IRS Research, Applied Analytics, and Statistics

TPC TAX POLICY CENTER
URBAN INSTITUTE & BROOKINGS INSTITUTION

9TH ANNUAL IRS/TPC JOINT RESEARCH CONFERENCE ON TAX ADMINISTRATION

#LiveAtUrban

9th Annual IRS/TPC Joint Research Conference on Tax Administration

Welcome

Eric Toder	Institute Fellow, Urban Institute, and Codirector, Urban-Brookings Tax Policy Center
Barry Johnson	Acting Chief Research and Analytics Officer, IRS
Chuck Rettig	Commissioner of Internal Revenue

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Session 1. Estimating the Effects of Tax Administration on Compliance

Moderator:	***Robert McClelland*** *Urban-Brookings Tax Policy Center*
Estimating the Specific Indirect Effect for Multiple Types of Correspondence Audits	***Lucia Lykke*** *MITRE Corporation*
Enforcement vs. Outreach – Impacts on Tax Filing Compliance	***Anne Herlache*** *IRS:RAAS*
Assessing the Impact of Exchange of Information	***Pierce O'Reilly*** *OECD*
Discussant:	***Michael Udell*** *District Economics Group*

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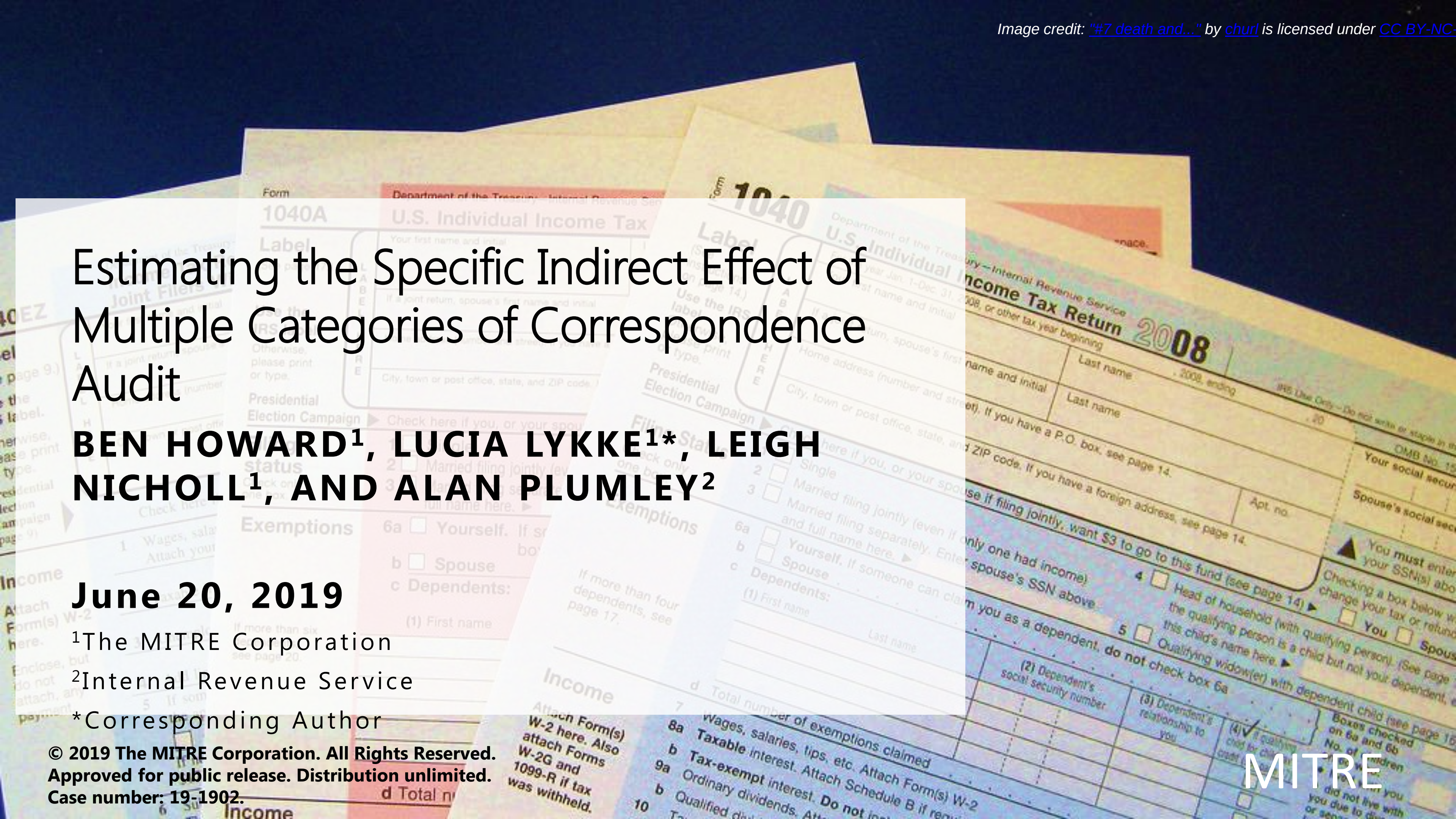


Image credit: "#7 death and..." by churl is licensed under CC BY-NC

Estimating the Specific Indirect Effect of Multiple Categories of Correspondence Audit

BEN HOWARD[1], LUCIA LYKKE[1]*, LEIGH NICHOLL[1], AND ALAN PLUMLEY[2]

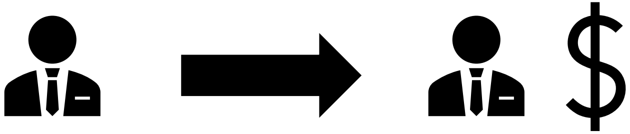
June 20, 2019

[1]The MITRE Corporation
[2]Internal Revenue Service
*Corresponding Author

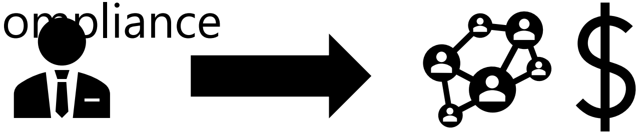
What is the indirect effect of tax enforcement?

TWO TYPES OF INDIRECT EFFECT

Specific Indirect Effect
Experiencing an enforcement activity increases subsequent year compliance for that taxpayer



General Indirect Effect
When taxpayers experience an enforcement activity, other taxpayers around them will increase compliance



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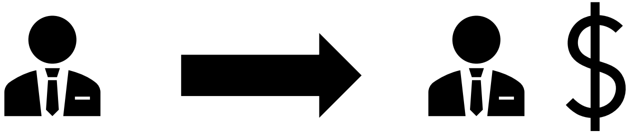

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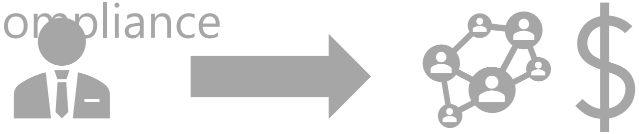


Research Objectives

Investigate whether audited taxpayers differ in their contributions to IRS revenue over time compared to unaudited taxpayers.

Explore whether these trends vary by category of audit.

Implications for IRS resource allocation decisions

Background

- **Evidence** for specific indirect effect seen in both random (NRP) and operational U.S. taxpayer data
  - Experiencing an NRP audit is associated with a 1.2% increase in **wage income** reporting and a 14.2% increase in **self-employment income** (DeBacker at al. 2015)
  - Audited taxpayers who were assessed an adjustment increased Schedule C net profit and taxable income reporting (Beer 2015)

- **Attenuation** of indirect effect ~3-5 years after audit (DeBacker et al. 2015; Beer 2015; Datta et al. 2015; Nestor and Beers 2014)

Background, continued

- Does the **type of population** audited or **characteristics** of the audit matter?
  - Evidence that **self-employment income** is more sensitive to indirect effects than other types of income, including wage income and Schedule D income (DeBacker et al. 2015; Kleven et al. 2011)
  - Audits focused on **Earned Income Tax Credit (EITC)** claimants and **nonfilers** show evidence of indirect compliance effects (Datta et al. 2015; Guyton et al. 2018)

Operational Context

We examine three categories of correspondence (mail) audit

Each has different operational eligibility and selection criteria

Audit Category 1

Examines some **Schedule C expenses** among taxpayers who file a Schedule C and meet other category-specific eligibility criteria.

Audit Category 2

Examines some **Schedule A deductions** among taxpayers who itemize deductions and meet other category-specific eligibility criteria.

Audit Category 3

Examines **Schedule SE (self-employment tax)** among taxpayers who meet other category-specific eligibility criteria.

Prioritization methods: Each audit category relies on different metrics to prioritize which returns to audit. These are known to us and used as control variables to account for selection into the audited "treatment" versus unaudited "control" group.

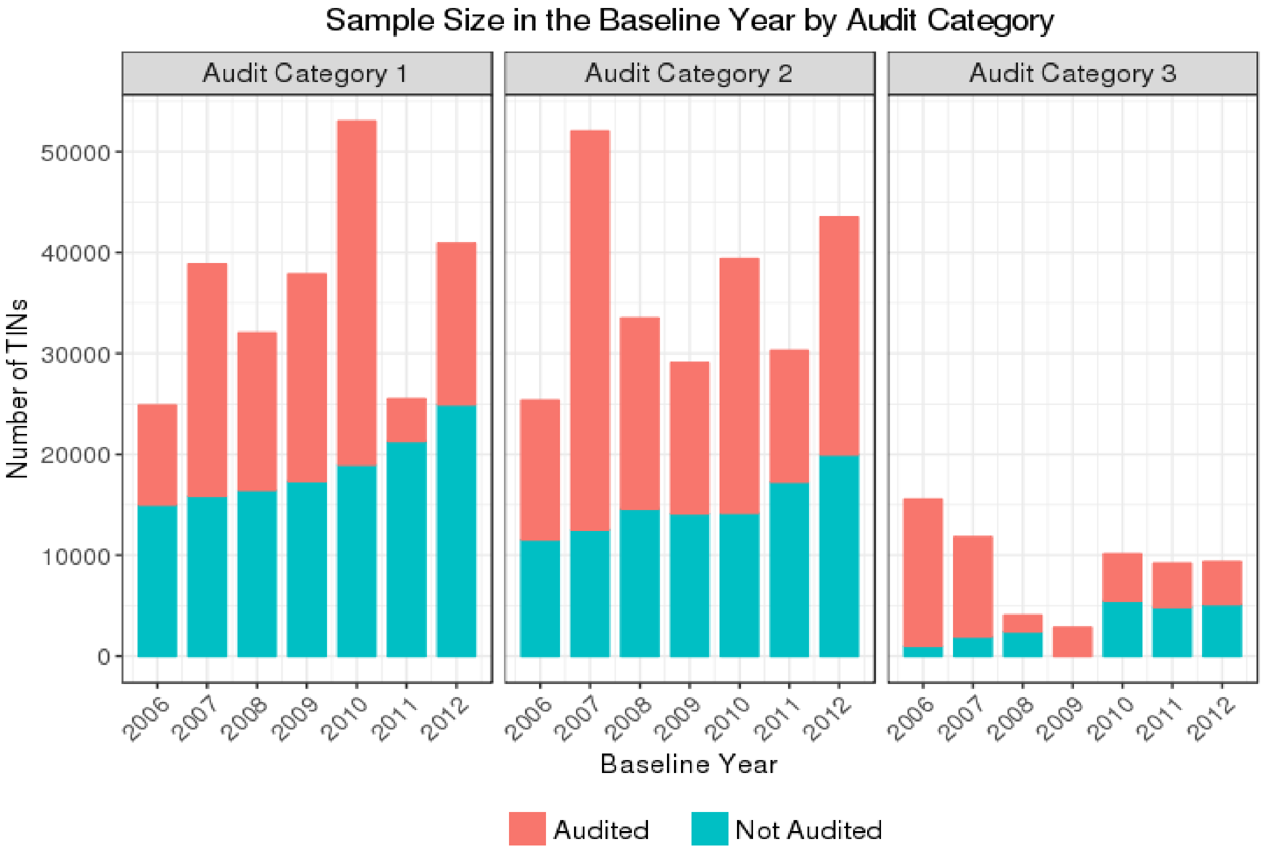
Analytical Sample

TWO GROUPS:

1. Audited
2. Not Audited, Eligible

- Primary Taxpayer Identification Number (TIN) data drawn from Compliance Data Warehouse (CDW) for **Tax Years (TY) 2006-2018**
  - **Audited group**: All primary TINs audited under audit categories 1, 2, or 3 for returns filed in TYs 2006 through 2012
  - **Eligible/not audited group**: Random sample of up to 25,000 TINs/year who met the eligibility requirements for the audit category for TYs 2006 through 2012
  - Reporting on subsequent F1040, Schedule A, Schedule C, and Schedule SE tracked for both groups for **up to eight TYs** after baseline
- Baseline year = TY taxpayer entered the sample, due to audit or eligibility

Sample Size by Tax Year (2006-2012)



- Variation in size of audit categories
- Variation in audit volume year over year within audit categories

Linear Mixed Effects Model 1 (Total Tax)

$$\ln(\text{total tax} + 1)_{ij} = \beta_0 + \beta_1 priority_i + \beta_2 audited_i + \beta_3 year.after.baseline_{ij} + \beta_4 audited_i * year.after.baseline_{ij} + \beta_k C_k + \epsilon_{ij}$$

Where

- *C* represents time-varying control variables filing status, tax year, and AGI
- *i* = 1, ..., n taxpayer
- *j* = 0, …, t years after baseline
- Random intercept for taxpayer included

**All dollar amounts are adjusted for inflation to 2018 USD*

Linear Mixed Effects Model 2 (Audit-specific relevant items)

$$\ln(\sum \text{relevant items} + 1\ )_{ij}$$

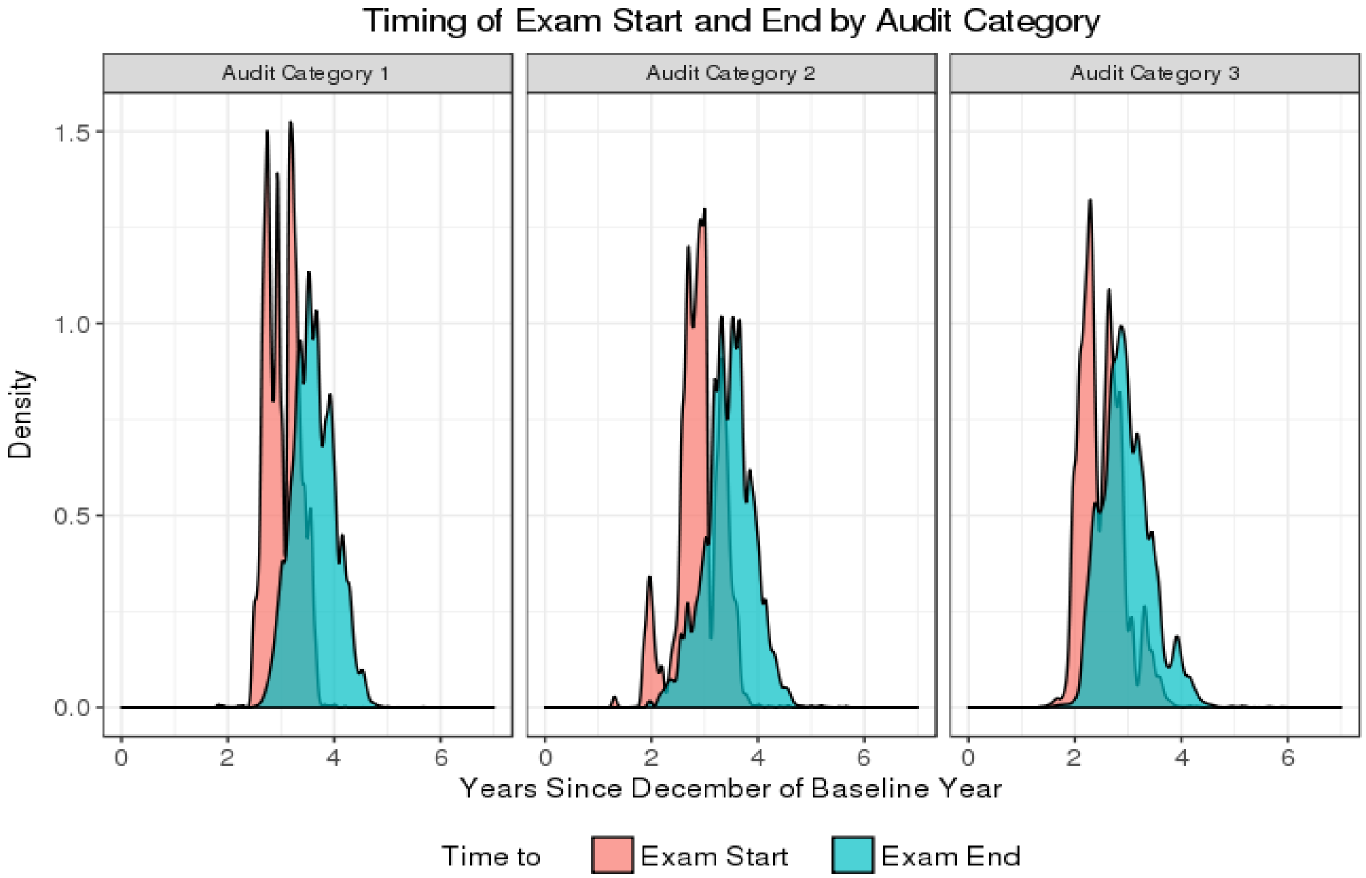
$$= \beta_0 + \ \beta_1 audited_i + \beta_2 year.after.baseline_{ij} + \beta_3 audited_i * year.after.baseline_{ij} + \ \beta_k C_k + \ \epsilon_{ij}$$

Where

- *C* represents time-varying control variables filing status, tax year, and AGI
- *i* = 1, ..., n taxpayer
- *j* = 0, …, t years after baseline
- Random intercept for taxpayer included

**All dollar amounts are adjusted for inflation to 2018 USD*

Timing of Audits



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Results

TOTAL TAX MODELS

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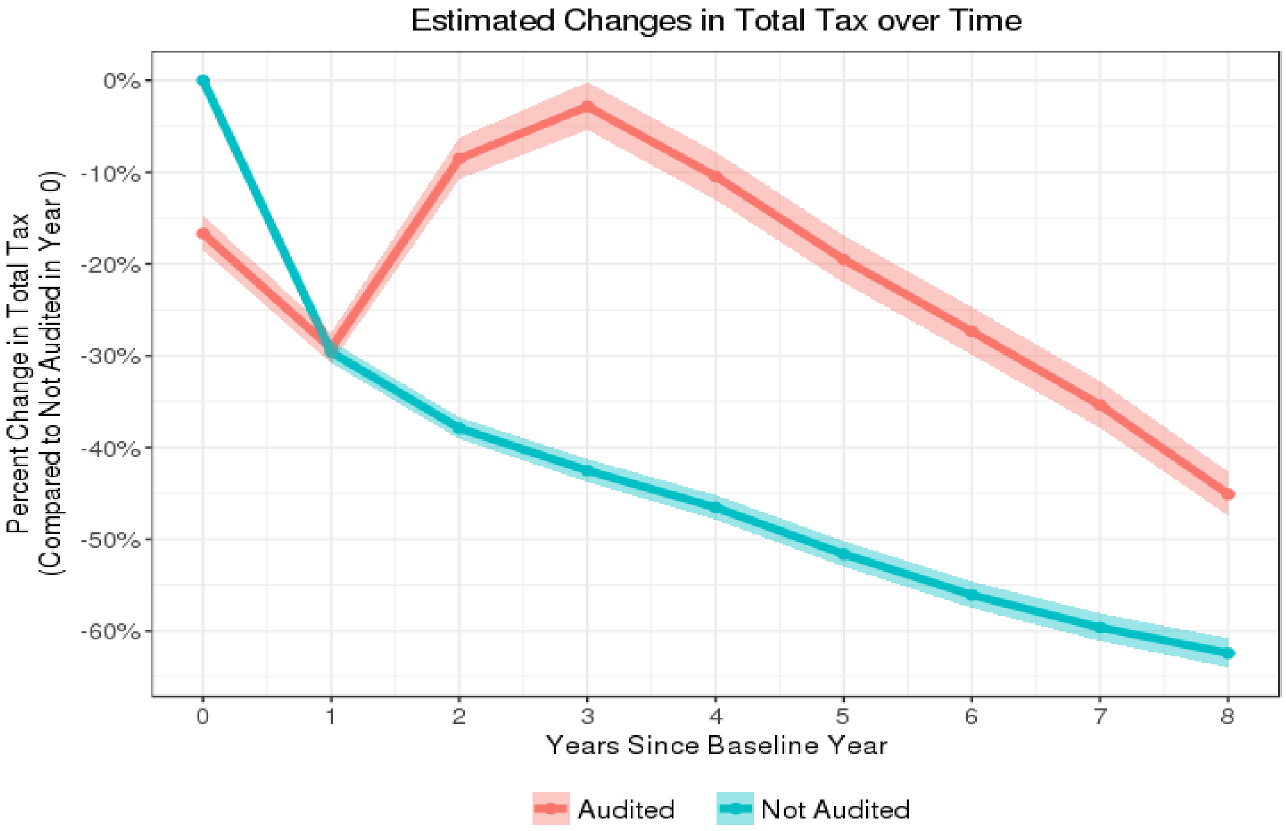
Results: Predicted Total Tax, Audit Category 1



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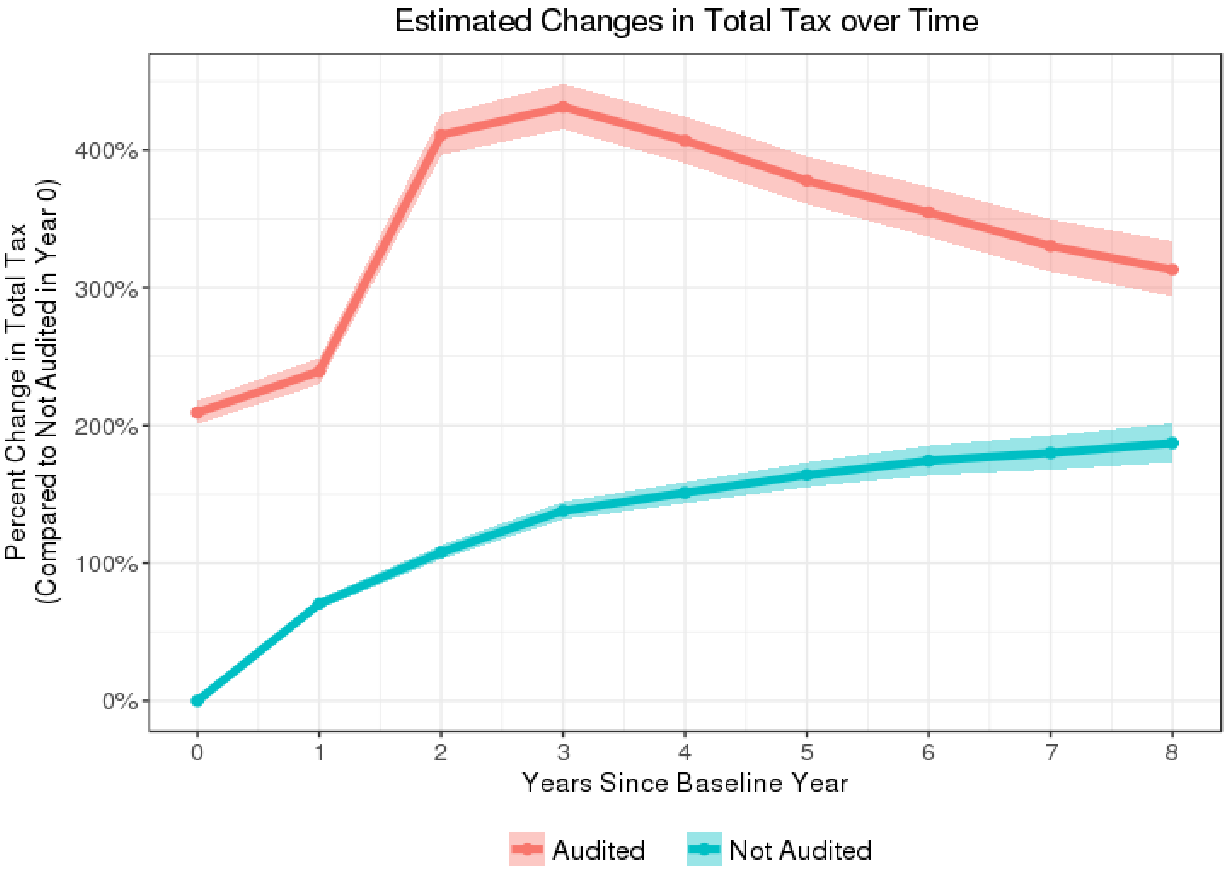
Results: Predicted Total Tax, Audit Category 2



