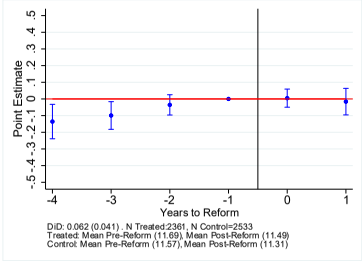
B. P75 sales



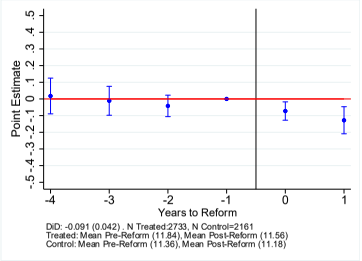
C. P50 N Transactions



D. P75 N Transactions



E. Significant RD Coefficient

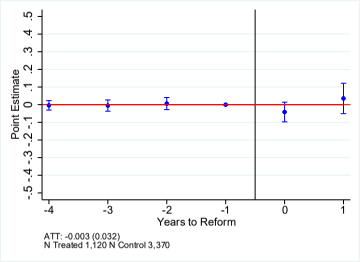


Notes: This figure shows event-study difference-in-difference estimates, comparing retailers with POS in regions (panel A) or subsectors (panel B) with high first stage estimates (treatment group) to retailers in regions/subsectors with low first stage estimates (control group). We run our main RD estimation for each retail subsector and each region with at least 50 firms. The sample division into high/low is indicated in the panel titles. For instance, in panel I.A., retailers in regions with an above-median RD jump in total card sales are considered as treated. In panels C. and D., the division depends on the RD jump in the number of card transactions. In panel I.E, we compared Montevideo (treated) to the rest of the country. In panel II.E., we compared sectors in which the RD coefficient is statistically significant to those in which it is not. The outcome variable is output VAT. This figure is discussed in Section 4.4.

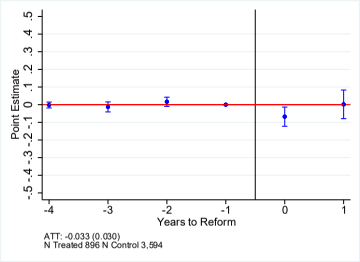
Figure C.6: The Impact of VAT Rebates on Tax Compliance
DiD Estimates Exploiting Variation in RD Estimates to Capture Treatment Status (2/2)