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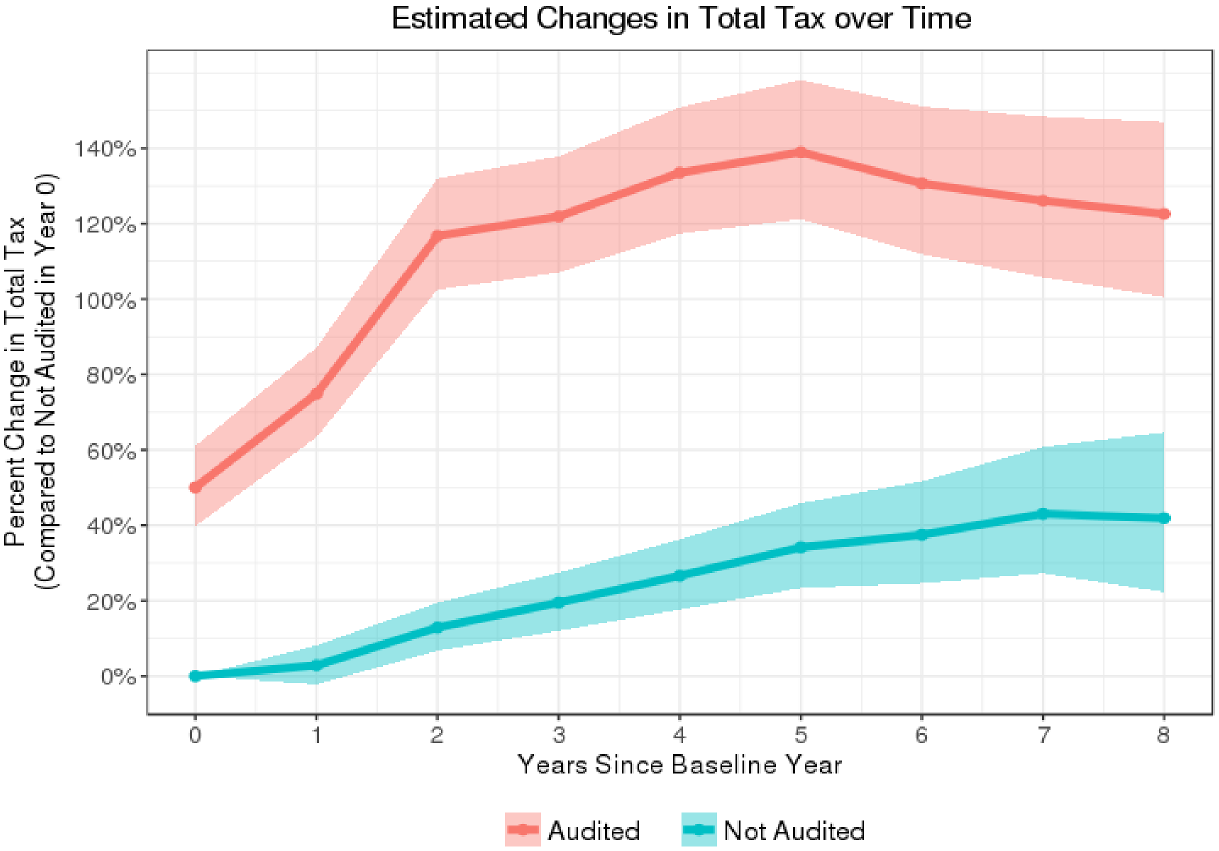
Results: Predicted Total Tax, Audit Category 3



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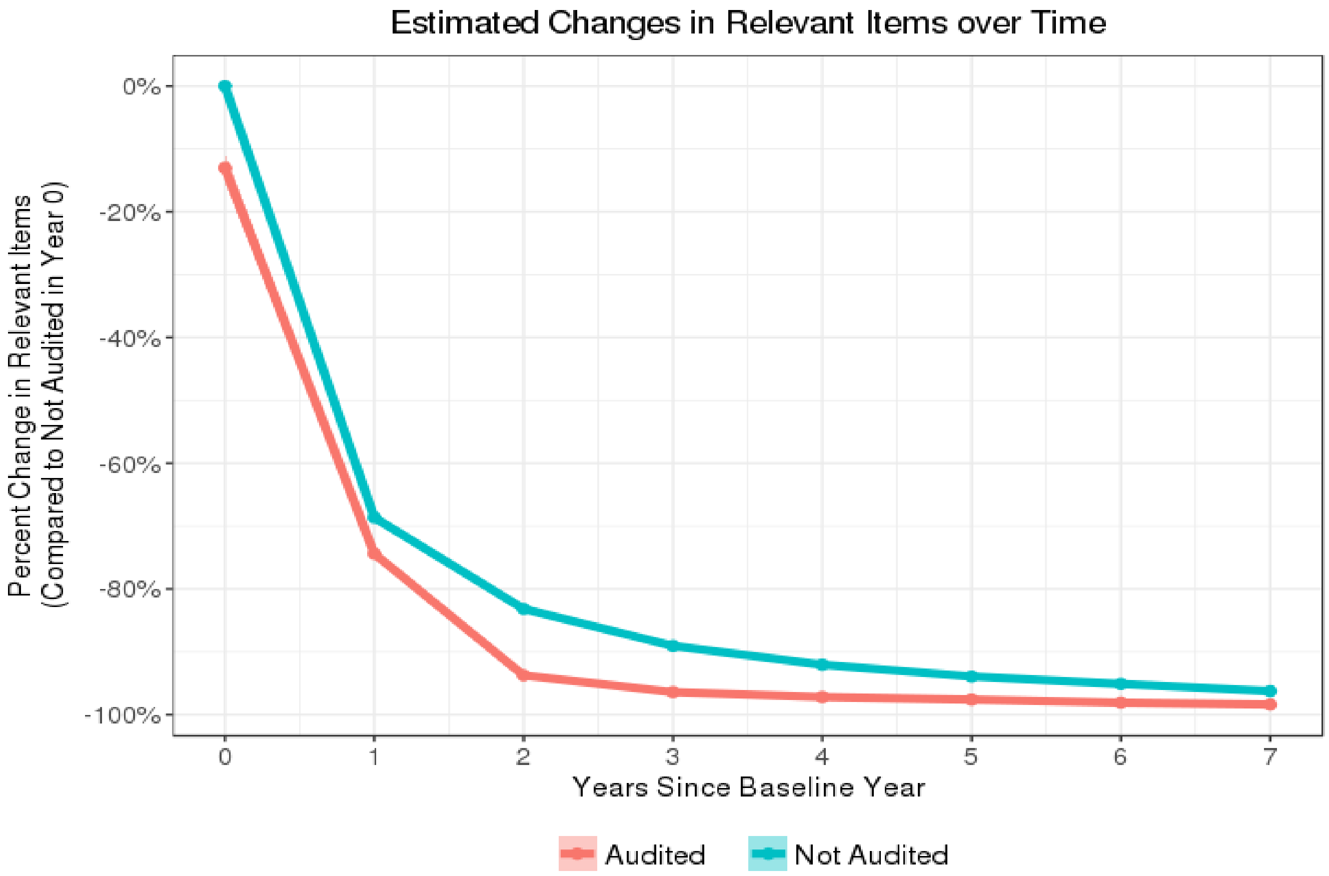
Results

RELEVANT LINE ITEM MODELS, AUDIT CATEGORIES 2 & 3

Predicted Sum of Schedule A Items, Audit Category 2



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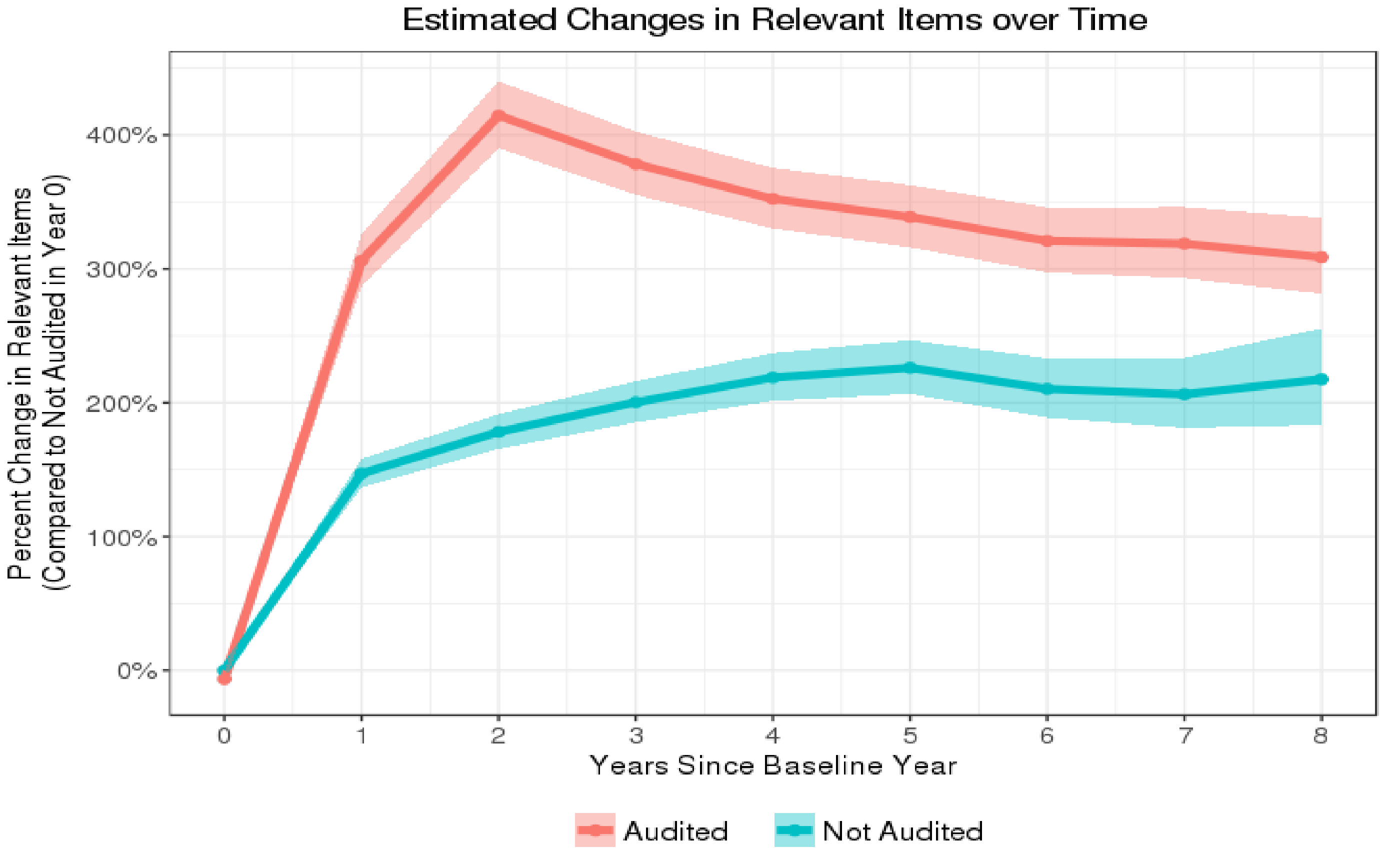
Predicted Self-Employment Tax, Audit Category 3



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Conclusions

DISCUSSION, LIMITATIONS, FUTURE WORK

Discussion

- Evidence of indirect effect on **total tax** reporting observed for three audit categories with **attenuation** after roughly year 3
- Audited and unaudited populations show **different baseline characteristics**
- Specific indirect effect is observed on reporting of **self-employment tax** (audit category 3)
- Some evidence of specific indirect effect on **Schedule A deduction** reporting (audit category 2)

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Discussion

- Audit category 1 (Schedule C expenses) suggests **different shape** to the total tax trajectory - total tax trajectories for audit and control groups cross, then diverge
- Audit category 2 (Schedule A deductions) shows **largest magnitude** of total tax reporting changes among audited group
- Evidence for indirect effect on specific line item reporting is less clear, and **differs by audit category**
    - Some evidence that audit category 2 taxpayers decrease deduction reporting more than control group between years 1-2
    - Strongest evidence for audit category 3 – may indicate taxpayers have been **“educated”** on self-employment tax reporting

Implications

- Results suggest that indirect effects may **vary in magnitude and trend** for different categories of audit; implications for **IRS resource allocation decisions**

Limitations

- Audited and not audited population **differ in their underlying characteristics**, even after accounting for **eligibility and prioritization**
- Eligibility and prioritization criteria may have shifted over the past few years, or some returns may have been excluded for audit

Future Research

- Incorporate **additional control variables** that may be correlated with prioritization; **sensitivity testing** with alternative methods to handle selection bias
- Expand to **more categories** of correspondence audit, and other types of audit (e.g., Field audits)
- **Experimentation** underway for one audit category

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References

Beer, Sebastian, Mathias Kasper, Erich Kirchler, and Brian Erard. 2015. "Audit Impact Study." TAS Research and Related Studies 2. https://taxpayeradvocate.irs.gov/Media/Default/Documents/2015ARC/ARC15_Volume2_3-AuditImpact.pdf.

Datta, Saurabh, Stacy Orlett, and Alex Turk. 2015. "Individual Nonfilers and IRS-Generated Tax Assessments: Revenue and Compliance Impacts of IRS Substitute Assessments When Taxpayers Don't File". Small Business/Self-Employed Division, Internal Revenue Service. https://www.irs.gov/pub/irs-soi/15rescondatta.pdf.

DeBacker, Jason, Bradley T. Heim, Anh Tran, and Alexander Yuskavage. 2015. "Once Bitten, Twice Shy? The Lasting Impact of IRS Audits on Individual Tax Reporting - Semantic Scholar." Journal of Financial Economics 117(1). 2015. /paper/Once-Bitten-%2C-Twice-Shy-%3F-The-Lasting-Impact-of-IRS-Debacker-Heim/84175d69cf5c66003f921fa8c31a40d4c7806ba8.

DeBacker, Jason, Bradley T. Heim, Anh Tran, and Alexander Yuskavage. 2018. "The Effects of IRS Audits on EITC Claimants". National Tax Journal 71 (3): 451–484. https://doi.org/10.17310/ntj.2018.3.02.

Guyton, John, Kara Leibel, Day Manoli, Ankur Patel, Mark Payne, and Brenda Schafer. 2018. "Tax Enforcement and Tax Policy: Evidence on Taxpayer Responses to EITC Correspondence Audits". Working Paper 24465. National Bureau of Economic Research. https://www.nber.org/papers/w24465.pdf.

Kleven Henrik Jacobsen, Knudsen Martin B., Kreiner Claus Thustrup, Pedersen Søren, and Saez Emmanuel. 2011. "Unwilling or Unable to Cheat? Evidence From a Tax Audit Experiment in Denmark." Econometrica 79 (3): 651–92. https://doi.org/10.3982/ECTA9113.

Nestor, Mike, and Tom Beers. 2014. "Estimating the Impact of Audits on the Subsequent Reporting Compliance of Small Business Taxpayers: Preliminary Results." TAS 2. https://taxpayeradvocate.irs.gov/Media/Default/Documents/2014-Annual-Report/Estimating-the-Impact-of-Audits-on-the-Subsequent-Reporting-Compliance-of-Small-Business-Taxpayers-Preliminary-Results.pdf.

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ENFORCEMENT VERSUS OUTREACH: IMPACTS ON TAX FILING COMPLIANCE

IRS TPC RESEARCH CONFERENCE – JUNE 20TH, 2019

Presented by: Anne Herlache (anne.d.herlache@irs.gov)
With Stacy Orlett, Ishani Roy, Alex Turk, & Rizwan Javaid
Internal Revenue Service

PRESENTATION OUTLINE

- Background
- Design
- Results
- Conclusions and Future Directions

QUESTIONS ADDRESSED BY THE PILOT

- ★ Type, timing, and sequence of low-cost outreach
- Case identification closer to the filing deadline
- ★ Past noncompliance vs. encouraging future compliance
- Costs of not starting or delaying nonfiler treatment

DESIGN

- Randomized control trial
- Field experiment conducted during the 2018 filing season

- Primary outcomes
  - Filing Tax Year 2017 return
  - Filing Tax Year 2016 delinquent return

Early April, 2018

Wave 1

- TY 2017 filing reminder letters and postcards
- TY 2016 Return Delinquency Notice Process

Mid October, 2018

Wave 2

- Soft letter contacts around extension deadline

Mid December, 2018

Wave 3

- Soft letter contacts
- TY 2017 Return Delinquency Notice Process

DESIGN

Wave 1 Reminders:

- 7,500 Simple Letter
- 7,500 Simple Postcard
- 7,500 Complex Letter
- 7,500 Complex Postcard

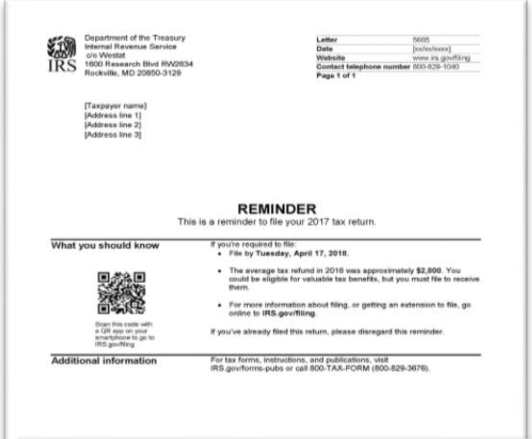
- Randomly assigned among groups 2, 6, 7, & 8

Treatment Group	Sample Size	Wave 1 (April 2018)	Wave 2 (Oct. 2018)	Wave 3 (Dec. 2018)
1	5,000	TY 2016 RD Notice*		
2	5,000	Reminder		
3	5,000		Soft Letter	
4	5,000			Soft Letter
5	5,000			TY 2017 RD Notice*
6	5,000	Reminder	Soft Letter	
7	10,000	Reminder	Soft Letter	Soft Letter
8	10,000	Reminder	Soft Letter	TY 2017 RD Notice*
9 (Control)	15,000	PSA Postcard		
Total	**65,000**			

*RD Notice: Return Delinquency Notice Process, beginning with CP59

WAVE 1 REMINDERS

Simple



IRS
Department of the Treasury
Internal Revenue Service
c/o Westat
1600 Research Blvd RW2634
Rockville, MD 20850-3129

Letter 5665
Date [xx/xx/xxxx]
Website www.irs.gov/filing
Contact telephone number 800-829-1040
Page 1 of 1

[Taxpayer name]
[Address line 1]
[Address line 2]
[Address line 3]

REMINDER

This is a reminder to file your 2017 tax return.

What you should know

If you're required to file:

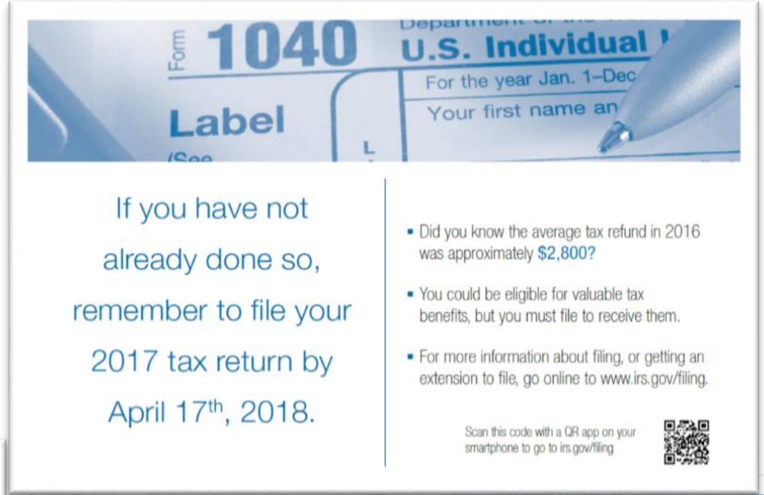
- File by **Tuesday, April 17, 2018.**
- The average tax refund in 2016 was approximately **$2,800**. You could be eligible for valuable tax benefits, but you must file to receive them.
- For more information about filing, or getting an extension to file, go online to **IRS.gov/filing**.

If you've already filed this return, please disregard this reminder.

Scan this code with a QR app on your smartphone to go to IRS.gov/filing

Additional information

For tax forms, instructions, and publications, visit IRS.gov/forms-pubs or call 800-TAX-FORM (800-829-3676).

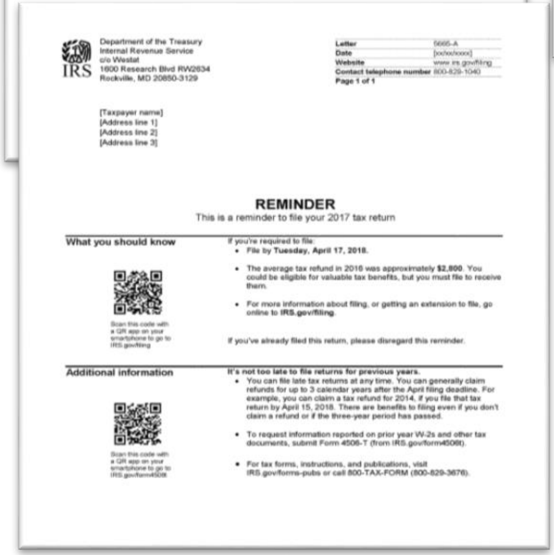

Form 1040
U.S. Individual
For the year Jan. 1–Dec
Your first name an
Label
L

If you have not already done so, remember to file your 2017 tax return by April 17th, 2018.

- Did you know the average tax refund in 2016 was approximately $2,800?
- You could be eligible for valuable tax benefits, but you must file to receive them.
- For more information about filing, or getting an extension to file, go online to www.irs.gov/filing.

Scan this code with a QR app on your smartphone to go to irs.gov/filing

Complex



IRS
Department of the Treasury
Internal Revenue Service
c/o Westat
1600 Research Blvd RW2634
Rockville, MD 20850-3129

Letter 5665-A
Date [xx/xx/xxxx]
Website www.irs.gov/filing
Contact telephone number 800-829-1040
Page 1 of 1

[Taxpayer name]
[Address line 1]
[Address line 2]
[Address line 3]

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- For more information about filing, or getting an extension to file, go online to **IRS.gov/filing**.

If you've already filed this return, please disregard this reminder.

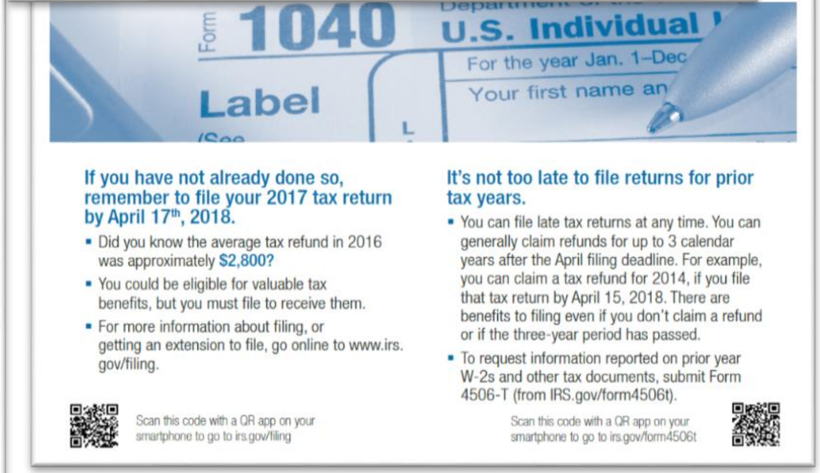
Scan this code with a QR app on your smartphone to go to IRS.gov/filing

Additional information

It's not too late to file returns for previous years.

- You can file late tax returns at any time. You can generally claim refunds for up to 3 calendar years after the April filing deadline. For example, you can claim a tax refund for 2014, if you file that tax return by April 15, 2018. There are benefits to filing even if you don't claim a refund or if the three-year period has passed.
- To request information reported on prior year W-2s and other tax documents, submit Form 4506-T (from IRS.gov/form4506t).
- For tax forms, instructions, and publications, visit IRS.gov/forms-pubs or call 800-TAX-FORM (800-829-3676).

Scan this code with a QR app on your smartphone to go to IRS.gov/form4506t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For the year Jan. 1–Dec
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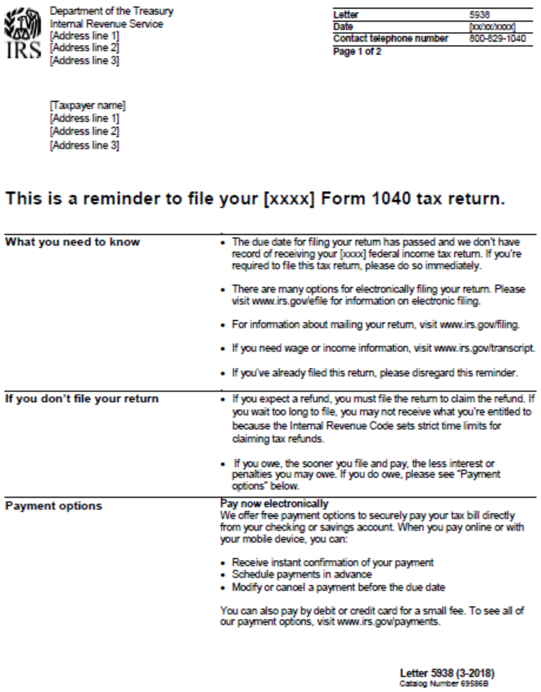
Scan this code with a QR app on your smartphone to go to irs.gov/form4506t

SOFT LETTER & TRADITIONAL NOTICE

Soft Notice

- 1 page
- Wave 2
- Wave 3



IRS

Department of the Treasury
Internal Revenue Service
[Address line 1]
[Address line 2]
[Address line 3]

Letter	5938
Date	[xx/xx/xxxx]
Contact telephone number	800-829-1040

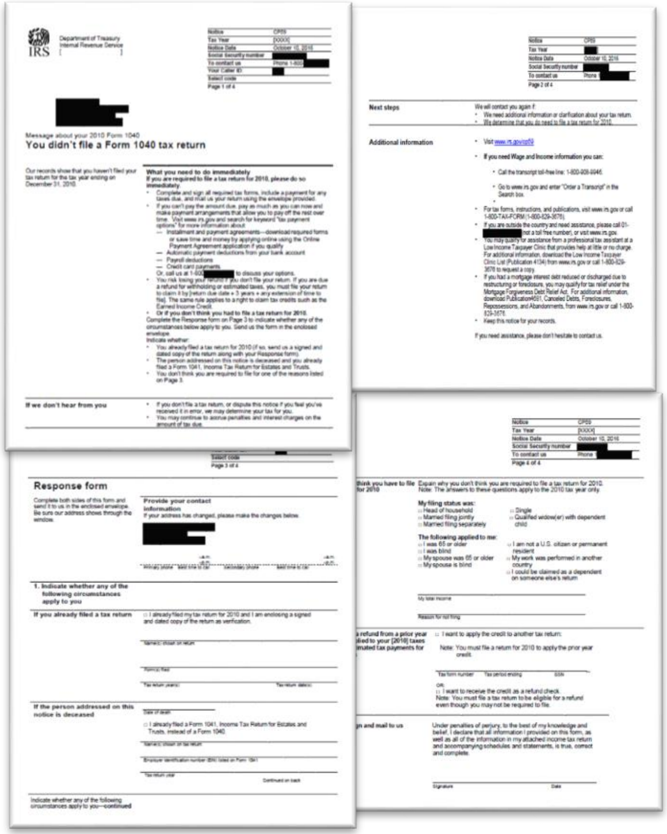
Page 1 of 2

[Taxpayer name]
[Address line 1]
[Address line 2]
[Address line 3]

This is a reminder to file your [xxxx] Form 1040 tax return.

What you need to know	• The due date for filing your return has passed and we don't have record of receiving your [xxxx] federal income tax return. If you're required to file this tax return, please do so immediately. • There are many options for electronically filing your return. Please visit www.irs.gov/efile for information on electronic filing. • For information about mailing your return, visit www.irs.gov/filing. • If you need wage or income information, visit www.irs.gov/transcript. • If you've already filed this return, please disregard this reminder.
If you don't file your return	• If you expect a refund, you must file the return to claim the refund. If you wait too long to file, you may not receive what you're entitled to because the Internal Revenue Code sets strict time limits for claiming tax refunds. • If you owe, the sooner you file and pay, the less interest or penalties you may owe. If you do owe, please see "Payment options" below.
Payment options	**Pay now electronically** We offer free payment options to securely pay your tax bill directly from your checking or savings account. When you pay online or with your mobile device, you can: • Receive instant confirmation of your payment • Schedule payments in advance • Modify or cancel a payment before the due date You can also pay by debit or credit card for a small fee. To see all of our payment options, visit www.irs.gov/payments.

Letter 5938 (3-2018)
Catalog Number 69586B



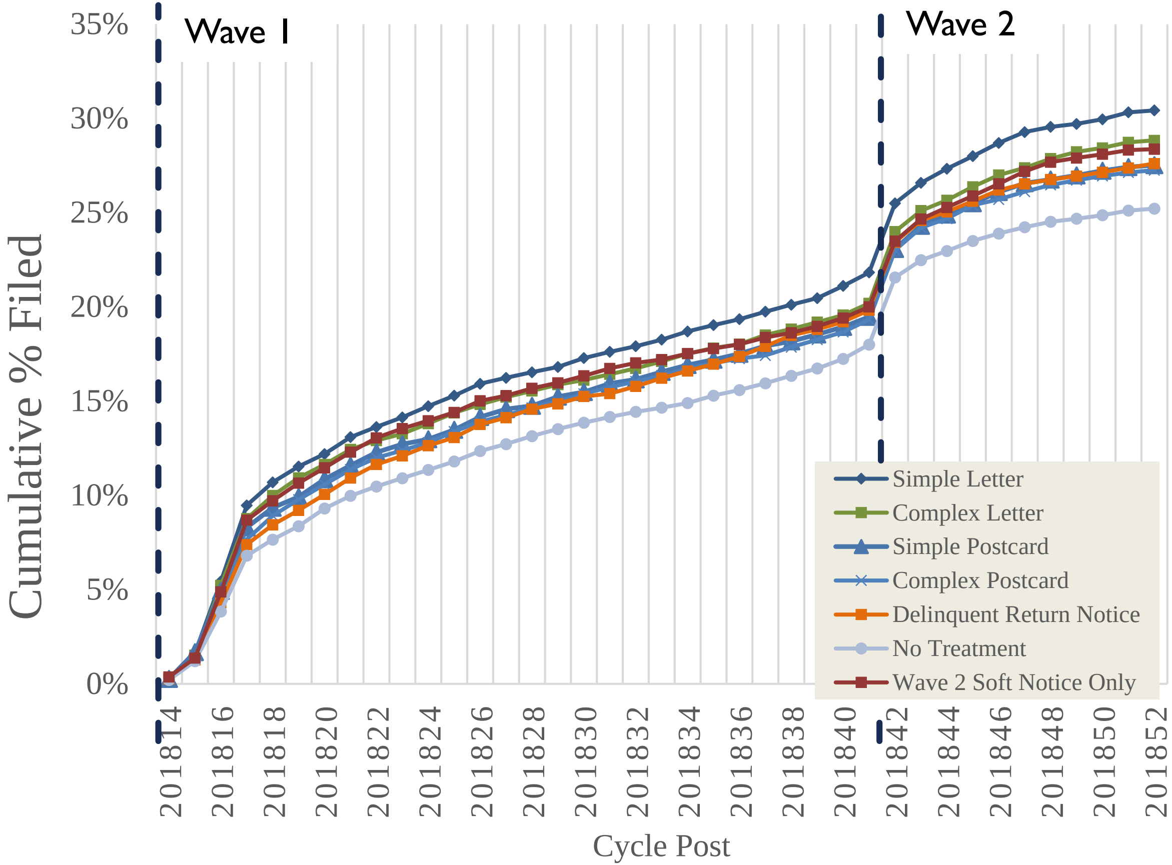
Message about your 2010 Form 1040
You didn't file a Form 1040 tax return

Response form

Traditional Notice

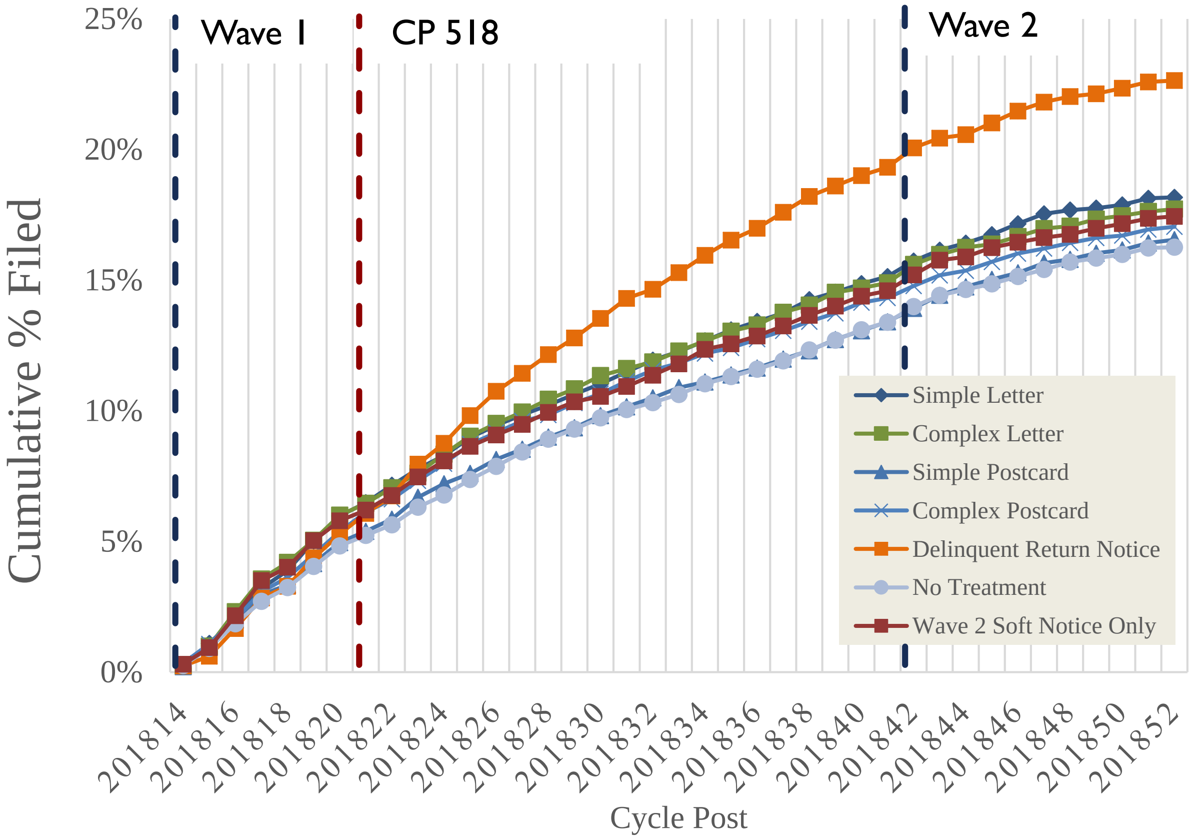
- 4 pages
- Wave 1 (TY 16)
- Wave 3 (TY 17)

WAVE 2: TY 2017 FILING OVERTIME



- Cumulative TY 2017 filing by week
- April through December 2018
- Spikes correspond to the April filing deadline & October extension deadline
- Dashed lines represent Waves 1 & 2 mailings

WAVE 2: TY 2016 FILING OVERTIME



- Cumulative TY 2016 filing by week
- April through December 2018
- Dark blue dashed lines represent Waves 1 & 2 mailings
- Dark red line represents additional RD Notice Process contact among some RD Notice starts

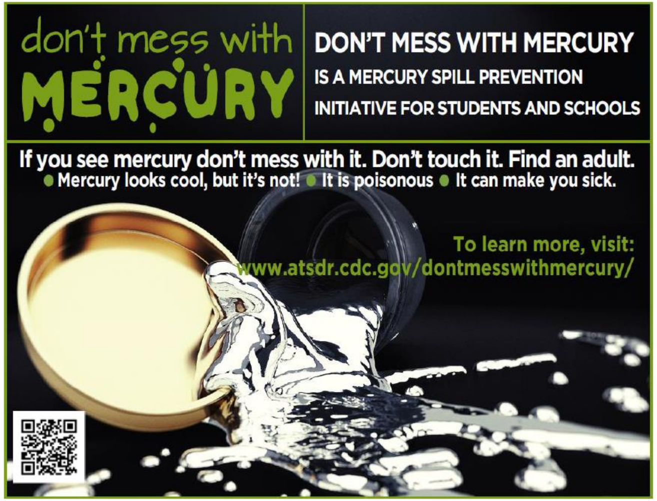
DEALING WITH UNDELIVERABLE MAIL

Control: CDC / ATSDR PSA Postcard

- Intended to track undeliverable mail in the control condition
- Differences in how addresses were updated led to different undeliverable mail rates
    - Used statistical controls

Lessons learned:

- Ensure all addresses are updated with the same process
- Consider methods to track undeliverables at a single point in time



DON'T MESS WITH MERCURY IS A MERCURY SPILL PREVENTION INITIATIVE FOR STUDENTS AND SCHOOLS

If you see mercury don't mess with it. Don't touch it. Find an adult.

● Mercury looks cool, but it's not! ● It is poisonous ● It can make you sick.

To learn more, visit: www.atsdr.cdc.gov/dontmesswithmercury/

ESTIMATED TREATMENT EFFECTS: WAVES 1 & 2

- Wave 1 outcomes: cumulative filing or filing for an extension through August 2018
- Wave 2 outcomes: cumulative filing through December 2018

Treatments	Wave 1 TY 2017	Wave 2 TY 2017	Wave 1 TY 2016	Wave 2 TY 2016
Simple letter	.046*	.034*	.007	.008
Simple postcard	.014*	.007	-.006	-.012
Complex letter	.030*	.020	.011*	.005
Complex postcard	.010	.006	.003	-.003
Return Delinquency Notice	.009	.027*	.037*	.060*
Soft Notice Only	NA	.027*	NA	.009
Additional from Soft Notice after Wave 1 Letter (either version)	NA	.005	NA	.003
Additional from Soft Notice after Wave 1 Postcard (either version)	NA	.007	NA	.006

ESTIMATED TREATMENT EFFECTS: PROJECTED TO 100K CONTACTS

- RD Notice Process securing the most returns overall
  - Primarily driven by TY 2016 returns
- A simple reminder letter is effective at encouraging a return to filing compliance

Treatments	Increase in TY 2017 Returns	Increase in TY 2016 Returns	Total Increase in Returns Filed
Simple Letter	3,400	800	4,200
Simple Postcard	700	-1200	-500
Complex Letter	2,000	500	2,500
Complex Postcard	600	300	300
Return Delinquency Notice	2,700	6,000	8,700
Soft Notice Only	2,700	900	3,600
Additional from Soft Notice after Reminder Letter (either version)	500	300	800
Additional from Soft Notice after Reminder Postcard (either version)	700	600	1,300

CONCLUSIONS FROM WAVES 1 & 2

- Postcards are not effective

- Repeated “soft” contact was not effective

- Timing and focus matter
  - Simple reminder at the appropriate time has a lasting impact
  - Additional information about filing the prior year return may “crowd out” the effect on filing the current year

- May not get “two birds with one stone”
  - Tradeoffs between past and current compliance.

ANSWERS FROM WAVE 3 – FORTHCOMING

RD

Soft Contact

- Direct comparison of TY 2017 RD Notice start and additional soft contact
- Segmentation: Behavior among extension filers who filed to file by the October deadline
- The effect of treatment on subsequent filing behavior (TY 2018)

TAKE-HOME MESSAGE

- Avoid “double-barreling” the taxpayer with issues to resolve

- Timing, format, and message matter
    - Capitalize on natural points of salience in the tax season
    - Among prior nonfilers, letters outperform postcards
    - Use straightforward, simple messaging where possible

Outreach vs. Enforcement:
Tradeoffs in Treatment

THANK YOU

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SELECTED REFERENCES

Datta, S., Orlett, S., Turk, A. (2015). "Individual Nonfilers and IRS Generated Tax Assessments: Revenue and Compliance Impacts of IRS Substitute Assessment When Taxpayers Don't File" *2015 IRS Research Bulletin,* Publication 1500, pp. 113–137.

Guyton, J., Manoli, D.S., Schafer, B., & Sebastiani, M. (2016). Reminders & recidivism: Evidence from tax fling & EITC participation among low-income nonfilers. *NBER Working Paper Series.* NBER, Cambridge, MA.

- Evidence that outreach can prompt voluntary compliance even among taxpayers with a tax liability
- Evidence of recidivism – repeated reminders showing positive impacts on subsequent year filing

Orlett, S., Javaid, R., Koranda, V., Muzikir, M, and Turk, A. (2018). Impact of Filing Reminder Outreach on Voluntary Filing Compliance for Taxpayers with a Prior Filing Delinquency, *IRS Research Bulletin – 7th Annual Joint Research Conference on Tax Administration*, 83-98.

- Current study built upon this design – preemptive outreach was effective at promoting future compliance
- Some evidence that letters may be more effective than postcards

REFUND VERSUS BALANCE DUE

	Treatment Group	Wave 1 Treatment	Filed TY17 After Treatment	Refund	Balance Due	Filed TY16 After Treatment	Refund	Balance Due
1	1	RD Notice	24%	50%	50%	19%	46%	54%
2	2	Simple Letter	24%	55%	45%	14%	43%	57%
3	2	Complex Letter	28%	55%	45%	16%	46%	54%
4	2	Simple Postcard	22%	49%	51%	13%	40%	60%
5	2	Complex Postcard	23%	50%	50%	14%	48%	52%
6	3	.	24%	54%	46%	14%	44%	56%
7	4	.	22%	54%	46%	13%	48%	52%
8	5	.	21%	54%	46%	14%	46%	54%
9	6	Simple Letter	25%	48%	52%	14%	47%	53%
10	6	Complex Letter	24%	57%	43%	15%	49%	51%
11	6	Simple Postcard	21%	56%	44%	13%	45%	55%
12	6	Complex Postcard	23%	49%	51%	14%	49%	51%
13	7	Simple Letter	25%	54%	46%	15%	50%	50%
14	7	Complex Letter	23%	54%	46%	14%	51%	49%
15	7	Simple Postcard	23%	47%	53%	13%	45%	55%
16	7	Complex Postcard	23%	57%	43%	14%	49%	51%
17	8	Simple Letter	25%	52%	48%	14%	48%	52%
18	8	Complex Letter	24%	54%	46%	14%	47%	53%
19	8	Simple Postcard	24%	51%	49%	14%	41%	59%
20	8	Complex Postcard	24%	49%	51%	14%	49%	51%
21	9	Control Postcard	23%	53%	47%	14%	46%	54%

FILING BEHAVIOR AFTER WAVE 1 (TY 2016) RD NOTICE

	TY 2017 Filer	TY 2017 Nonfiler	Filed TY 2017 Prior to Wave 1 Treatment
TY 2016 Filer	637	249	80
TY 2016 Nonfiler	330	3144	158
Filed TY 2016 Prior to Wave 1 Treatment	234	100	68

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ASSESSING THE IMPACT OF EXCHANGE OF INFORMATION

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Banque de France

Presentation to IRS-TPC Research Conference

Washington D.C., 20 July 2019

OECD

BETTER POLICIES FOR BETTER LIVES

Overview

1. **Introduction**
2. Exchange of Information Expansion
3. Data
4. Results
5. Conclusion and Future Work

Motivation for Exchange of Information (EOI) impact assessment

- In 2009, the G20 declared that ‘the era of bank secrecy is over’ (G20 Leaders Statement)
- To increase global tax transparency, the OECD implemented exchange of information mechanisms:
  - Exchange of Information on Request (EOIR), with information exchanged since 2009
  - Automatic Exchange of Information (AEOIR), with information exchanged since 2017
- This ongoing exchange of information requires an assessment of its effectiveness to ensure continued momentum behind global efforts in increasing tax transparency
- Estimated costs in complying with the exchange of information standards by market actors and authorities demand a well-functioning mechanism (Finér & Tokola, 2017; HMRC, n.d.)

Existing research on EOI and key contributions

Existing research

- Bank liabilities (Johannesen & Zucman, 2014; Menkhoff & Miethe, 2017; Casi et al., 2018; Beer et. al., forthcoming)
- Portfolio investment (Zucman, 2013; Pellegrini et al., 2017; Hanlon et. al. 2015; Heckemeyer & Hemmerich, 2018)
- FDI (Blonigen et al., 2013)

Key contributions of this paper

1. More years, more EOI – fewer places for money to hide
2. Expanded country coverage, inclusion of broader set of EOI agreements
3. Disaggregation of results into corporates and households (in progress)

Overview

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What is EOI and why is it useful?

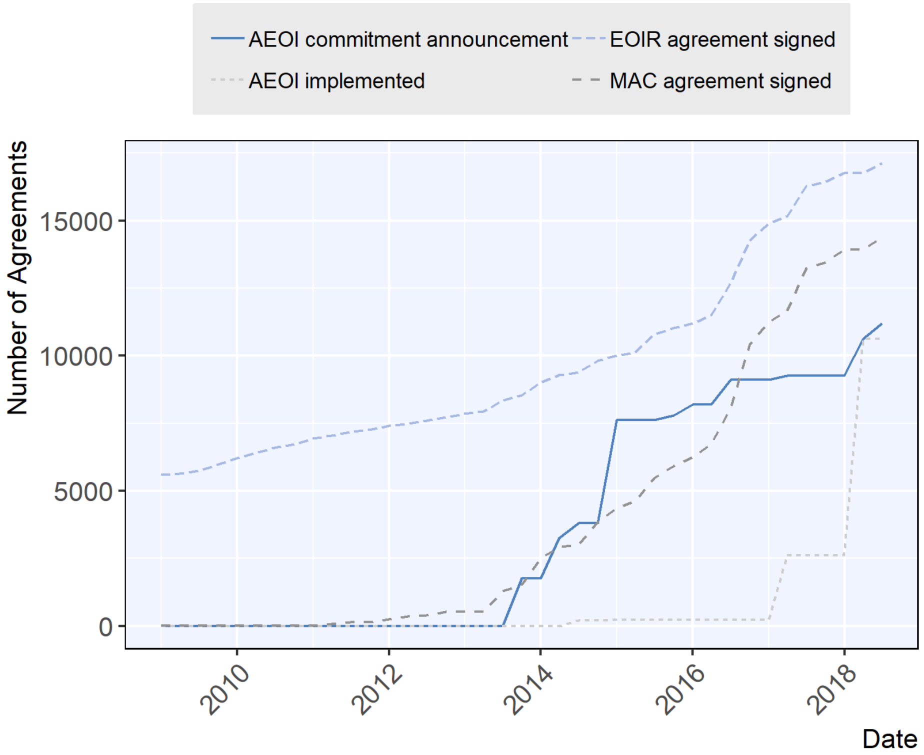
What is EOI?