I. Across regions

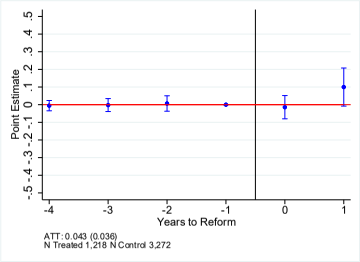
A. P50 sales



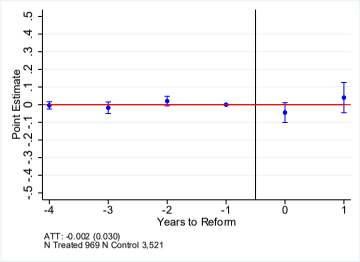
B. P75 sales



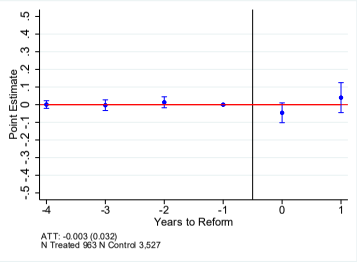
C. P50 N Transactions



D. P75 N Transactions

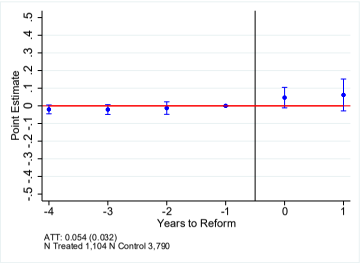


E. Montevideo

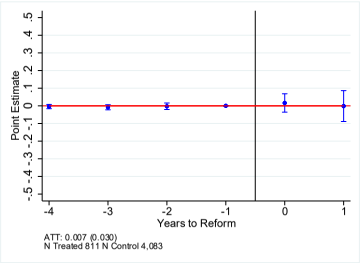


II. Across sectors

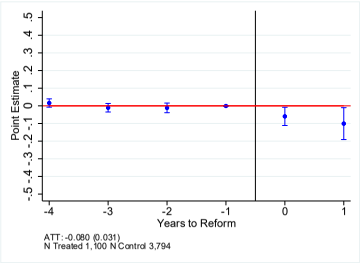
A. P50 sales



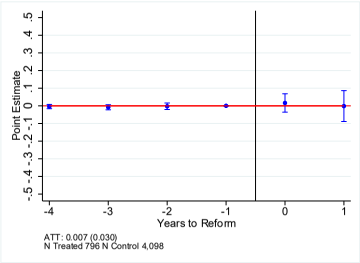
B. P75 sales



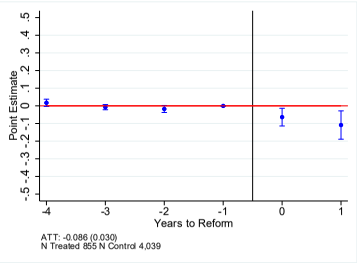
C. P50 N Transactions



D. P75 N Transactions



E. Significant RD Coefficient



Notes: This figure is identical to C.5, except that the estimates are based on the synthetic difference-in-difference estimation. This figure is discussed in Section 4.4.

Table C.8: The Effect of VAT Rebates on Tax Compliance
DiD Interaction with Size of the First Stage (RD Coefficient)

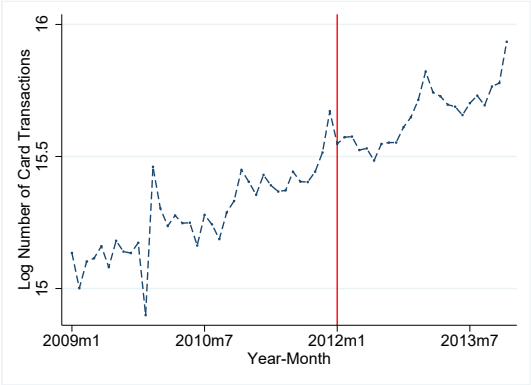
	Taxable Sales	Output VAT	Input VAT	Net Liability
	(1)	(2)	(3)	(4)
A. Interaction With Subsector-Level RD Coefficent for Volume of Card Transactions				
Post · Treated	-0.087	-0.078	-0.047	-0.023
	(0.069)	(0.057)	(0.080)	(0.076)
Post · (RD Coefficient> $p50$)	0.154	0.144	0.264	0.030
	(0.084)	(0.068)	(0.099)	(0.081)
Post · Treated · (RD Coefficient> $p50$)	0.017	0.012	-0.089	0.192
	(0.100)	(0.082)	(0.116)	(0.107)
B. Interaction With Subsector-Level RD Coefficent for Number of Card Transactions				
Post · Treated	0.087	0.085	0.082	0.228
	(0.072)	(0.059)	(0.085)	(0.082)
Post · (RD Coefficient> $p50$)	0.209	0.188	0.262	0.182
	(0.085)	(0.069)	(0.100)	(0.082)
Post · Treated · (RD Coefficient> $p50$)	-0.281	-0.264	-0.302	-0.257
	(0.103)	(0.085)	(0.120)	(0.111)
C. Interaction With Region-Level RD Coefficent for Volume of Card Transactions				
Post · Treated	-0.032	-0.003	0.036	0.139
	(0.117)	(0.094)	(0.138)	(0.123)
Post · (RD Coefficient> $p50$)	0.020	0.066	0.079	0.079
	(0.115)	(0.092)	(0.137)	(0.111)
Post · Treated · (RD Coefficient> $p50$)	-0.021	-0.047	-0.111	-0.036
	(0.129)	(0.104)	(0.152)	(0.136)
D. Interaction With Region-Level RD Coefficent for Number of Card Transactions				
Post · Treated	-0.196	-0.159	-0.107	0.051
	(0.136)	(0.110)	(0.158)	(0.144)
Post · (RD Coefficient> $p50$)	-0.114	-0.072	-0.043	-0.028
	(0.130)	(0.105)	(0.154)	(0.126)
Post · Treated · (RD Coefficient> $p50$)	0.167	0.131	0.058	0.060
	(0.146)	(0.118)	(0.170)	(0.154)
N Treated	4,985	4,985	4,985	4,985
N Control	6,118	6,118	6,118	6,118

Notes: This table presents estimates of the DiD-interaction specification in Equation C.1. The panel titles indicate which RD coefficient we use to construct the interaction dummy. The percentiles are constructed across retail subsectors and across wholesale subsectors separately. Everything else is as in Table 1. This table is discussed in Section 4.4.