- To increase global tax transparency, the OECD implemented two important exchange of information mechanisms:
  - Exchange of Information on Request (EOIR) since 2009; information exchanged if “foreseeably relevant”
  - Automatic Exchange of Information (AEOI), with commitments by Global Forum member countries in 2014 to engage in automatic exchange of information under the Common Reporting Standards (CRS); first exchanges started in 2017
- Information covered consists of different kinds of investment income (such as interest and dividends), sales proceeds of assets or information on account balances

Why is it useful?

- To date, more than 4500 information agreements are in force with 90 jurisdictions implementing the CRS
- 47 million offshore accounts with a total value of EUR 4.9 trillion have been exchanged for the first time
- These initiative have resulted in over EUR 95 billion in additional revenue (tax, interest, penalties)
- This makes the EOI initiatives the most comprehensive network to fight global tax evasion

EOI expansion



- The network of EOI agreements has steadily expanded since 2012
- A broad EOI network means fewer places to hide assets
- A key means of EOI expansion has been MAC signature
- MAC-based EOI is a large share of all EOI relationships, especially for IFCs
- As far as we are aware, no existing study has included EOI based on MAC into analysis of bank deposits

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Why use international investment statistics to investigate offshore financial activity?

- An expected taxpayer response to EOI could be to move or disclose previously undisclosed assets held in international financial centres (IFCs)
- Therefore, changes in cross-border financial data in IFCs could be used to assess offshore activity and potentially examine the impact of EOI
- Previous studies have looked at different components of countries' assets and liabilities:
- (Johannesen & Zucman, 2014) EOIR reduces bank deposits, but bank deposits in IFCs overall had not declined.
  - Suggests that commencement of EOIR leads tax evaders to shift deposits to non-signatory jurisdictions, limiting the impact of EOIR
  - However, standards are now more widely adopted – fewer places for money to hide

Data on bank deposits

- Key dependent variable - cross-border bank deposits (from the Bank for International Settlements) held in an International Financial Centre by a non-bank counterparty (bank to bank deposits excluded).
  - Non-banks include households and corporates
- Why bank deposits?
  - Bank deposits one of the key variables covered by AEOI, also one of the most liquid
  - Data quality
- 29 countries disclose bilateral counterparty country data in a file the BIS makes available to the public (i.e. non-bank cross-border deposits):
  - Australia, Austria, Belgium, Brazil, Canada, Chile, Chinese Taipei, Denmark, Finland, France, Germany, Greece, Guernsey, Hong Kong SAR, Ireland, the Isle of Man, Japan, Jersey, Korea, Luxembourg, Macao SAR, Mexico, the Netherlands, South Africa, Spain, Sweden, Switzerland, the United Kingdom and the United States
- 8 jurisdictions have provided bilateral data to the OECD on a confidential basis
  - Bahrain, Bermuda, China, Curacao, India, Malaysia, Panama and Turkey

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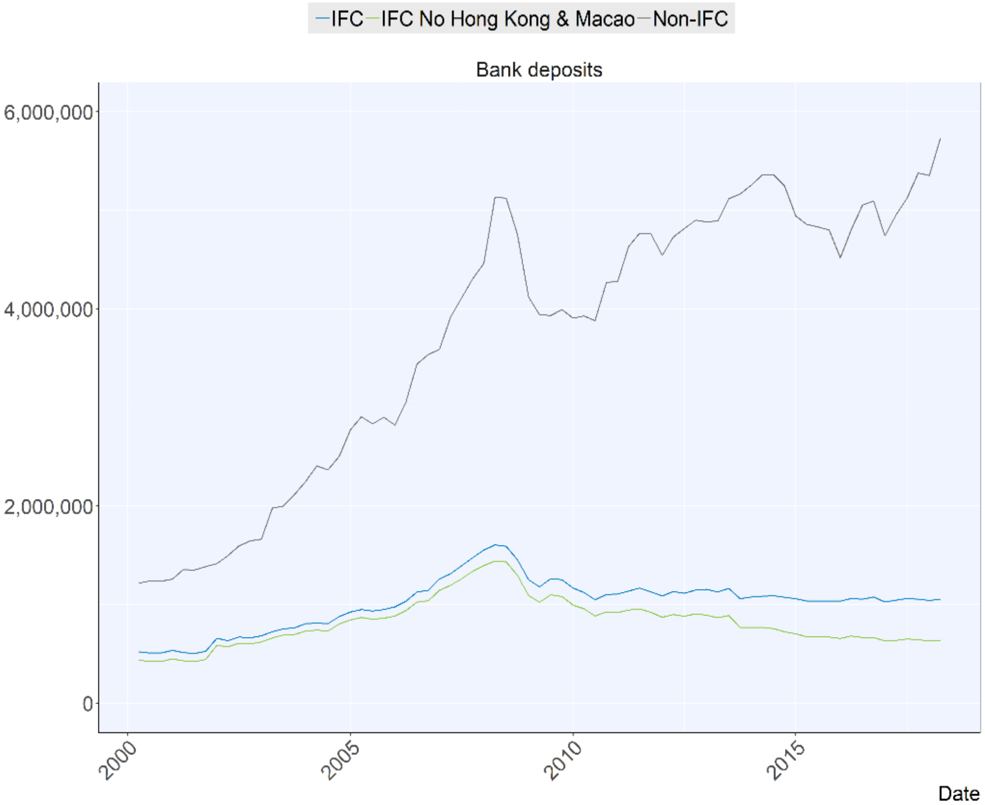
Bank deposits held by non-banks



- Deposits in IFCs peaked at USD 1.6 trillion in Q1 of 2008.
- Since then fallen substantially, by 551 billion or 34%.
- Mainly in the immediate aftermath of the financial crisis – 22% over the period from Q2 2008 to the Q1 of 2009.
- The decrease has continued in recent years (by a further 12% from the 2008 peak).
- Reduction of deposits in IFCs being predominantly driven by household deposits (i.e. not by corporates) (results not shown)

Regression specification

- Approach is similar to that used by Johannesen & Zucman (2014) to regress EOI signature on cross-border bank deposits. The key hypothesis:

An EOIR agreement between a given IFC and a given non-IFC should be associated with reduction in bank liabilities held in that IFC by residents of the non-IFC.

- This hypothesis could be tested using the following regression equation

$$log\left(Deposits_{ijq}\right) = \alpha + \beta\, EOI_{ijq} + \epsilon_{ijq}$$

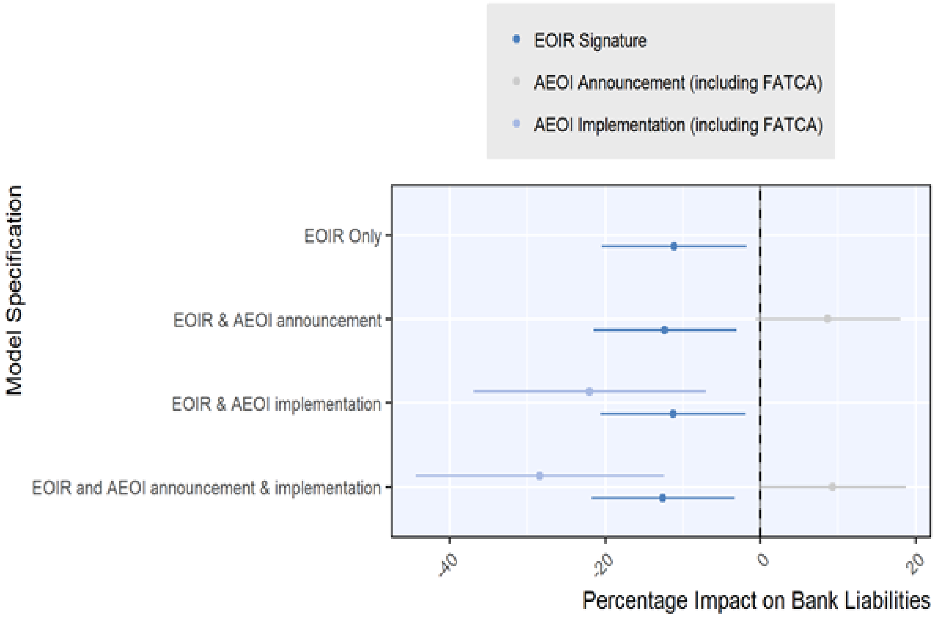
- The main regression includes country-pair and quarter fixed effects, accounting for linear correlation at the country-pair level:

$$log\left(Deposits_{ijq}\right) = \alpha + \beta\, EOI_{ijq} + \gamma_{ij} + \theta_q + \epsilon_{ijq}$$

- EOI_{ijq}: EOI agreement between countries *i* and *j,* focusing on the signature of EOIR, announcement and implementation of AEOI, participation in MAC

Preliminary regression results – country-pair and quarter Fixed Effects (FEs)

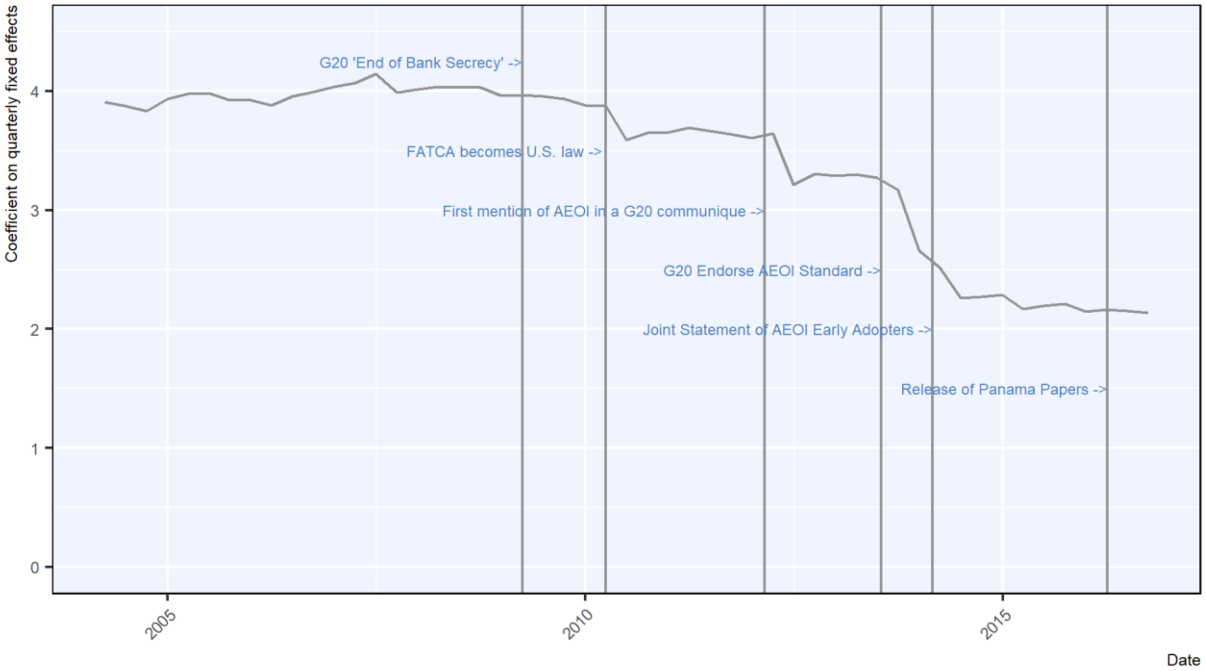
Coefficients on EOI variables for regression of bank deposits in IFCs with respect to non-IFCs, across model types



- Quarter and country-pair FEs control for varying time trends such as financial crises and invariant country-pair factors (e.g. language)
- AEOI implementation decreases IFC bank deposits (20% - 25%)
- EOIR signature shows negative impact on IFC deposits (11% - 12%)
- Low statistical significance of AEOI announcement variable:
  - – Multicollinearity issues possible

Exploring multicollinearity

Coefficients on quarter fixed effects for regression of bank liabilities in IFCs with respect to non-IFCs



- AEOI announcements bunched closely together in time
- Makes AEOI announcements collinear with time fixed effects
- Fixed effects on IFC bank deposits fall at the same time as key events in the expansion of AEOI
- Examine alternative specifications to account for this

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Conclusion and future work

Conclusion:

- Foreign-owned bank deposits in IFCs strongly decreased (-34%) after the 2008 Q1 peak
- Our analysis provides significant evidence of a positive impact of EOI, particularly AEOI, on this decline (20% - 25%)
- The reduction of deposits in IFCs has predominantly been driven by household deposits (i.e. not by corporates) (results not shown)

Future work:

- Continued examination of multicollinearity, household/corporate breakdown, country differences, bank data by ultimate investor, et al.
- Impact of EOI on other assets classes: FDI and portfolio data may be used as well
  - particularly in light of global FDI increase post-financial crisis (Lane & Milesi-Ferretti, 2018)

Thank you!

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References

- Bank for International Settlements (2013), Reporting guidelines and practices for BIS international banking statistics, Bank for International Settlements, Basel, Switzerland.
- Beer, S., M. Coelho and S. Léduc (forthcoming), “Hidden Treasures: The Impact of Automatic Exchange of Information on Cross-Border Tax Evasion”, IMF Working Paper.
- Blanchard, O. and J. Acalin (2016), “What Does Measured FDI Actually Measure?”, PIIE Policy Brief 16-17.
- Blonigen, B., L. Oldenski and N. Sly (2013), “The Differential Effects of Bilateral Tax Treaties”, pp. 1-24.
- Casi, E., L. Spengel, and B. Stage (2018), “Cross-Border Tax Evasion After the Common Reporting Standard: Game Over?”, ZEW Discussion Paper No. 18-036.
- Finér and Tokola (2017), “The Revolution in Automatic Exchange of Information: How is Information Used and What Are the Effects?” Bulleting of International Taxation, Vol. 71/12: 688-696.
- HMRC (n.d.), “Tax administration: regulations to implement the UK’s automatic exchange of information agreements”, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/413976/TIIN_8148_tax_admin_automatic_exchange.pdf (accessed: June 11, 2019).
- Huizinga, H. and G. Nicodème (2004), “Are international deposits tax-driven”, Journal of Public Economics, Vol. 88/6, pp. 1093-1118.
- Johannesen, N. and G. Zucman (2014), “The end of bank secrecy? An evaluation of the G20 tax haven crackdown”, American Economic Journal: Economic Policy, Vol. 6/1 B, pp. 65-91, http://dx.doi.org/10.1257/pol.6.1.65.
- Lane, P. R. and G. M. Milesi-Ferretti (2018), “The External Wealth of Nations Revisited: International Financial Integration in the Aftermath of the Global Financial Crisis”, IMF Economic Review, Vol. 66: 189-222.
- Menkhoff, L. and J. Miethe (2017), “Dirty money coming home: Capital flows into and out of tax havens”.
- Pellegrini, Sanelli, and Tosti (2017) “What do External Statistics tell us About Undeclared Assets held Abroad and Tax Evasion?” Bank of Italy Occasional Paper No. 367
- Zucman, G. (2013), “The missing wealth of nations: Are europe and the U.S. net debtors or net creditors?”, Quarterly Journal of Economics, http://dx.doi.org/10.1093/qje/qjt012.

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Session 1. Estimating the Effects of Tax Administration on Compliance

Moderator:	***Robert McClelland*** *Urban-Brookings Tax Policy Center*
Estimating the Specific Indirect Effect for Multiple Types of Correspondence Audits	***Lucia Lykke*** *MITRE Corporation*
Enforcement vs. Outreach – Impacts on Tax Filing Compliance	***Anne Herlache*** *IRS:RAAS*
Assessing the Impact of Exchange of Information	***Pierce O'Reilly*** *OECD*
Discussant:	***Michael Udell*** *District Economics Group*

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Session 2. The Influence of External Factors on Compliance

Moderator:	***George Contos*** *IRS, Communications & Liaison*
Recent Changes in the Paid Return Preparer Industry and EITC Compliance	***Emily Y. Lin*** *Treasury Office of Tax Analysis*
Taxpayer Responses to Third-party Income Reporting: Evidence from Spatial Variation across the U.S.	***Bibek Adhikari*** *Illinois State University*
Effect of Recent Reductions in the Internal Revenue Service's Appropriations on Revenues	***Janet Holtzblatt*** *Tax Policy Center*
Discussant:	***Alan Plumley*** *IRS:RAAS*

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Recent Changes in the Paid Return Preparer Industry and EITC Compliance

Emily Y. Lin

IRS-TPC Joint Research Conference on Tax Administration
June 20, 2019

Please do not cite. The findings and views in this paper are preliminary and do not necessarily reflect the positions of the Department of the Treasury.

EITC Noncompliance

- Decades of research have shown a high level of noncompliance with Earned Income Tax Credit (EITC) eligibility rules.
  - 25% improper payment rate for FY2018, estimated to be $18.4 billion.
  - Misreporting of all individual income tax credits, EITC included, accounted for 9% of the gross tax gap in tax years 2008-2010 ($458 billion).

    -- Underreporting of business income accounted for 27% of the gross tax gap.

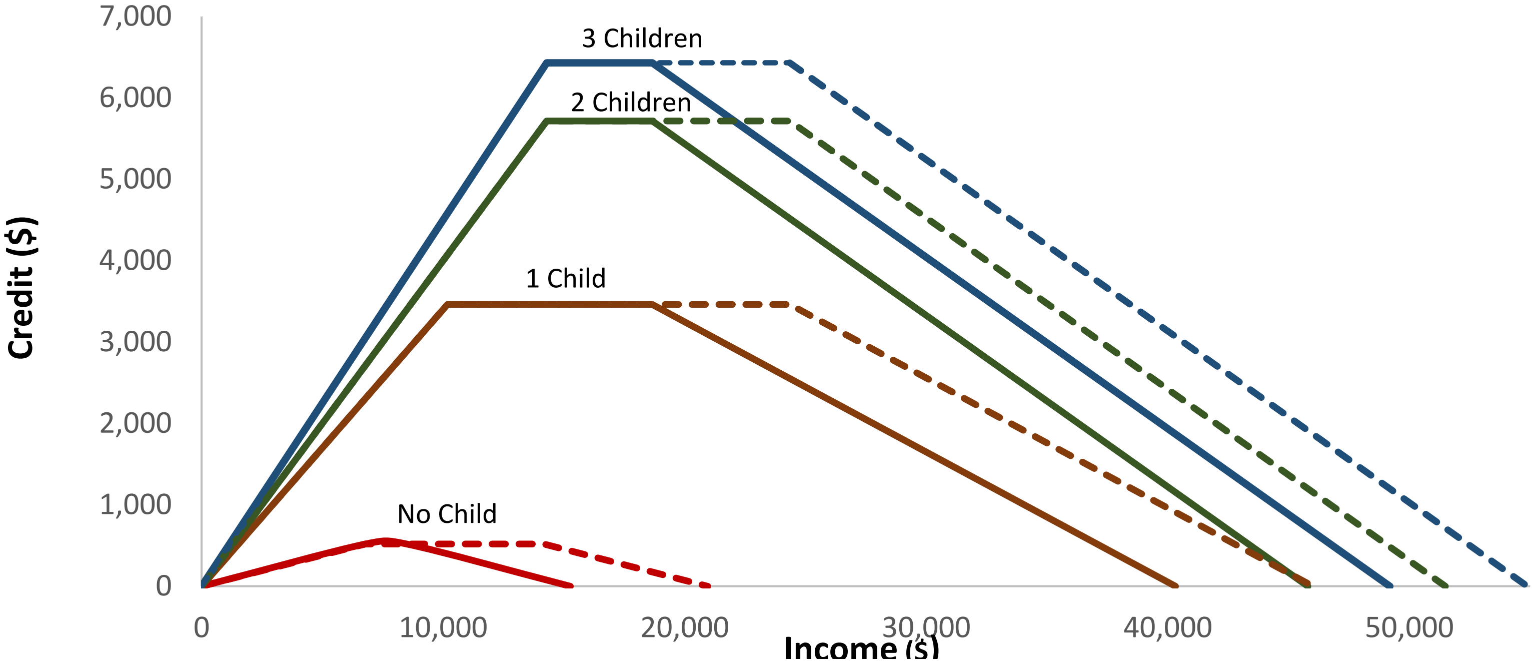
- Over 50 percent of EITC returns used a paid preparer in tax year 2016. Roles of preparers—
  - Preparers assist taxpayers in understanding and complying with tax law;
  - Incompetent or unethical preparers can add to tax noncompliance.

- A series of changes in legislation, regulation, and tax administration that affected the profession took place between 2009 and 2012.
  - Goal-- Strengthen preparer compliance and competence and thereby reduce tax return errors, often with a focus on addressing EITC improper payments.

- Have these efforts achieved their stated goal of enhancing EITC compliance?

EITC Provides Large Tax Benefits

EITC amounts vary with income, filing status, and the number of Qualifying Children claimed. The maximum credit is $6,431 for low-income families with 3 or more children in tax year 2018.



Extended List of Eligibility Requirements

Eligibility depends on a number of criteria IRS cannot readily observe under self-certification of tax reporting, such as living arrangements, marital status and self-employment income. Among the eligibility rules,

- Income tests
  - Taxpayers must have earned income. The credit initially phases in with earned income, reaches the maximum, and then phases out as income increases
  - Earned income includes wage income and self-employment income
  - Adjusted Gross Income (AGI) must be below specific amounts
  - Investment income must be $3,500 or less (TY 2018)
- Qualifying Child tests:
  - Age: under age 19, under age 24 if student, or disabled
  - Relationship: son/daughter, stepchild, foster child, sibling, or a descendent of these
  - Residency: must live with taxpayer in the United States for more than half of the year
- Filing status
  - Married individuals must file jointly. Married couples filing separately are not eligible
  - Exception

Treasury (2018) has identified inability to authenticate eligibility by the IRS before tax refunds are paid as the main root cause for EITC improper payments.

Common Types of EITC Errors

- IRS (2014): Common types of EITC errors for tax years 2006-2008:

Error Type	Percentage of Total EITC Over-Claim Dollars*
Qualifying Child Error (mostly failure of the residency test)	54%
All Income Misreporting	32%
Self-Employment Income	23%
Wage Income	6%
AGI or Investment Income	8%
Filing Status Error	17%
Other Errors	10%

*Percentages add to more than 100% due to multiple errors on a return.

- Leibel (2014): 75% of all children claimed in error failed to meet the residency test.

Paid Preparers and EITC Noncompliance

- IRS (2014): Random audits of EITC claims for tax years 2006-2008—
  - No difference in the over-claim dollar percentage between self-prepared and paid-preparer EITC returns, 28%-39%.
  - A wide range of over-claim dollar percentages across EITC returns prepared by different types of paid preparers. Two most common types of paid preparers used were—
    - National tax return preparation firms:
      21% of EITC returns. 20% -30% error dollar rate.
    - Un-enrolled return preparers:
      26% of EITC returns. 33%-40% error dollar rate.

- Studies on the role of paid preparers in affecting EITC compliance—
  - Book (2007) outlines scenarios in which EITC errors may be made on returns prepared un-credential preparers.
  - Jones (2017) finds evidence that EITC compliance is compromised when a preparer has a strong incentive to sell refund anticipation products to taxpayers.

Paid Preparer Industry Changes 2009-2012 (I)

- Congress enacted **electronic-filing mandate** of individual income tax returns prepared by paid preparers in 2009.
  - Paid preparers, except for those expecting to file 10 or fewer returns, were required to e-file.
  - IRS phased in the implementation in calendar years 2011 and 2012.

- IRS released *Return Preparer Review* in 2009; recommended an increased oversight of paid preparers and identified implementation plans to achieve the goal.
  - Beginning in January 2011, all paid preparers were required to register with the IRS and receive a **preparer tax identification number (PTIN)** to furnish on tax returns.

- Langetieg et al. (2013) find association between the above changes (e-filing, preparers holding a PTIN) and fewer errors on paid-preparer returns.

- Regulation in 2011 **required standards for all paid preparers**, including those without license or credential.
  - Minimum education and competency requirements (later ruled to be exceeding the IRS's authority).

Paid Preparer Industry Changes 2009-2012 (II)

- In 2011, Congress raised the **EITC preparer due diligence penalty** from $100 (unindexed) to $500 (indexed).
  - Penalty assessed on paid preparers for each tax return with which the preparer fails to exercise due diligence in determining taxpayer eligibility for, and the amount of, the EITC.
  - Under the authority, preparers are required by regulation to complete Form 8867, Paid Preparer's Earned Income Credit Checklist (redesigned and renamed in 2016). **Changes to Form 8867 and its administration**.
    - Beginning in TY 2011, preparers were required to submit the form to the IRS for EITC claims.
    - IRS began to summarily impose the penalty for missing Form 8867 in TY 2012.
    - Major revisions for TY 2012 to address the less compliant EITC rules.

- IRS began a multi-year **EITC Return Preparer Study** in FY 2012.
  - IRS tested different outreach and enforcement strategies on paid preparers of EITC returns and adopted those identified as effective in its routine operation.
  - Efforts (calls, letters, audits) targeted to paid preparers who failed to meet the EITC due diligence requirements or who filed a large number of EITC returns with potential errors.

Methodology

- Data: 1% EITC sample from the population file of individual income tax returns, TYs 2004-2016.

- Four potential EITC error indicators:
  - **Claiming the head-of-household status**
    - A common EITC error-- misreporting of filing status by married individuals as head-of-household.
  - **Claiming a qualifying child to whom the taxpayer is not the parent**
    - Leibel et al. (2017) shows that children claimed with qualifying child errors are much less likely to be the son or daughter of the taxpayer than children meeting the eligibility tests.
  - **Breaking the IRS Dependent Database Scoring System (DDB) rules**
    - DDB applies a large number of eligibility-related rules to returns claiming child related tax benefits, and is one of the scoring system used for audit selection.
  - **Reporting earned income at the first EITC kink if self-employed**
    - Chetty et al. (2012) shows bunching at the first kink of the EITC schedule, an income point that maximize tax refunds, is related to income misreporting for the self-employed.

- Methodology: difference-in-difference
  - Paid-preparer v. self-prepared, before and after the 2009-2012 industry reform.

Trends in Error Predictors by Preparation Method (I)

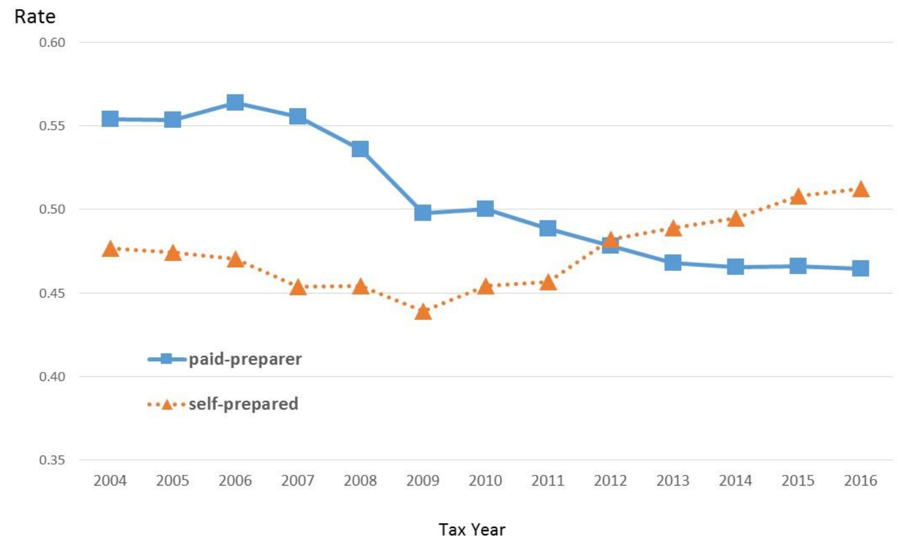


Figure 1 Claiming Head of Household

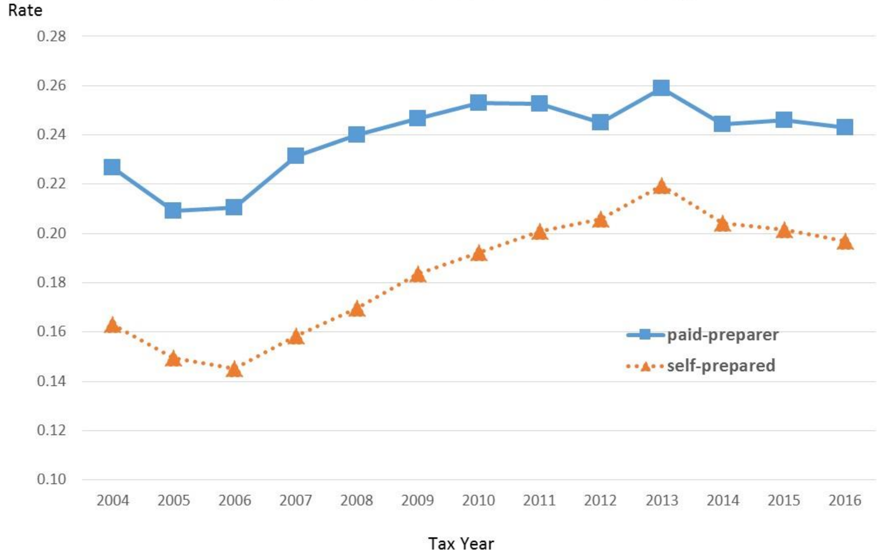


Figure 2 Non-Parent Claim for EITC with QC

Trends in Error Predictors by Preparation Method (II)

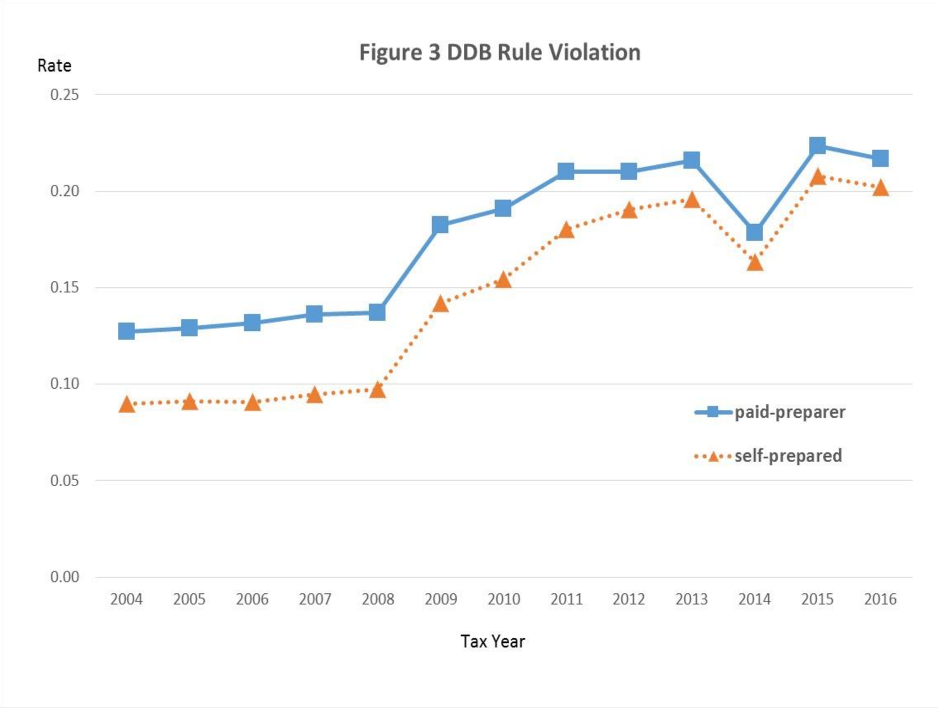


Figure 3 DDB Rule Violation

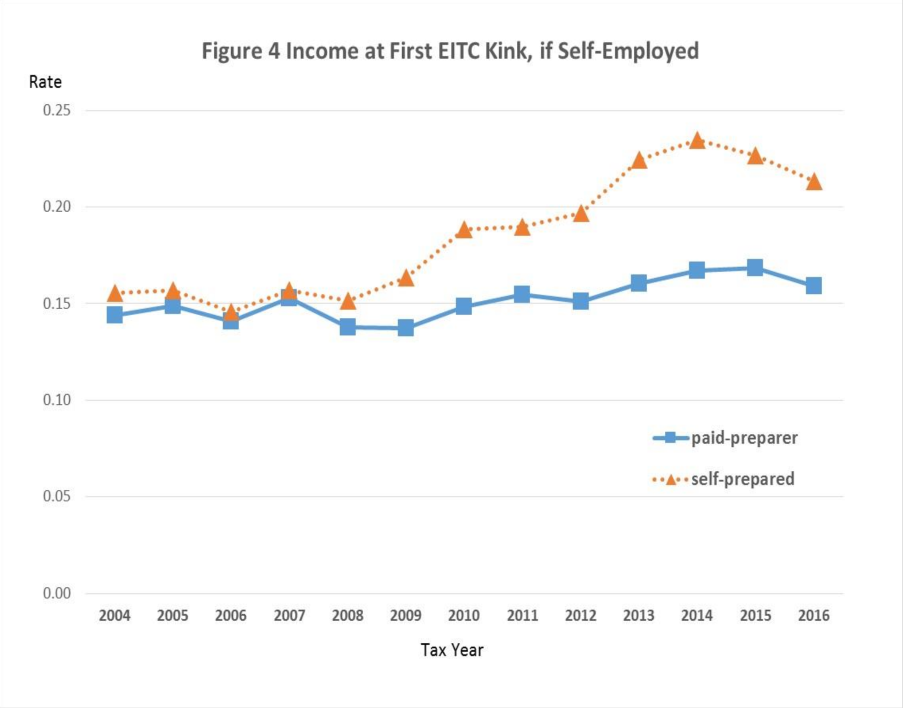


Figure 4 Income at First EITC Kink, if Self-Employed

Trends in Relative Potential Error Rates

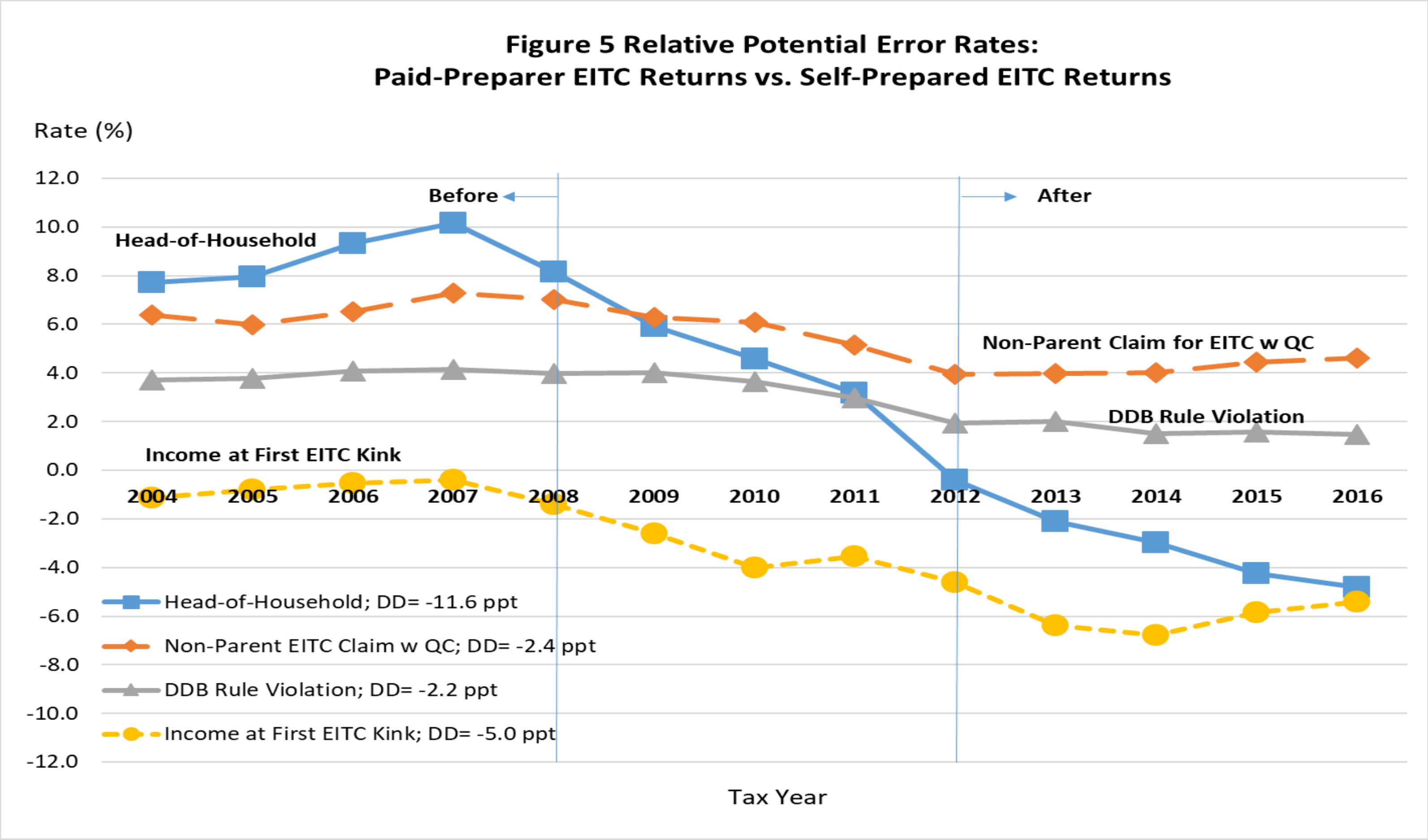


Figure 5 Relative Potential Error Rates:
Paid-Preparer EITC Returns vs. Self-Prepared EITC Returns

Estimation Results and Error Reductions

- Difference-in-difference estimation; controls for age, gender, return complexity (schedules attached), state effects, and two indicators of individual compliance
  - Pre-reform DIF score top 5 percent or top 5-20 percent in the low-income sample.
  - Whether the taxpayer has a child age 18 or younger in the year.

- $Y_i = \alpha + \beta(Paid_i * Post_i) + \gamma Paid_i + \delta Post_i + X_i'\theta + \epsilon_i$.

Potential Error Indicator	**OLS Coefficient**	**Implied Reduction in Error Rate (ppt) under Plausible Assumptions**	**Percent of EITC Returns with This Error, TYs 2006-2008 (%)**
Head-of-Household Filing Status	-0.0739	**-0.34**	4.2 (Filing Status Errors)
Non-Parent Claim for EITC with QC	-0.0340	**-0.95**	12.7 (QC Errors)
DDB Rule Violation	-0.0153	**-0.67**	12.7 (QC Errors)
Income at the First EITC Kink, if Self-Employed	-0.0521	**-0.68**	13.1 (SE Income Misreporting)

Conclusion and Future Research

- Modest, positive effects of the preparer industry changes in 2009-2012 on EITC compliance.

- Use IRS's random audit studies to examine the effects on actual, rather than predicted, errors.

- Study the exact channels through which the effects occurred.
  - Types of preparers: small- v. large-volume preparers, unenrolled preparers vs. other types.

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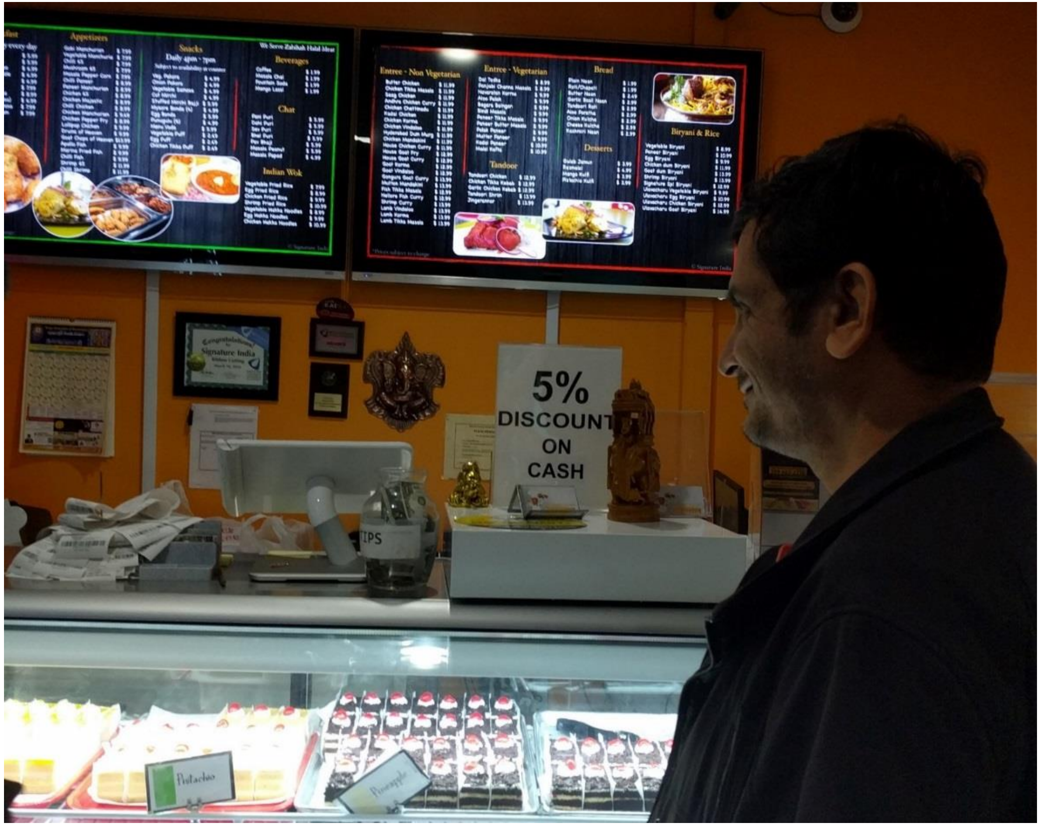
Taxpayer Responses to Third-party Income Reporting: Evidence from Spatial Variation across the U.S.

by

Bibek Adhikari (Illinois State University)
James Alm (Tulane University)
Timothy F. Harris (Illinois State University)

Businesses Prefer Cash

Businesses Prefer Cash



Large Difference in Tax Gap Compliance by Income Type

- Tax compliance gap
  - Wages and salary = 99%
  - Business income = 37%
  - Similar results for other advanced countries (Kleven, 2016)

- What could be the cause of this tax compliance gap?
  - Third-party income reporting and withholding
  - Examples are W-2, 1099-INT, 1099-MISC, and 1099-K

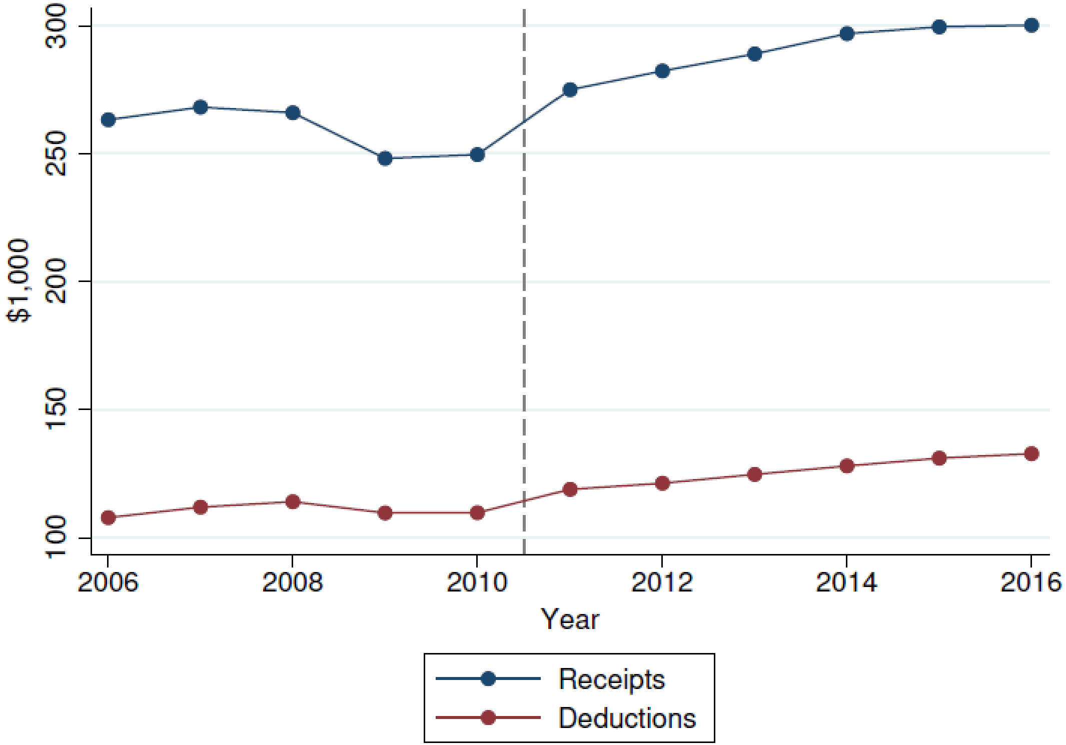
Difficult to Subject Business Income to Third-party Income Reporting

- Form 1099-K to the rescue?
  - Passed in 2008, effective from 2011
  - Payment companies such as American Express
  - Required to report to the IRS
  - Receipts that businesses receive through their payment system
- What is covered by 1099-K?
  - Business income are third-party reported
    - Except for cash receipts
  - But, expenses are still not third-party reported

Does Form 1099-K Increase Tax Compliance?

- Research questions
  - Does 1099-K increase reported receipts?
  - How about reported expenses?
  - For what industries is the policy most effective?
  - Any difference between Schedule C vs S-Corp?
- Current Study focuses on
  - Small businesses
  - Business-to-Consumer industries

Average Receipts and Deductions around 1099-K Implementation



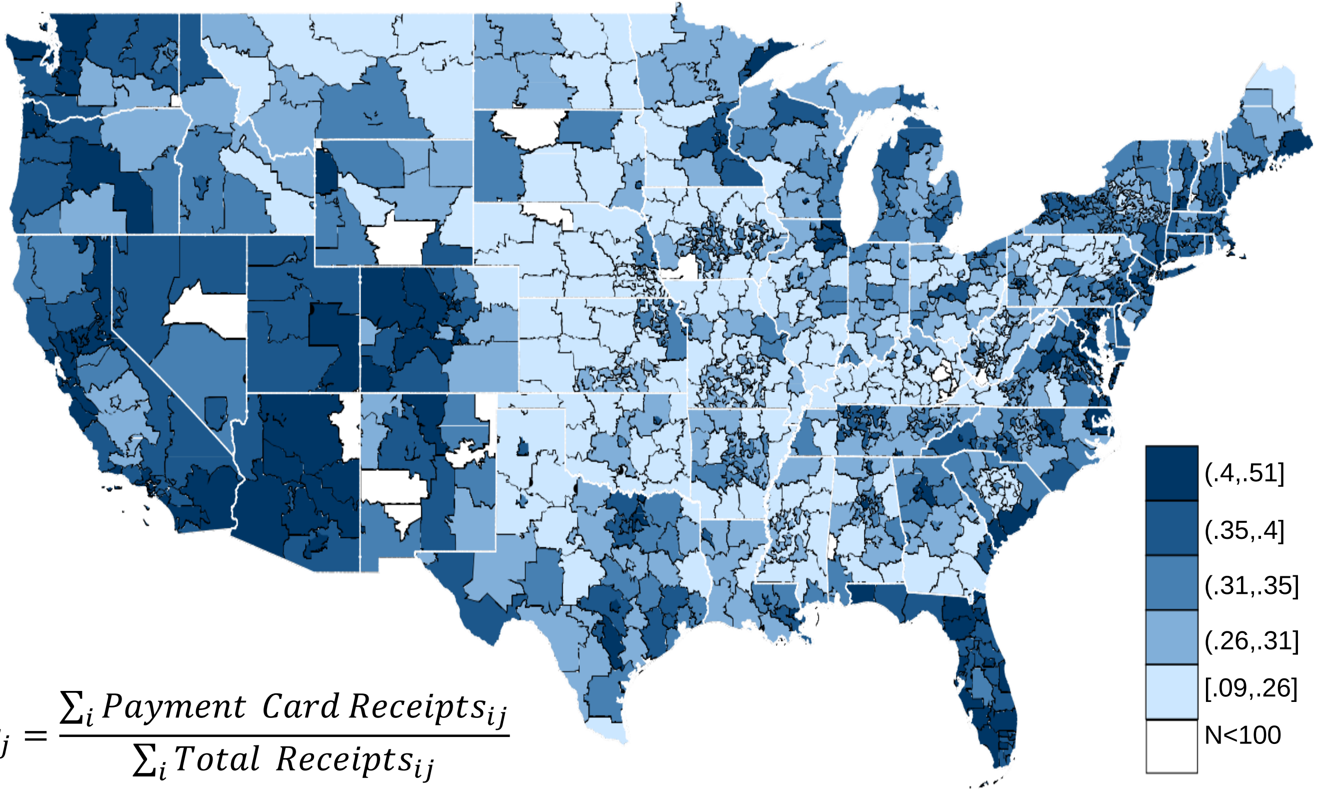
How to Evaluate the Effectiveness of Form 1099-K?