D Interpretation and Policy Implications Appendix

Figure D.1: The Impact of Reductions in Commission Fees and Tax Withholding Rates On The Use of Electronic Payment Technology

A. Number of Card Transactions

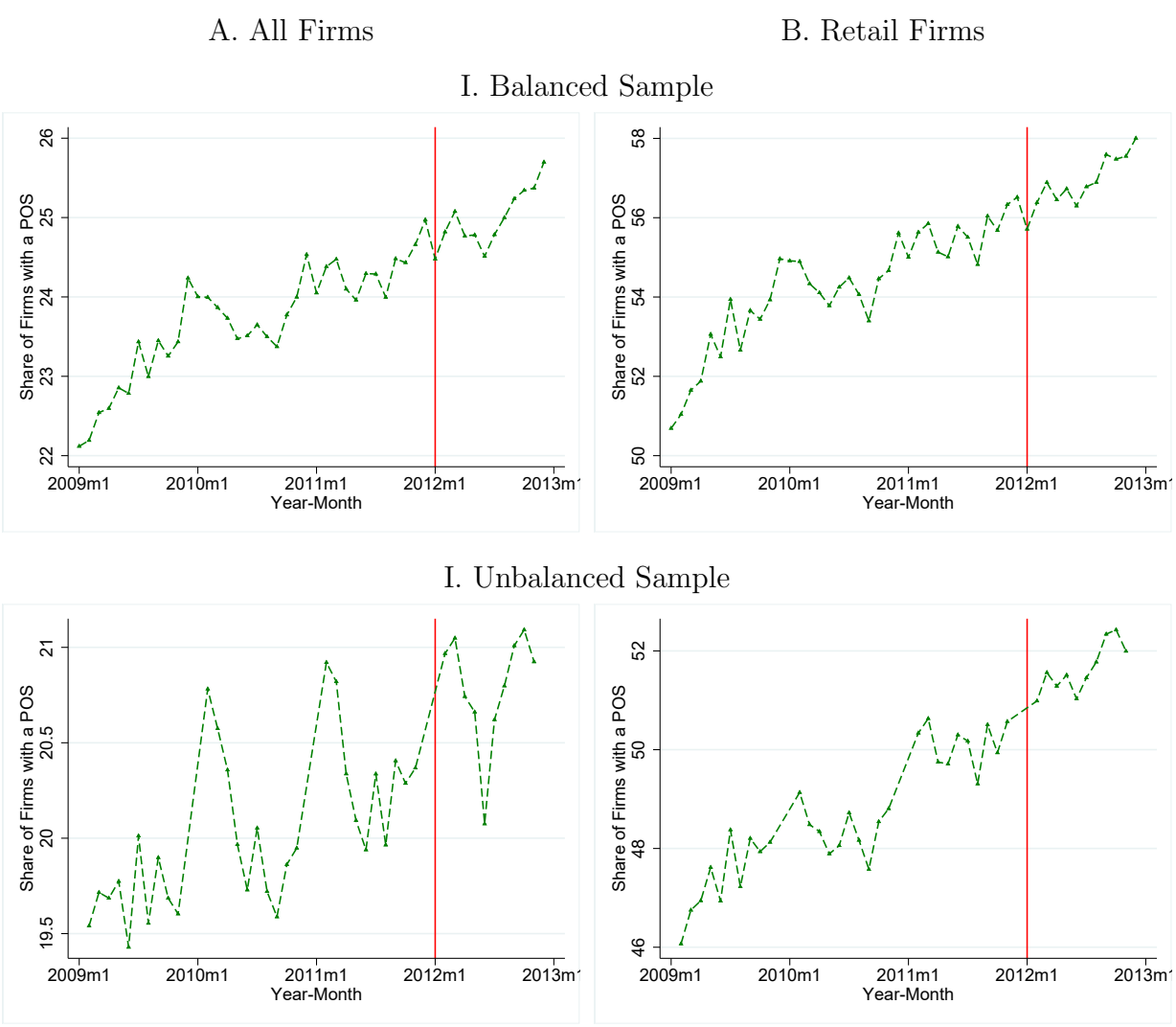


B. Volume of Card Transactions

C. Number of POS

Notes: These graphs are similar to those in Figure 1, Panel A, displaying time series aggregates, as per the panel titles. The vertical line marks January 2012, when withholding rates applied by credit/debit card companies were reduced (see Figure A.8) and commissions charged by credit/debit card companies were lowered (see Section 2.3). This figure is discussed in Section 5.