- Identification is challenging due to lack of a control group
  - Form 1099-K was not randomized
  - Firms receiving 1099-K are different from firms not receiving 1099-K

How to Evaluate the Effectiveness of Form 1099-K?

- Use spatial variation in the use of payment card
  - First, focus on firms receiving 1099-K
  - If a firm is located in high payment card use area
  - Then higher share of its revenue reported via 1099-K
  - Thus, more affected by 1099-K

Index of Payment Card Use by Zipcode



$$Index_j = \frac{\sum_i Payment\ \ Card\ Receipts_{ij}}{\sum_i Total\ \ Receipts_{ij}}$$

Summary Statistics of Payment Card Use Index by Zip Code

	Mean	Median	Min	Max	S.D.	Number of Zip codes
Full Sample	0.32	0.32	0.09	0.51	0.07	867
1st Quartile	0.22	0.23	0.09	0.26	0.03	217
2nd Quartile	0.30	0.30	0.27	0.32	0.02	217
3rd Quartile	0.35	0.35	0.32	0.38	0.02	217
4th Quartile	0.42	0.41	0.38	0.51	0.03	216

Empirical Specification: Continuous Difference-in-Differences

$$Log(Receipts_{i,j,t}) \\ = \delta_1 Post_t \times Log(Index_j) + \alpha_i + \gamma_t + \varepsilon_{i,j,t}$$

Where,

δ_1 = Index elasticity of receipts

α_i = Firm fixed effects

γ_t = Year fixed effects

$\varepsilon_{i,j,t}$ = Error term

Subscripts:

i = Firm

j= Zip code

t = Year

Index Elasticity of Receipts and Deductions by Business Type

	Log Receipts	Log Deductions
Schedule C		
Log Index X Post 1099-K	0.079*** (0.012)	0.044*** (0.012)
Number of Observations	4,422,903	4,432,495
S-Corporation		
Log Index X Post 1099-K	0.085*** (0.008)	0.052*** (0.007)
Number of Observations	1,815,510	1,815,508

Index Elasticity of Receipts and Deductions by Industry

	Log Receipts	**Log Deductions**
Retail Trade	0.063*** (0.014)	0.018* (0.011)
Transportation / Warehouse	0.073* (0.041)	0.18*** (0.044)
Professional Services	0.049** (0.023)	0.009 (0.021)
Entertainment/ Arts	0.132*** (0.031)	0.059** (0.026)
Accommodations/ Food Services	0.149*** (0.018)	0.101*** (0.016)
Other Services	0.03** (0.013)	0.03 (0.012)

Conclusions

- Suggest an increase in tax compliance
  - More affected firms report more revenue
  - They also report more expenses, partially offsetting increases in receipts
- Suggests some heterogeneity by industry
  - Largest effect on receipts
    - Accommodation and Food Services (0.149)
  - Largest effect on deductions
    - Transportation and Warehousing (0.18)

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Effects of Recent Reductions in the Internal Revenue Service's Appropriations on Revenues

June 2019

Janet Holtzblatt (Tax Policy Center) and Jamie McGuire (Joint Committee on Taxation)

This paper was prepared for the 9th Annual IRS-TPC Joint Research Conference on Tax Administration.

This paper embodies work undertaken for the staff of the Joint Committee on Taxation, but as members of both parties and both houses of Congress comprise the Joint Committee on Taxation, this paper should not be construed to represent the position of any member of the Committee. The statements made and the views expressed are solely those of the authors and do not reflect the views of the Urban Institute or its Board.

Focus of Study

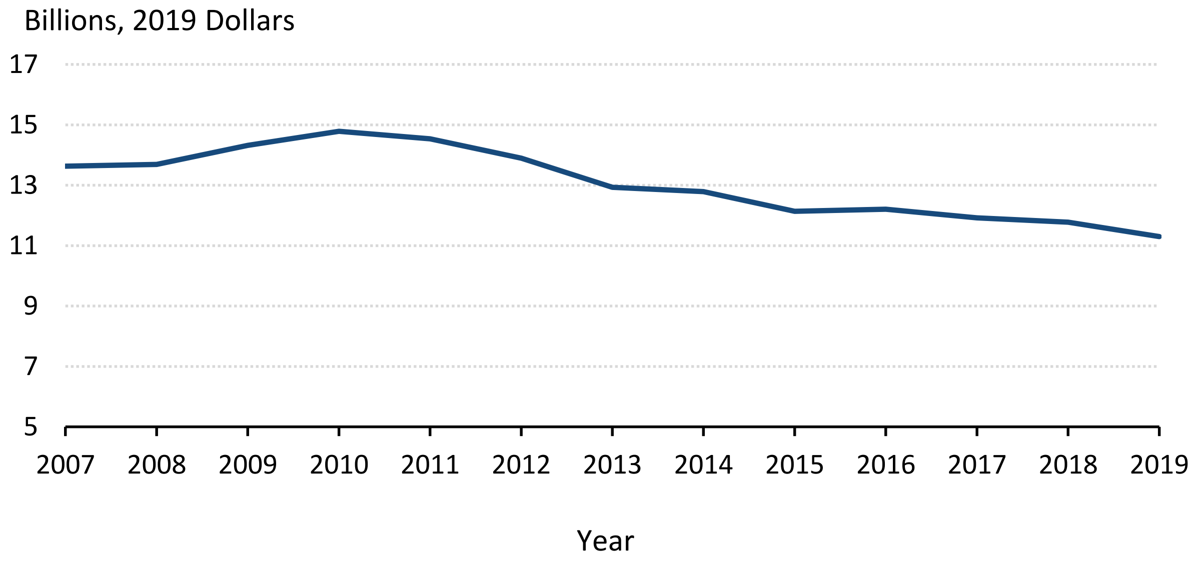
- How did the IRS respond to recent reductions in funding for enforcement?
- What was the impact on returns on investment?
- What was the effect on revenues?

In 2019, the IRS received appropriations totaling $11.3 billion—**24 percent less than in 2010**.

FIGURE 1

IRS Appropriations Fell by 24 Percent

Fiscal Years 2007 - 2019



Source: Appropriation acts and Internal Revenue Service, *Budget in Brief,* various years.

The biggest cutbacks were in enforcement. Funding fell by nearly $2 billion from 2010 levels.

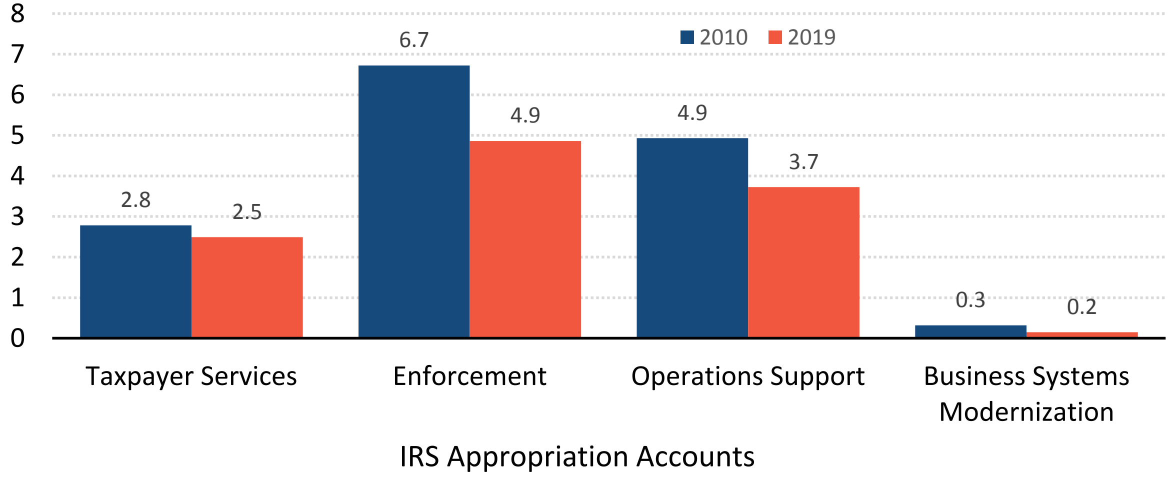
In some years, some of the funds appropriated for enforcement were shifted to other IRS accounts. Those transfers are not shown here.

FIGURE 2

Where Have the Cuts Been Deepest?

Fiscal Years 2010 and 2019

Billions, 2019 Dollars



Source: Appropriation acts and Internal Revenue Service, *Budget in Brief*, various years.

Budget Cutbacks Accompanied By More Responsibilities

- Administration of new tax credits for health insurance coverage and the enforcement of health coverage mandates (Affordable Care Act in 2010)*
- Processing of reports of financial assets held abroad by U.S. citizens (Foreign Account Tax Compliance Act in 2010)
- Acceleration of matching of W-2s to returns and delay of payment of certain refundable tax credits (Protecting Americans from Tax Hikes Act in 2015)*
- Major changes to the tax code and forms (the 2017 tax act)*

* *Some start-up funding provided*.

Since 2010, the number of IRS full-time-equivalent (FTE) employees fell from about **95,000 to 74,000**.

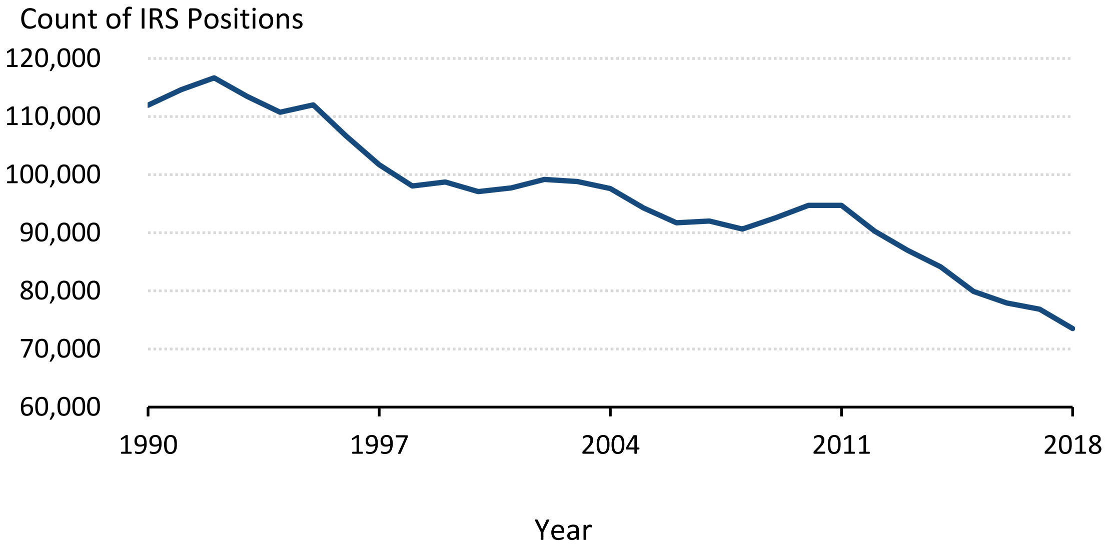
Two-thirds of the reductions occurred in examinations and collections.

The IRS lost nearly **8,000** revenue officers and agents—the employees responsible for the most difficult audits.

FIGURE 4

The Number of IRS Employees fell Sharply

Fiscal Years 1990 - 2018



Source: Internal Revenue Service, *Data Book 2018*.

The IRS's Aging Computer Systems

- Master files rely on programming language that is over 50 years old.

- From former IRS Commissioner John Koskinen:
  - The IRS's technology is "analogous to driving a Model T automobile that has satellite radio and the latest GPS system."

- But electronic filing grew from 50 percent of returns in 2010 to 70 percent in 2018.

The audit rate fell from **0.9 percent** in 2010 to **0.5 percent** in 2018.

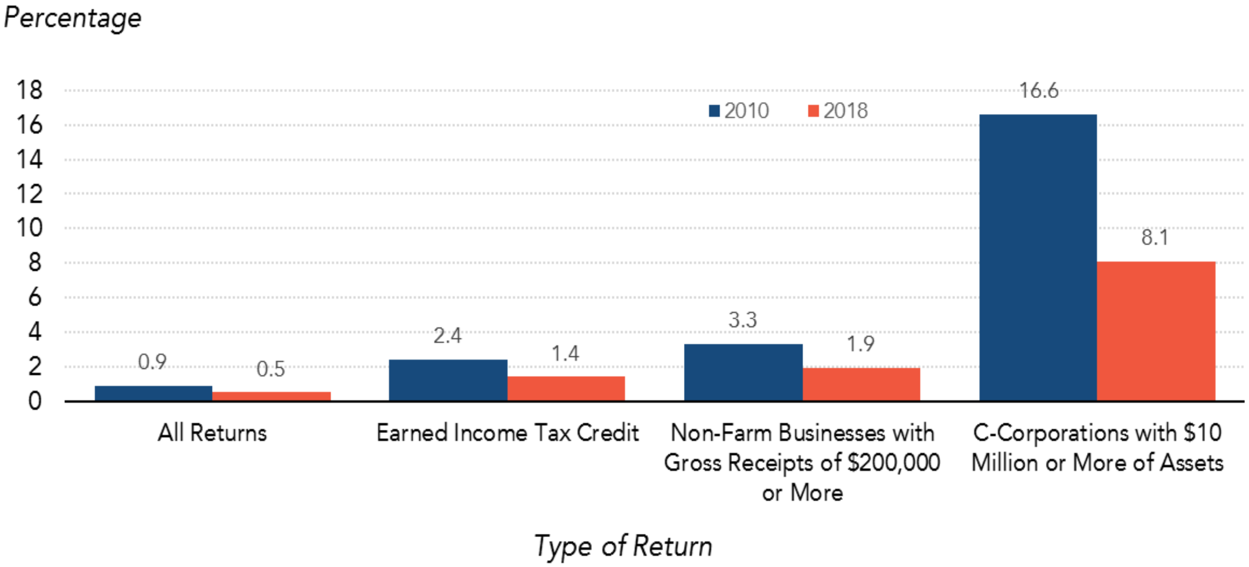
The chance of being audited fell for both low-income taxpayers and for big businesses.

Audit rates for the largest corporations—$20 billion or more of assets—dropped by half—from **98 percent to 49 percent**.

FIGURE 3

Audit Rates

Fiscal Years 2010 and 2018



Source: Internal Revenue Service, *Data Book*, various years.

Enforcement Revenues

- Includes taxes, interest, plus penalties from:
  - Automated underreporting program
  - Examinations
  - Collections
- Includes revenues collected in fiscal year but from actions that may have begun in earlier years.
- Amounts received may reflect economic conditions.
  - 2010: **$66 billion** (2019 dollars)
  - 2018: **$60 billion** (2019 dollars)

Average Return on Investment (ROI)

- In our study, the average return on investment is the amount collected by the IRS relative to the costs of the enforcement activities.
  - Includes taxes, interest, and penalties
  - Includes compensation paid to IRS employees directly involved in enforcement activities
  - Includes costs from beginning of an enforcement action—possibly from prior year—through the collections process
  - Collections may extend over multiple years.
- Limited to tax returns audited in either 2010 or 2017
  - In our study, enforcement revenue is equal to the amounts—which may be received in multiple years—attributable to the examinations that occurred in either 2010 or 2017.

What Is Not Included in Our Measures of ROI?

- Costs of support staff and management
- Costs of buildings, computers, etc.
- Costs incurred by other agencies (e.g., Tax Division at Department of Justice)
- Savings from deterrence

Data

- Enforcement Revenue Income System (ERIS)
  - IRS data set
  - Follows each tax return from start of enforcement activity through collections.
  - Contains number of hours worked by IRS staff and their grade (level) on the government’s salary scale
  - Includes enforcement-related payments from individual
- Pay scales from Office of Personnel Management
- Costs of nonwage compensation based on studies by Congressional Budget Office

3.2 million returns—both newly-initiated and carried over from prior years—were audited in 2010.

Number of returns in audit fell to **1.8 million** in 2017.

Most audits were conducted through correspondence—and that ratio did not change much between 2010 and 2017.

But a smaller share of field audits in 2017 were started that year compared to 2010.

TABLE 1

Types of Examinations Conducted in 2010 and 2017

	2010	2017
Type of Examination (Percent)		
Field	23	21
Office	12	11
Correspondence	65	68
Total (thousands)	3,206	1,827

Source: Authors' calculations from Enforcement Revenue Information System.

TABLE 2

Number of Tax Returns in Examinations (After Exclusions) Conducted in 2010 or 2017

	Tax Returns	
	2010	2017
Total	3,205,573	1,827,295
Exclude returns with Earned Income Tax Credit	2,302,088	1,184,662
and exclude if reported hours = 0	1,921,456	1,079,638
and exclude if in top half percentile of enforcement revenue	1,911,856	1,074,246
and limit to case where enforcement completed by March 31, 2012 (2019)	1,332,663	917,531

Source: Authors' calculations from Enforcement Revenue Information System.
Notes: EITC returns are excluded because savings from pre-refund audits (which are generally associated with the EITC) are not counted as enforcement revenue in ERIS. The cut-offs for the top half percentile of enforcement revenue are:

2010: Field: $790,000; Office: $43,000; Correspondence: $30,000
2017: Field: $1,200,000; Office: $62,000; Correspondence: $40,000

The more complicated the examination, the more time spent on it and related activities.

The average hours per tax return increased by 2 hours between 2010 and 2017.

But the average rose by 12 hours for field examinations.

TABLE 3

Average Hours Worked by IRS Staff on Examinations (After Exclusions) Conducted in 2010 and 2017 and Related Activities

	2010	2017
Type of Examination		
Field	45	57
Office	10	11
Correspondence	2	2
Overall	15	19

Source: Authors' calculations from Enforcement Revenue Information System.

Notes: Sample restricted to returns (1) without earned income tax credit, (2) with positive reported hours for IRS enforcement and collections staff, (3) with enforcement revenue in the zero to 99.5 percent range, and (4) with enforcement activities completed by March 31, 2012 (March 31, 2019).

TABLE 4

Average Costs of Examinations (After Exclusions) Conducted in 2010 And 2017 And Related Activities

	Per Return		Per Hour	
	2010	2017	2010	2017
Type of Examination				
Field	2,920	4,170	65	73
Office	447	556	46	52
Correspondence	80	98	40	43
Overall	*932*	*1,285*	*62*	*69*

Source: Authors' calculations from Enforcement Revenue Information System. Data on federal government salaries from Office of Personnel Management's website. Authors' calculations of costs of federal benefits based on Congressional Budget Office, *Comparing the Compensation of Federal and Private-Sector Employees, 2011 to 2015* , and Congressional Budget Office, *Comparing the Compensation of Federal and Private-Sector Employees* ,

Notes: Sample restricted to returns (1) without earned income tax credit, (2) with positive reported hours for IRS enforcement and collections staff, (3) with enforcement revenue in the zero to 99.5 percent range, and (4) with enforcement activities completed by March 31, 2012 (March 31, 2019).

TABLE 5

Average Enforcement Revenue From Examinations (After Exclusions) Conducted in 2010 and 2017

	Per Return (dollars)		Per Hour (dollars)	
	2010	2017	2010	2017
Type of Examination				
Field	12,053	14,496	269	254
Office	2,562	3,139	265	294
Correspondence	1,075	1,693	540	748
Overall	*4,376*	*5,427*	*289*	*293*

Source: Authors's calculations from Enforcement Revenue Information System.

Notes: Sample restricted to returns (1) without earned income tax credit, (2) with positive reported hours for IRS enforcement and collections staff, (3) enforcement revenue in the zero to 99.5 percent range, and (4) with enforcement activities completed by March 31, 2012 (March 31, 2019).

The average enforcement revenue per return was 11 times higher for field examinations than for correspondence audits conducted in 2010 and 9 times higher in 2017.

However, the average enforcement revenue per hour was larger for correspondence audits than for the other types of examinations in 2010, and that gap grew larger in 2017.

The ROI was greatest for correspondence examinations—the least costly type with the least revenue per return.

Only the ROI for correspondence audits rose from 2010 to 2017—reflecting the growth in average enforcement revenue.

The ROI fell for field audits because of the increase in hours worked.

TABLE 6

Average Returns on Investment for Examinations (After Exclusions) Conducted in 2010 and 2017

	2010	2017
Type of Examination		
Field	4.1	3.5
Office	5.7	5.7
Correspondence	13.4	17.3
Overall	4.7	4.2

Source: Authors' calculations from Enforcement Revenue Information System.

Notes: Sample restricted to returns (1) without earned income tax credit, (2) with positive reported hours for IRS enforcement and collections staff, (3) enforcement revenue in the zero to 99.5 percent range, and (4) with enforcement activities completed by March 31, 2012 (March 31, 2019).

TABLE 7

Average Returns on Investment for Examinations Conducted in 2010

We estimated the average ROI for audits conducted in 2010, including all revenue collected through March 2019.

Overall, the ROI was 8:1—again highest for correspondence audits, but close to the average ROIs for field and office audits.

Type of Examination	
Field	7.5
Office	7.3
Correspondence	18.5
Overall	8.0

Source: Authors' calculations from Enforcement Revenue Information System.

What if inflation-adjusted funding had remained at the 2010 levels throughout decade?

- And if there had been no changes in tax law, IRS enforcement, and taxpayer behavior:
  - Then audits in 2019 would yield **$15 billion** in enforcement revenue over time.
- The same conditions as above, except the funds—in excess of the 2019 appropriations—were used for field examinations:
  - Then audits in 2019 would yield **$14 billion** in enforcement revenue over time.
- The estimates assume (1) additional funding would not be used for EITC returns; (2) the audits would not result in unusually large collections; and (3) the marginal return on additional investment would be equal to the average return on investment.

Conclusions

- Cutbacks in funding between 2010 and 2017 did not change the composition of audits by types.
  - But fewer field audits—as share of all field audits—initiated in 2017 than in 2010.
- An increase in hours worked reduced the ROI for field examinations, whereas an increase in average enforcement revenues raised the ROI for correspondence audits.
- On average, the ROI on 2010 audits was 8:1—but this calculation omits EITC audits (with low costs and low yields) and taxpayers with unusually large payments (with high costs and high yields).
- Focusing only on ROIs, however, for audit selection could lead to fewer field audits, which typically involve taxpayers with business income and corporations.