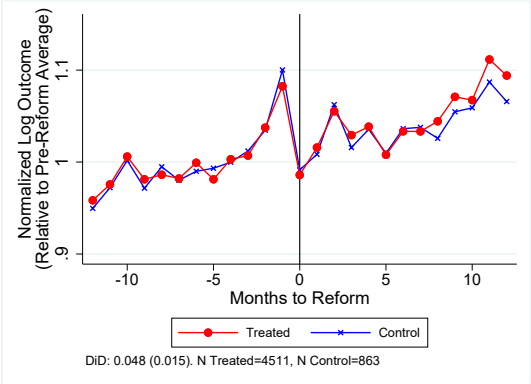
Figure D.2: The Impact of Reductions in Commission Fees and Tax Withholding Rates On The Share of Firms with a POS Around January 2012



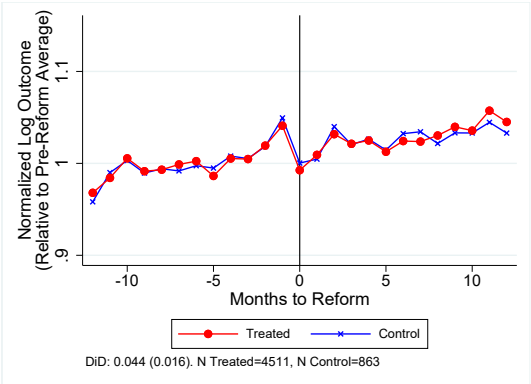
Notes: This figure plots the share of firms that had a POS around January 2012, when withholding rates applied by credit/debit card companies were reduced (see Figure A.8) and commissions charged by credit/debit card companies were lowered (see Section 2.3). In the unbalanced sample, we omit the months of December and January each year to avoid outliers, which arise from the fact that many firms file in only these months. This figure is discussed in Section 5.

Figure D.3: The Impact of Reductions in Commission Fees and Tax Withholding Rates
Difference-in-Difference Estimation on Monthly Data