Next Steps

- Incorporate more types of costs into ROIs
- Explore characteristics of outliers and frequency
- Estimate ROIs for pre-refund audits
- Estimate revenue effects of cut-backs over the entire decade

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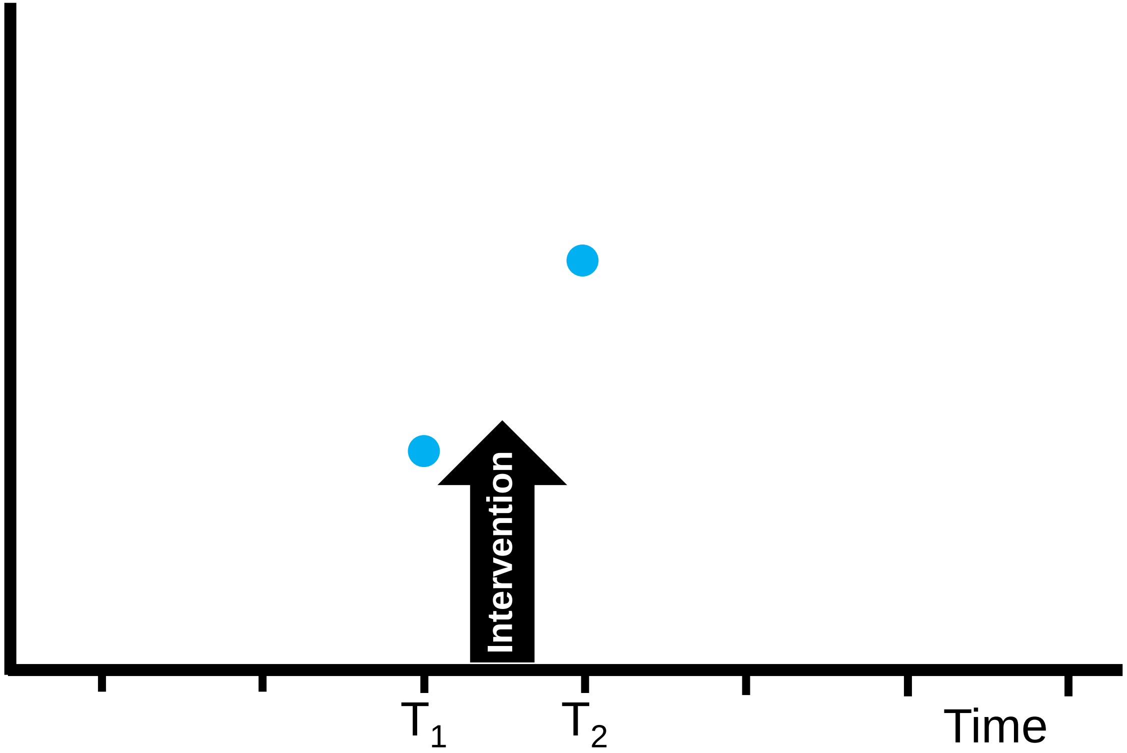
Session 2: The Influence of External Factors on Compliance

Alan Plumley
IRS Research, Applied Analytics, and Statistics

IRS-TPC Research Conference

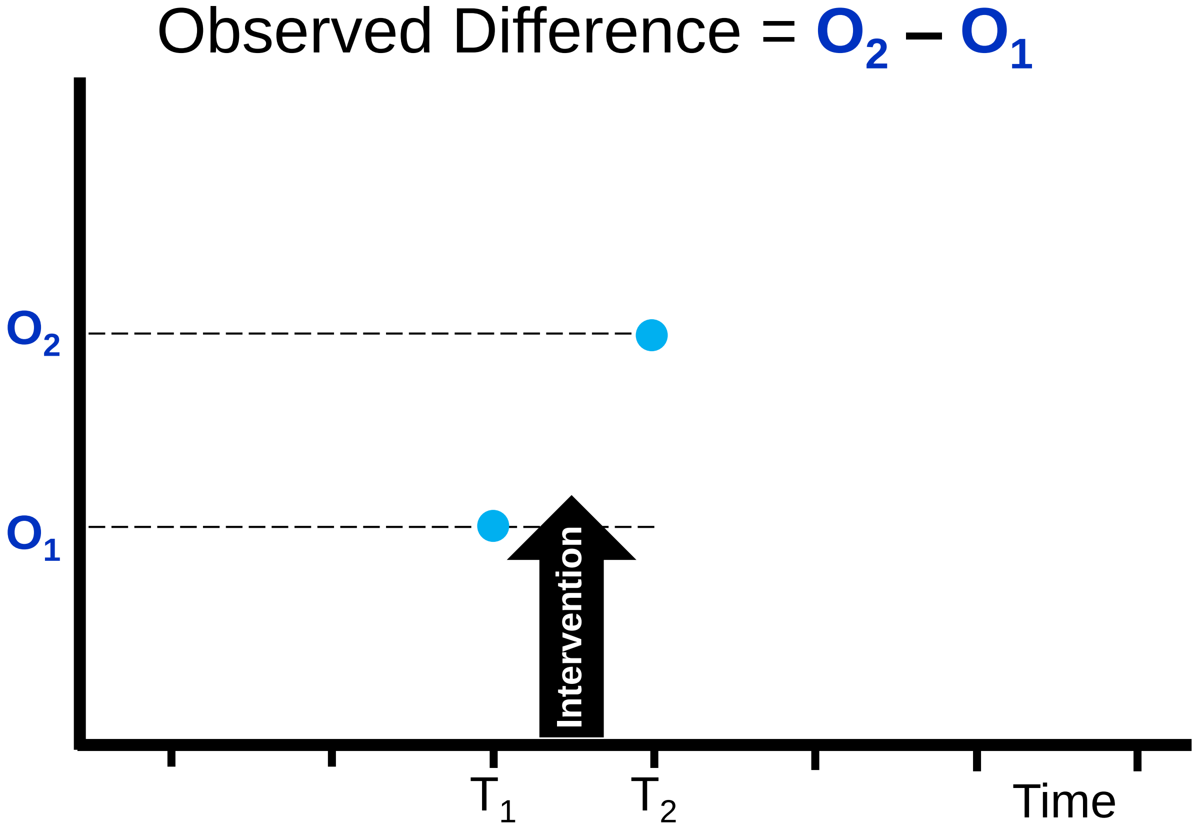
June 20, 2019

What is the impact of an intervention?



That is, how much of the change is attributable to the intervention?

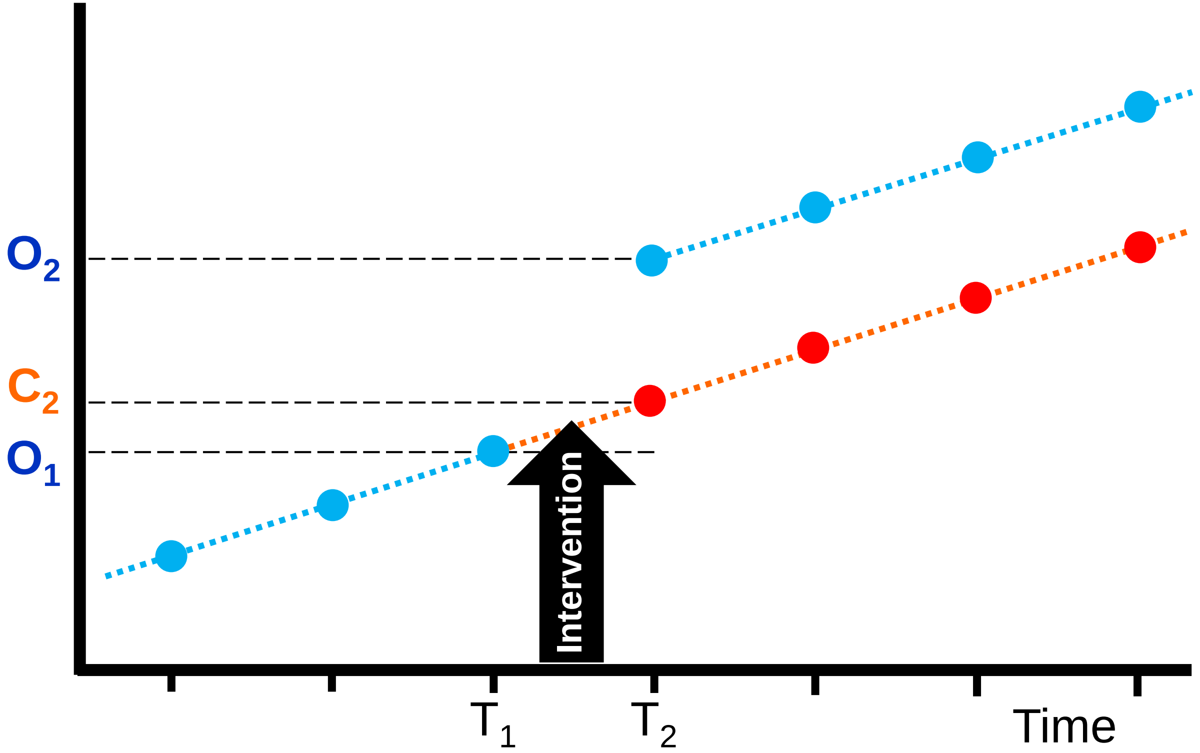
What is the impact of an intervention?



It may appear that the impact is the difference we observe over time.

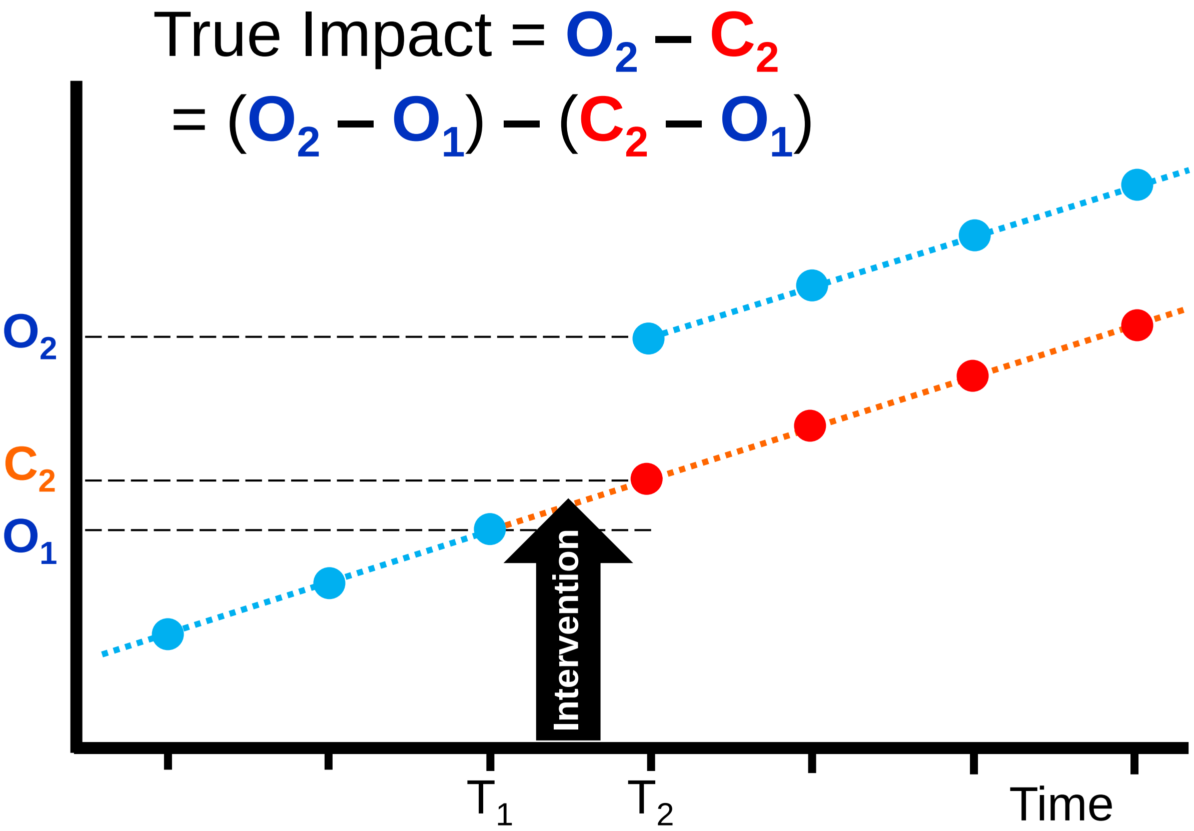
What is the impact of an intervention?

True Impact = $O_2 – C_2$



But the true impact is the difference between what we observe after the intervention (O_2) and what we *would have* observed in the absence of the intervention (C_2).

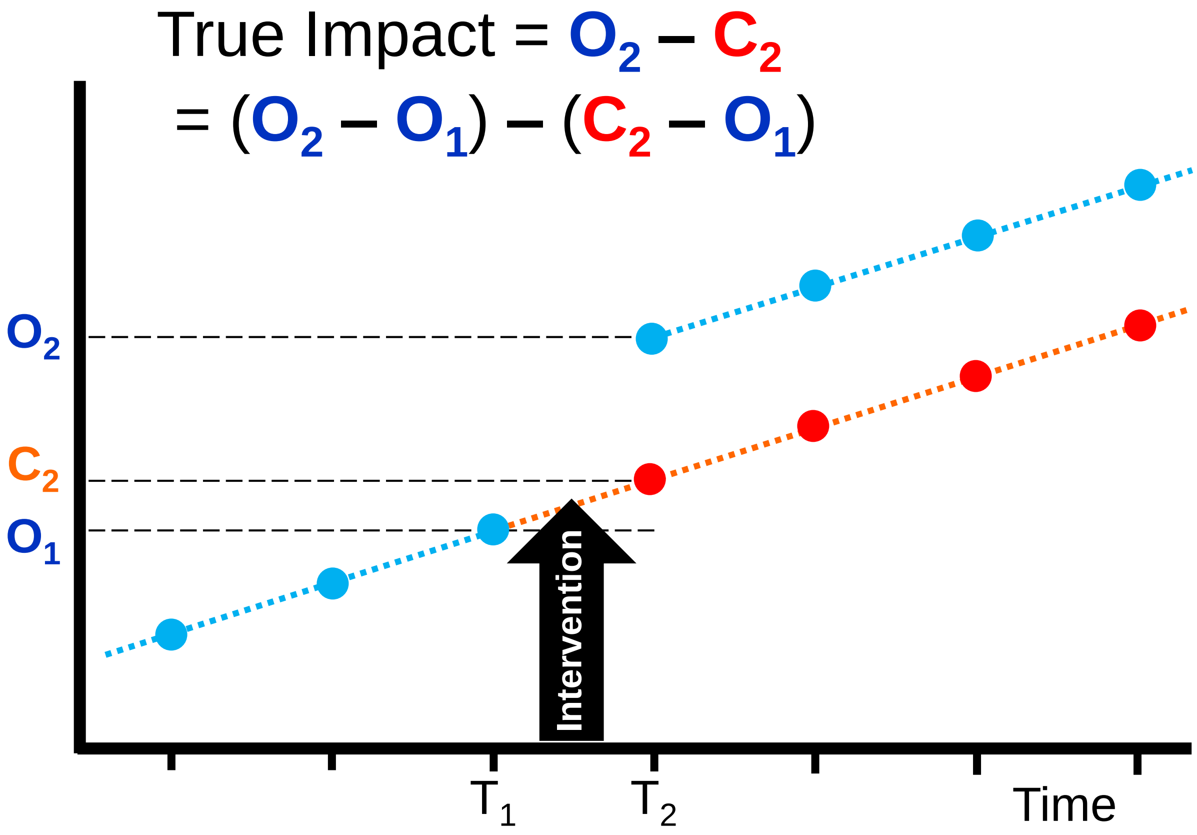
What is the impact of an intervention?



That's the same as the observed difference ($O_2 - O_1$) minus the status quo difference over the same interval ($C_2 - O_1$).

It's often called a difference in differences.

What is the impact of an intervention?



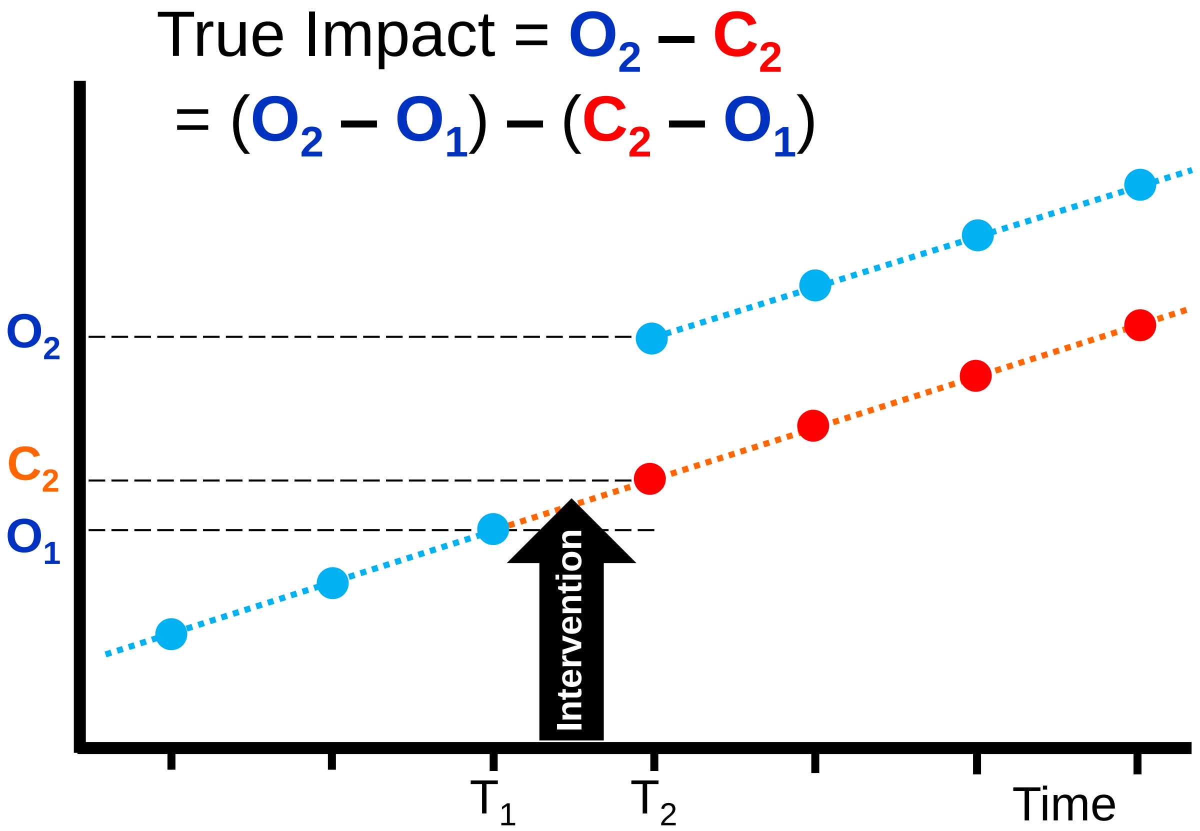
$$\text{True Impact} = O_2 - C_2$$

$$= (O_2 - O_1) - (C_2 - O_1)$$

Simple in concept. What's the challenge?

We generally don't observe what *would have* happened in the absence of the intervention (C_2), so we have to *estimate* it.

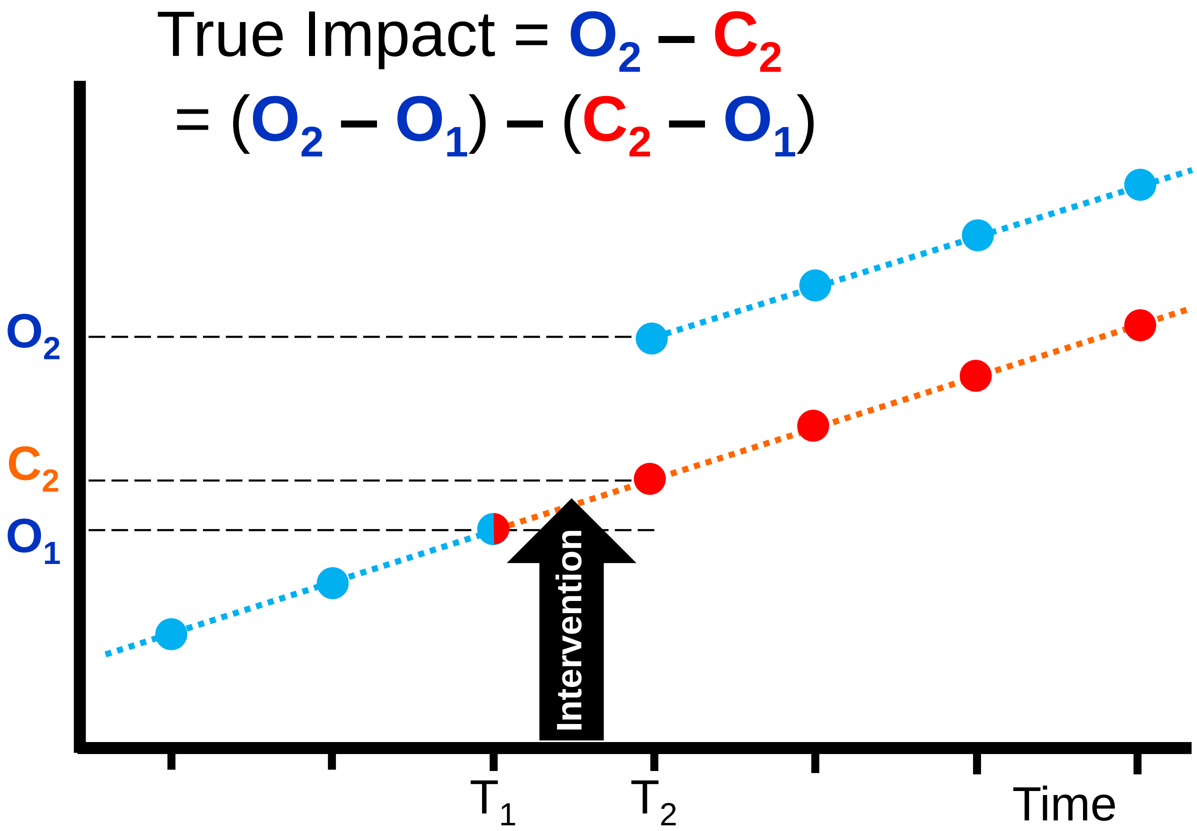
What is the impact of an intervention?



Ideal would be to set up a randomized control trial *in advance* of the intervention.

Most analyses, though, try to create a control after the fact.

What is the impact of an intervention?


$$\text{True Impact} = O_2 - C_2$$
$$= (O_2 - O_1) - (C_2 - O_1)$$

Key characteristics of a control group:

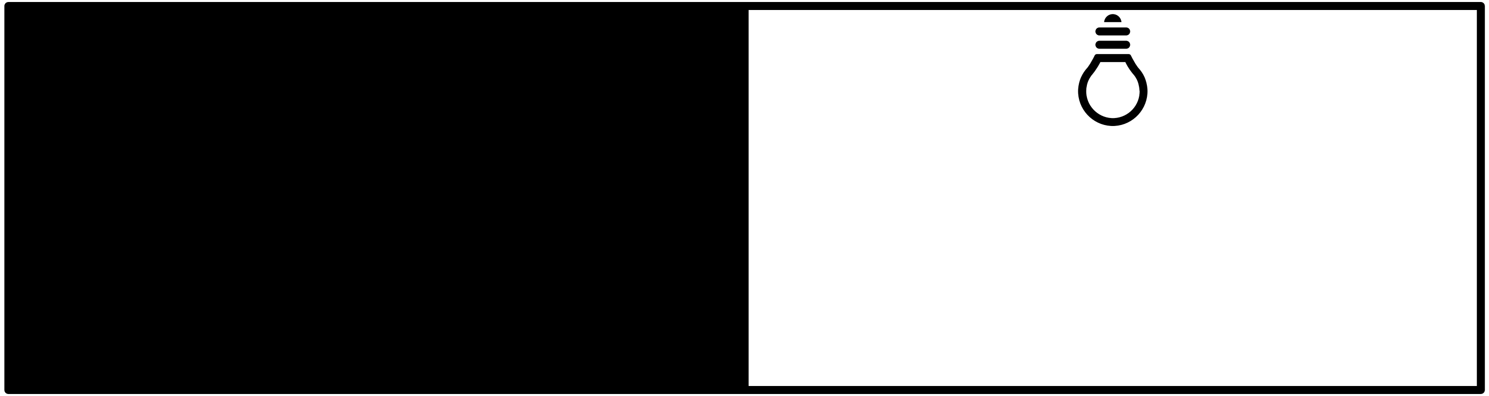
1. Identical to the test group (except for the intervention)
2. Not affected by the intervention

What would have happened in the absence of the intervention?