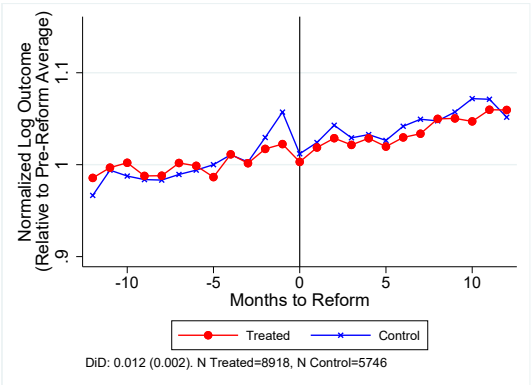
A. Number of Card Transactions



B. Volume of Card Transactions

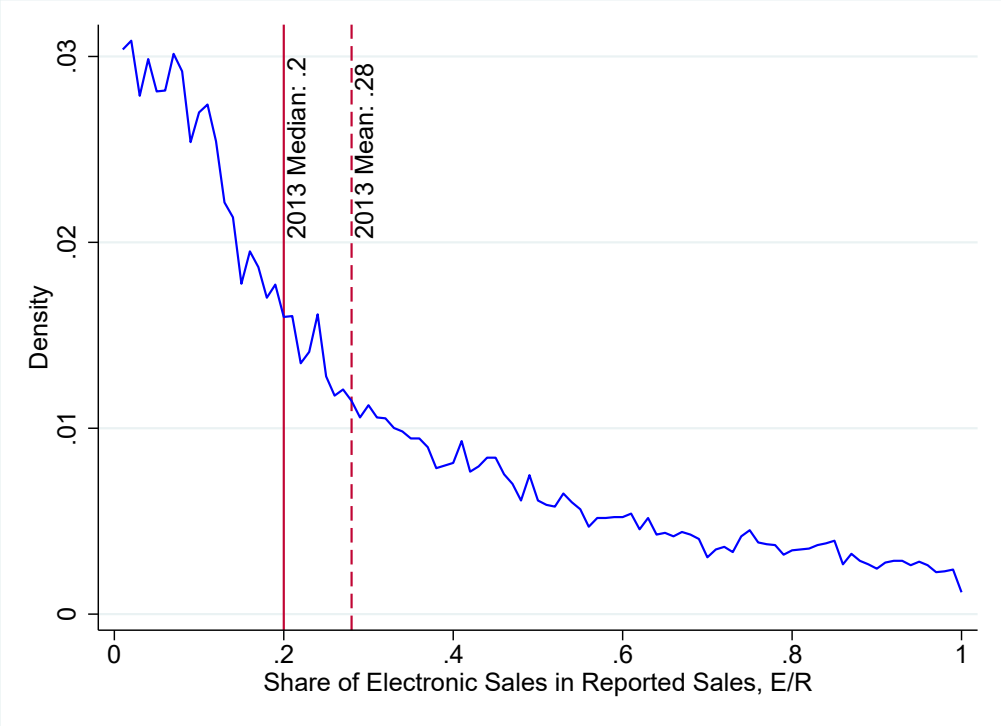


C. Having a POS



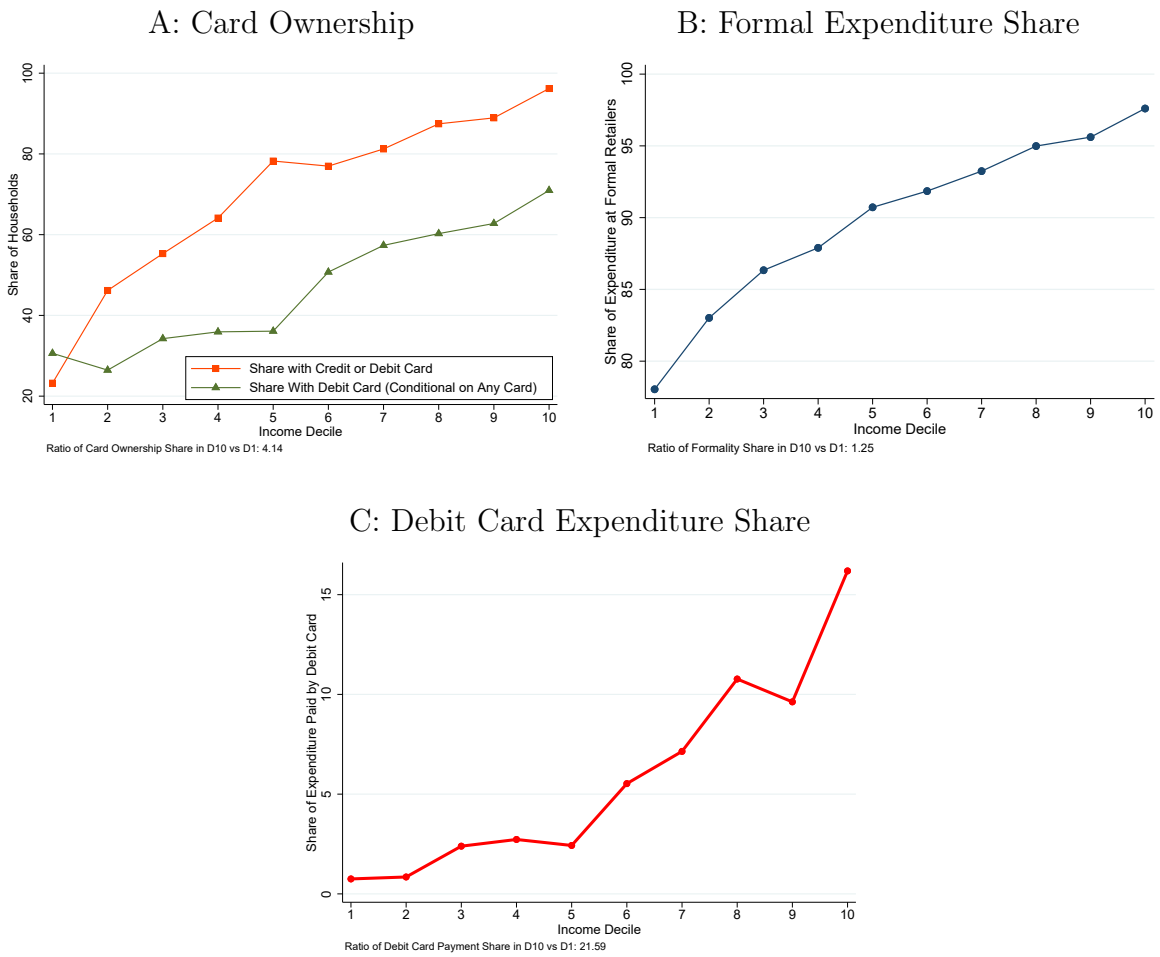
Notes: These graphs implement a difference-in-difference estimation similar to the one from Section 4.1, equation 2, on monthly data. We retain all firms that have card transactions at least once per quarter during 2011q1-2013q1. The post-reform period for the difference-in-difference estimation starts in January 2012, when withholding rates applied by credit/debit card companies on card purchases from non-CEDE firms were reduced (see Figure A.8) and commissions charged by credit/debit card companies were lowered (see Section 2.3). The outcome is the log of the volume/number of card transactions in panels A and B. We deal with zeros in the outcome in the same way as we do in the main difference-in-difference analysis, by valuing an extension margin change from zero to the minimum non-zero value the same as a 10 percent increase on the intensive margin. The outcome in panel C is a dummy for having a POS. This figure is discussed in Section 5.1.

Figure D.4: Share of Card Sales in Reported Sales in Costa Rica



Notes: This is similar to Figure 4, Panel C, but shows the share of card sales reported sales in Costa Rica, using firm-level sales tax records and card payment records (DGT Costa Rica, 2013). In Costa Rica, as in Uruguay, credit and debit card companies report all card sales to the government and remit a small fraction of the transaction amount as advance tax payment.

Figure D.5: Statistics Informing the Distributional Impact of VAT Rebates

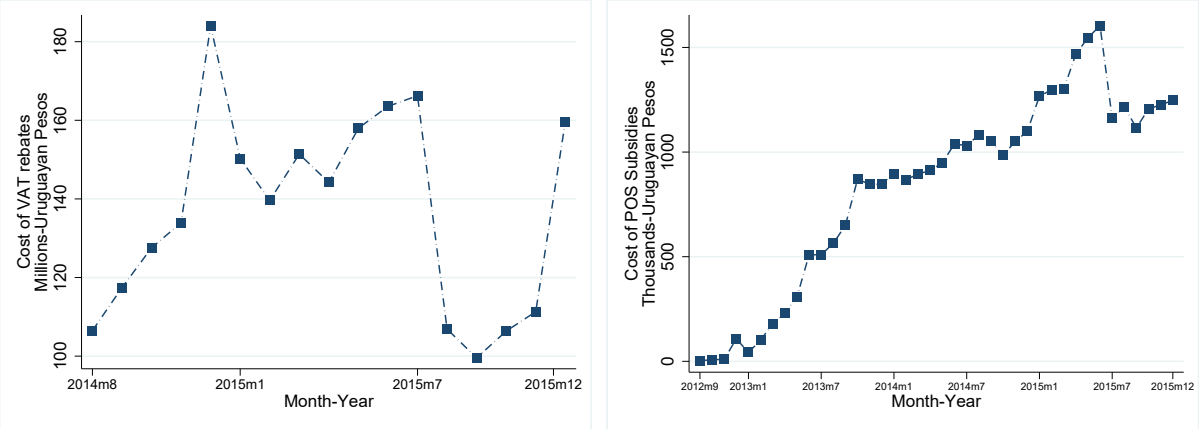


Notes: Panel A shows the share of households that have a credit or debit card, and the share of households that have a debit card, conditional on having any card. Panel B shows the share of household expenditure at formal retailers, using the 2005-2006 Household Income and Expenditure Survey (National Institute of Statistics, 2005-2006) and following the methodology in Bachas et al. (2023) to categorize retailers as formal and informal. Panel C shows the share of household expenditure that is paid for by debit card. The share of debit card payments is approximated from categorical data that allows respondents to choose between 0-25%, 25-50%, 50-75% and 75-100%. For each response category, we impute the maximum of the range as the value. We impute a zero share for households that do not have a debit card. We then average across households within each income decile. Panels A and C are based on the Household Finance Survey 2014 (National Institute of Statistics, 2014). This figure is discussed in Section 6.2.

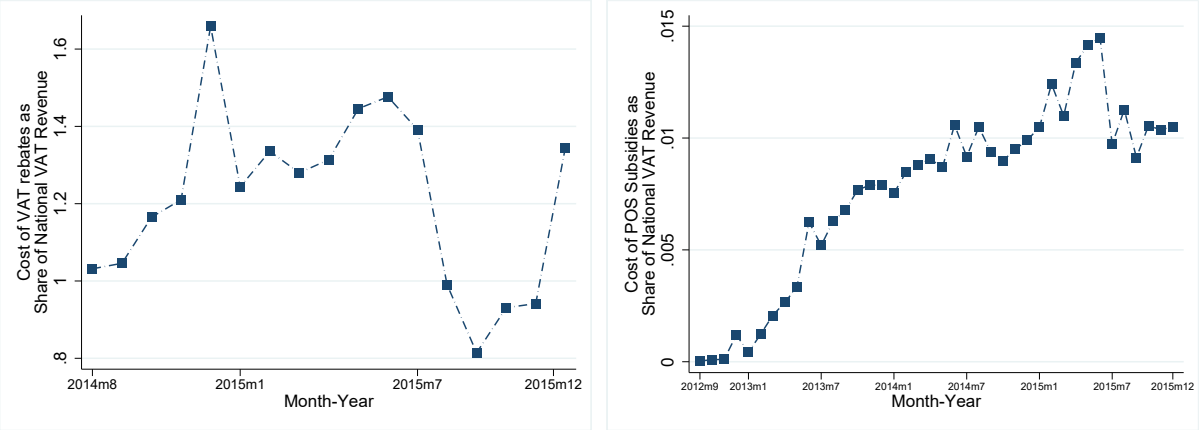
Figure D.6: The Cost of VAT Rebates and POS Subsidies

A. VAT Rebates B. POS Subsidies

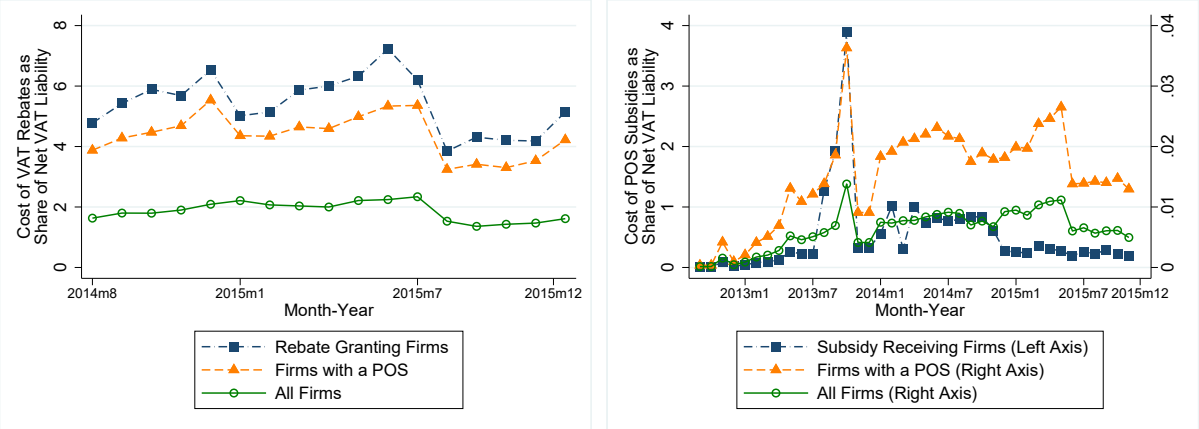
I. Nominal Cost



II. Cost as Share of Total VAT Revenue



III. Cost as Share of VAT Liability



Notes: This figure examines the cost of the VAT rebates and POS subsidies. Panel A1 plots the nominal cost (in millions or Uruguayan pesos) of the VAT rebates. Panel A2 plots the cost of the rebates as a share of total VAT revenue (extracted from dgi.gob). Total VAT revenue includes domestic VAT revenue and VAT collected at customs. Panel A3 plots the cost of the VAT rebates of VAT-filing-firms relative to the net VAT liability of three different groups of firms, as per the labels. Panel B displays similar measures for the POS subsidies. For panel B, the values for November and December 2013 are an average over the two months, as we observe no subsidy payments in December 2013, and a disproportionately high number in November, suggesting that December payments were erroneously recorded in November. This figure is mentioned in the conclusion, Section 7.

E POS Adoption Appendix

This section analyzes the characteristics of firms with and without a POS, the predictors of POS adoption, and the association between POS adoption and tax compliance outcomes. Table E.1 compares firms with a POS and those without POS in 2013, finding that firms with a POS are larger, older and have more branches, report a higher VAT liability, are more likely to be in retail, hotels and restaurants and less likely to be in services. Table E.2 shows that the same differences in terms of size, age and VAT liability between firms with and without POS also hold within the retail sector. Retail firms with a POS are also found to pay a higher effective tax rate, defined as the net VAT liability divided by sales.

In Table E.3, we present the results of a Cox hazard model to predict POS adoption, treating adoption as an absorbing state. Consistent with the descriptive statistics, the likelihood of POS adoption is significantly increasing in firm size as measured by turnover and the number of branches, firm location in the capital city, and sector (especially retail, hotels and restaurants).

Finally, in Table E.4, we show results of panel regressions linking changes in firm reporting behavior to POS adoption, controlling for firm fixed effects and year effects that we allow to vary by deciles of base-year turnover. The analysis suggests that POS adoption is associated with significant increases in reported output VAT, input VAT, net VAT and in the likelihood of reporting a positive net VAT liability.

This appendix is mentioned in Section 5.1 in the paper.

Table E.1: Comparing the Characteristics of Firms With and Without a POS

	POS Terminal	No POS Terminal	Difference	P-value
Log(Turnover+1)	15.33	10.39	4.946	[0.000]
Log(Output VAT+1)	13.80	8.51	5.292	[0.000]
Log(Input VAT+1)	13.50	8.14	5.354	[0.000]
Log(Net Liability+1)	11.08	7.08	4.004	[0.000]
Positive Liability	0.88	0.58	0.302	[0.000]
Effective Tax Rate	0.10	0.10	-0.002	[0.276]
Branches	2.72	1.61	1.107	[0.000]
Firm Age	15.32	12.86	2.455	[0.000]
Retail	0.48	0.09	0.388	[0.000]
Wholesale	0.11	0.12	-0.007	[0.016]
Construction	0.01	0.02	-0.014	[0.000]
Hotels and Restaurants	0.08	0.02	0.061	[0.000]
Finance	0.00	0.02	-0.016	[0.000]
Entretaiment	0.01	0.00	0.001	[0.019]
Other Services	0.14	0.51	-0.368	[0.000]
All Other Sectors	0.17	0.22	-0.045	[0.000]
CEDE Status	0.02	0.06	-0.047	[0.000]
N	14,199	70,028		

Notes: This table compares the characteristics of firms with and without a POS, in 2013. Columns 1 and 2 show means for the two groups, column 3 shows the difference and column 4 shows the p-value on the difference.

Table E.2: Comparing the Characteristics of Firms With and Without a POS: Retail Sector Firms

	POS Terminal	No POS Terminal	Difference	P-value
Log(Turnover+1)	15.46	13.35	2.106	[0.000]
Log(Output VAT+1)	13.83	10.84	2.991	[0.000]
Log(Input VAT+1)	13.65	10.65	3.000	[0.000]
Log(Net Liability+1)	10.81	8.16	2.648	[0.000]
Positive Liability	0.88	0.73	0.155	[0.000]
Effective Tax Rate	0.05	0.04	0.009	[0.000]
Branches	2.44	1.39	1.056	[0.000]
Firm Age	15.32	12.60	2.717	[0.000]
CEDE Status	0.01	0.04	-0.036	[0.000]
N	6,774	6,253		

Notes: This table is similar to Table E.1, except that we here focus on retail sector firms only.

Table E.3: Predicting POS Adoption Via a Cox Hazard Model

	Hazard Ratio	Coefficient
Log(Turnover+1)	1.173	0.159
	(0.007)	(0.006)
N Branches	1.012	0.012
	(0.003)	(0.003)
Montevideo	1.460	0.379
	(0.039)	(0.027)
Age	1.004	0.004
	(0.001)	(0.001)
CEDE	0.158	-1.848
	(0.014)	(0.086)
Retail	2.288	0.828
	(0.084)	(0.037)
Wholesale	1.326	0.282
	(0.059)	(0.044)
Hotel and Restaurants	1.717	0.540
	(0.112)	(0.065)
Entretaiment	1.160	0.148
	(0.233)	(0.201)
Construction	0.812	-0.208
	(0.124)	(0.153)
Finance	0.238	-1.433
	(0.071)	(0.296)
Other Services	0.704	-0.351
	(0.032)	(0.046)
N	10,030	10,030

Notes: This table presents the results of a Cox proportional hazard model predicting POS adoption between 2007 and 2016, considering the first POS adoption for a firm as an absorbing state. We deal with zeros in turnover in the same way as we do in the main difference-in-difference analysis, i.e. by valuing an extension margin change from zero to the minimum non-zero value the same as a 10 percent increase on the intensive margin.

Table E.4: Panel Analysis of POS Adoption and Tax Compliance

(a) All Firms

	Log Output VAT	Log Input VAT	Positive Liability	Net Liability	ETR
Has POS Terminal	0.80	1.24	0.06	1.24	0.02
	0.012	0.022	0.002	0.035	0.004
Mean	8.469	12.191	0.641	0.095	
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Turnover Control FE	Yes	Yes	Yes	Yes	Yes
N Treated	14,711	14,706	14,711	14,711	15,429
N Control	102,865	102,863	102,866	102,866	74,085

(b) Retail Firms

	Log Output VAT	Log Input VAT	Positive Liability	Net Liability	ETR
Has POS Terminal	0.60	0.84	0.04	0.92	0.00
	0.016	0.029	0.004	0.068	0.001
Mean	11.003	16.046	0.804	0.046	
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Turnover Control FE	Yes	Yes	Yes	Yes	Yes
N Treated	7,207	7,204	7,207	7,207	7,438
N Control	10,797	10,796	10,797	10,797	9,786

Notes: This table displays the results of panel regressions relating various tax compliance outcomes (column titles) to POS adoption. We deal with zeros in the outcome in the same way as we do in the main difference-in-difference analysis, by valuing an extension margin change from zero to the minimum non-zero value the same as a 10 percent increase on the intensive margin. The key independent variable is a dummy that switches on once the firm adoptions a POS. The regressions control for firm FE and year FE interacted with base year turnover decile indicators. The dataset is an unbalanced panel of firms between 2007 and 2016.