Author	Outcome of interest	Intervention	Control for what *would* have happened
Lin	Indirect indicators of potential EITC noncompliance on paid-prepared returns	Legislative, regulatory and tax administrative changes affecting the paid return preparer industry	Corresponding indicators on self-prepared returns (controlling for DIF score, presence of children, and non-claimants)
Adhikari	Reporting of business receipts & expenses by sole props & S-corps	3rd-party reporting of payment amount to vendor and IRS on Form 1099-K	Index of payment card use in ZIP codes in highest quartile vs. those in lowest quartile
Holtzblatt	Enforcement revenue in 2019	Cuts in the IRS budget between 2010 and 2019	Assumes 2010 ROI would be unchanged

Emily Lin: “Recent Changes in the Paid Return Preparer Industry and EITC Compliance”

Concerns About the Control



- Two identical bare rooms, each filled with the same mix of moths and cockroaches.
- A light is turned on in one room; completely dark in the other.
- After an hour, the lit room has more moths and fewer cockroaches, while the dark room has fewer moths and more cockroaches.

Concerns About the Control

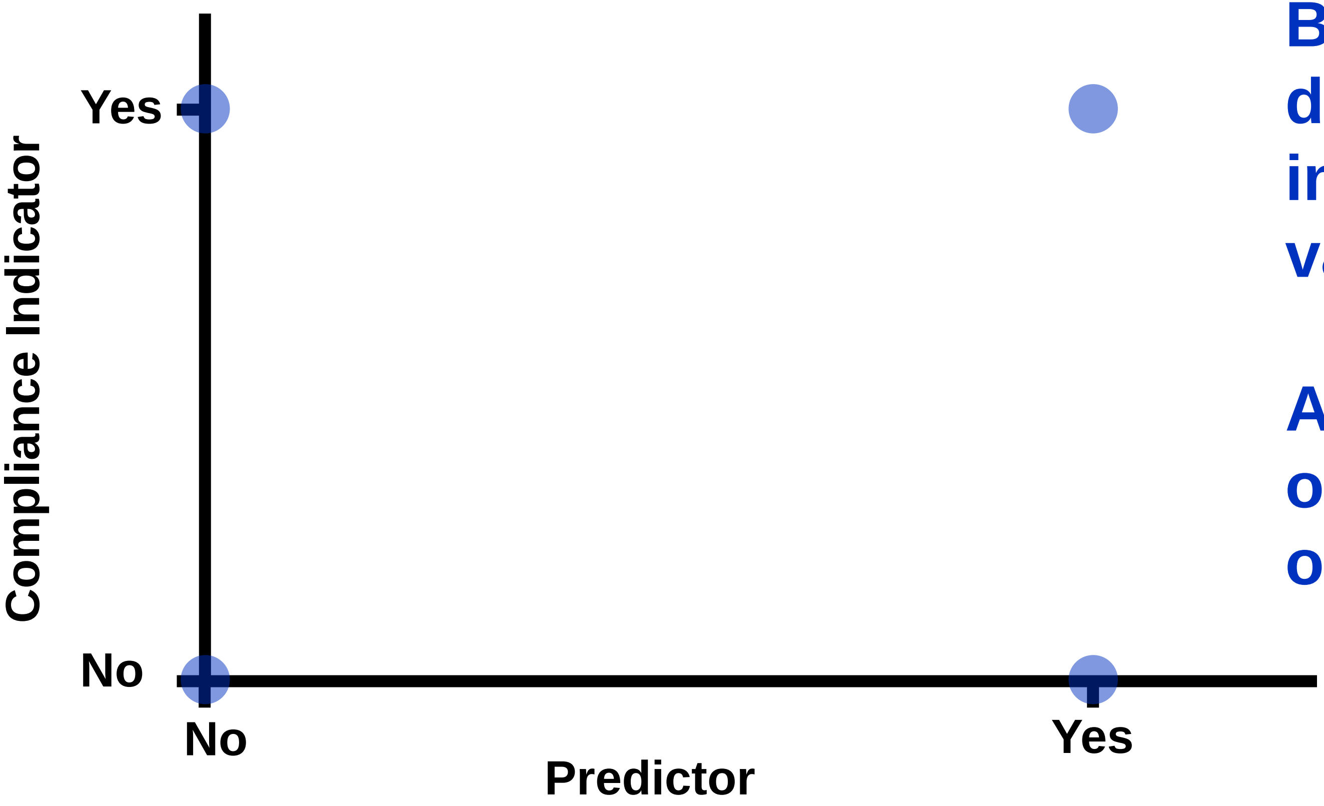
Self-Prepared
Paid Preparation

- Doesn’t eliminate the possibility that preparer reforms (intervention) ***caused*** people to change preparation mode (room) rather than change compliance (cockroaches becoming moths).
- Could check frequency of changing preparation mode.

Notes / Questions

- To what extent are the “compliance indicators” (dependent variables) actually indicative of noncompliance?
- Percentiles of DIF score distributions make sense only within an Exam activity code (which has a unique DIF formula).
- The OLS specification is suspect, given that the dependent variables and all but one of the independent variables are binary.

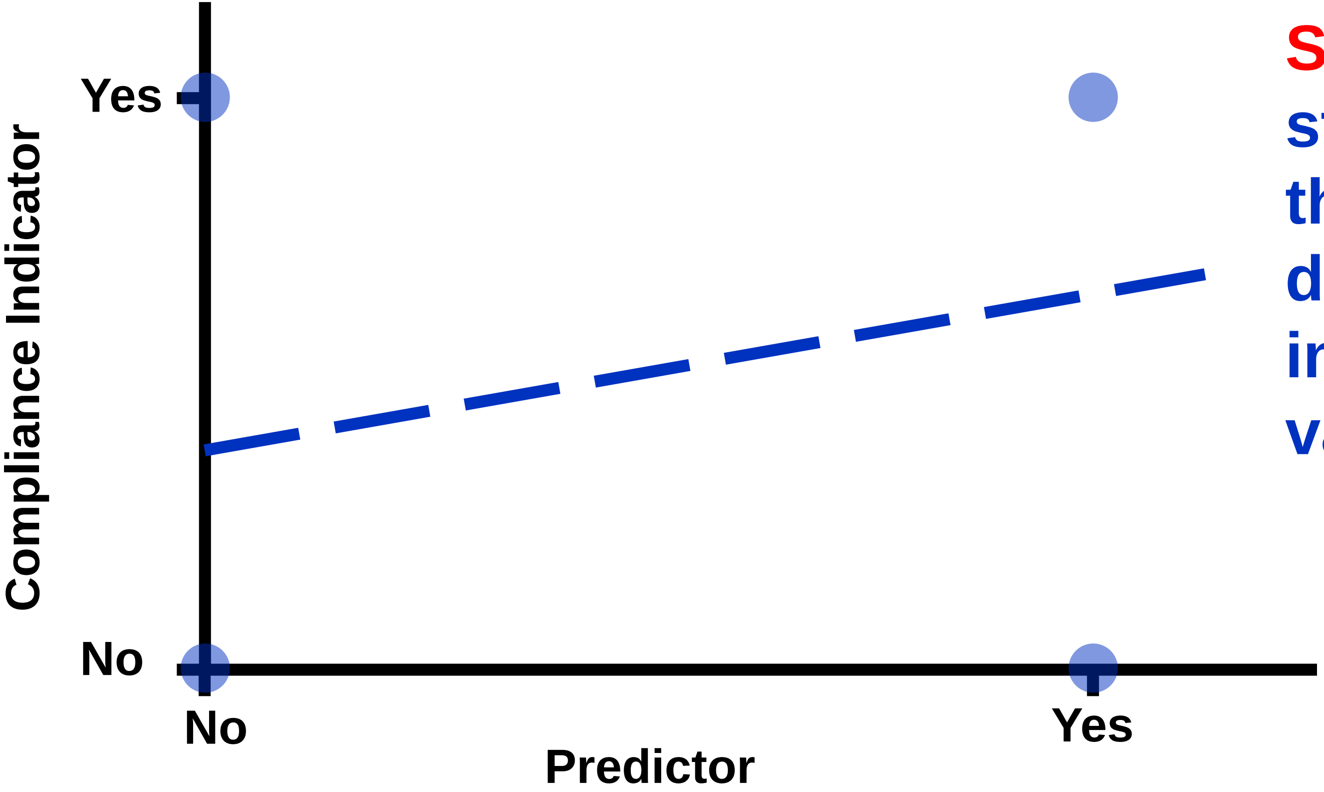
Emily Lin: "Recent Changes in the Paid Return Preparer Industry and EITC Compliance"



Binary dependent and independent variables:

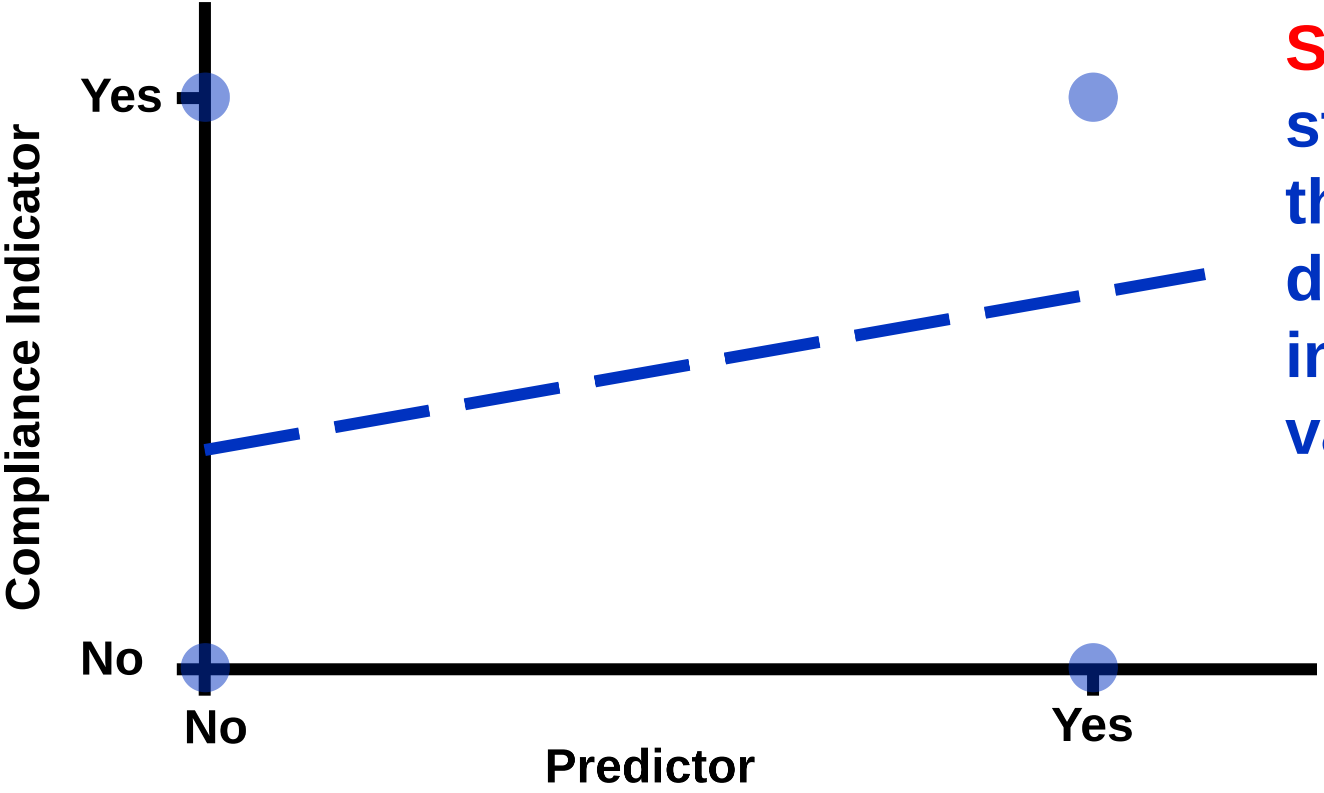
All the observations occur at 4 points

Emily Lin: “Recent Changes in the Paid Return Preparer Industry and EITC Compliance”



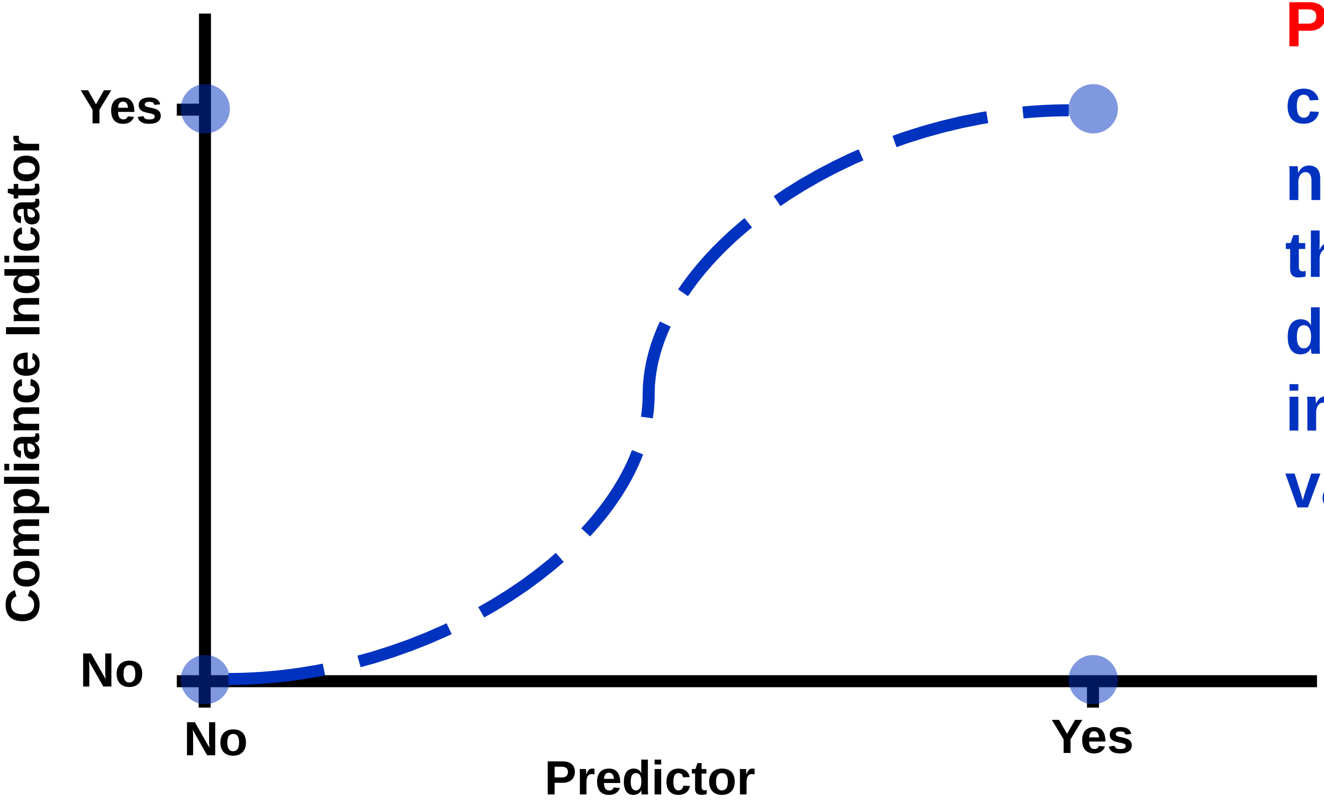
Ordinary Least Squares fit of a straight line through binary dependent and independent variables

Emily Lin: “Recent Changes in the Paid Return Preparer Industry and EITC Compliance”



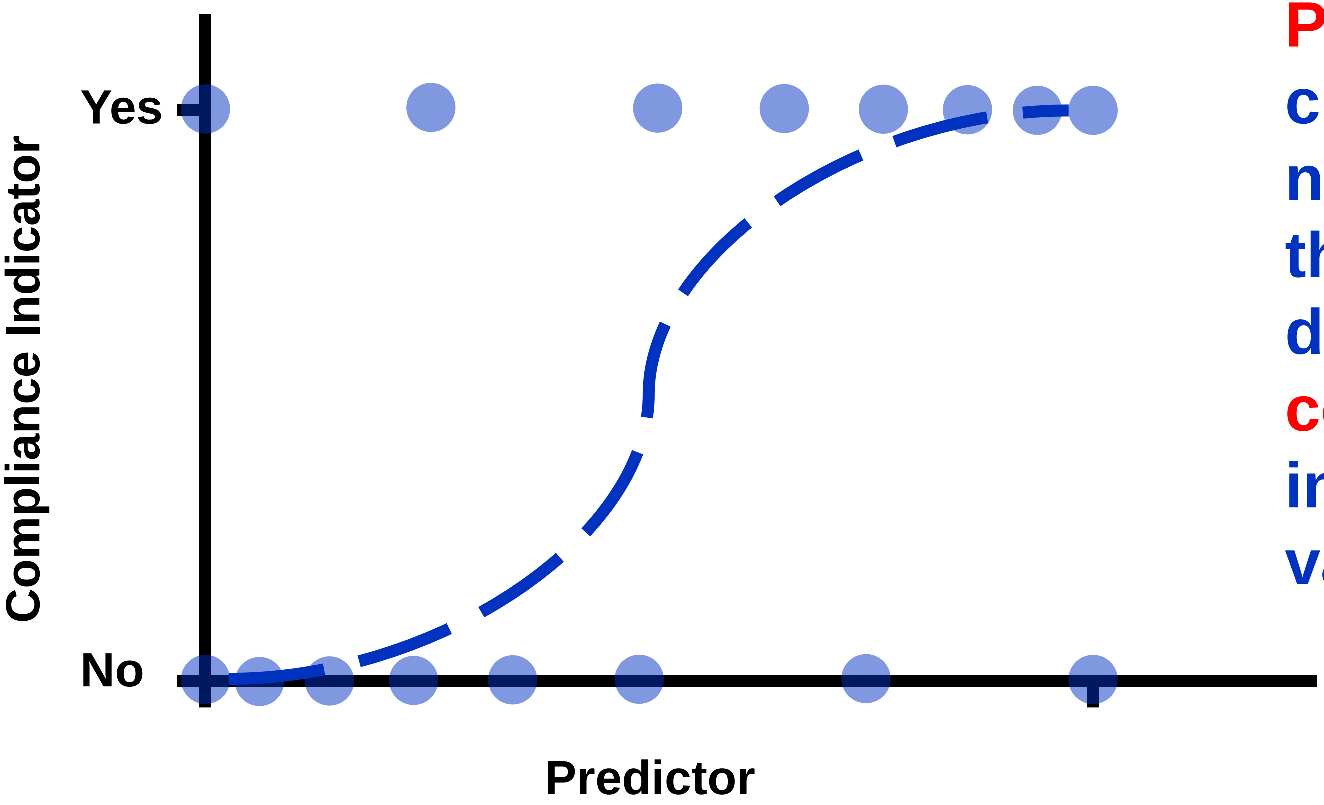
Ordinary Least Squares fit of a straight line through binary dependent and independent variables

Residuals can’t be normally distributed



Probit fit of a cumulative normal curve through binary dependent and independent variables

Emily Lin: “Recent Changes in the Paid Return Preparer Industry and EITC Compliance”



Probit fit of a cumulative normal curve through binary dependent and **continuous** independent variable

Adhikari: “Taxpayer Responses to Third-party Income Reporting”

Concerns About the Control

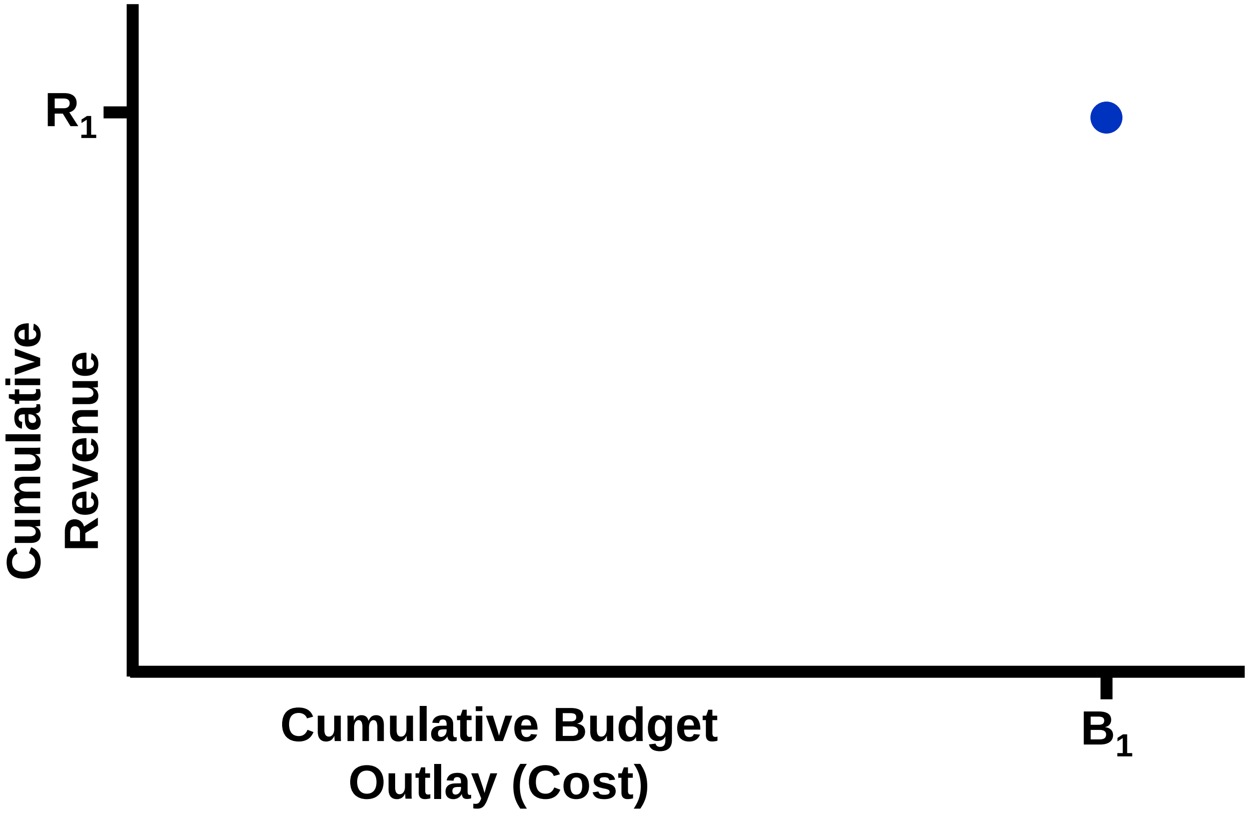
- The index of credit card use is based on the new Form 1099-K (the intervention). The authors ***assume*** that:
  - Credit card use is fixed over time within a 3-digit ZIP code.
  - The 1099-K didn’t affect credit card usage. What if (after intro of 1099-K) vendors gave consumers incentives to use cash or checks?
- Control for businesses that operate in multiple ZIP codes?
  - Those with $10M of receipts or expenses may not be local.
- Control is affected by the intervention, only “less” than the “test” group.

Notes / Questions

- Wouldn’t it be better to create the index from the population, rather than a sample?
- 3-digit ZIP code areas are smaller in the east and in urban areas, so the local assumption may be less true there. Control for population in ZIP code?
- Increase in reported expenses: businesses underclaim expenses if they underreport receipts (to avoid looking like an outlier)
- Tax gap compliance rates are percentages of dollars, not people

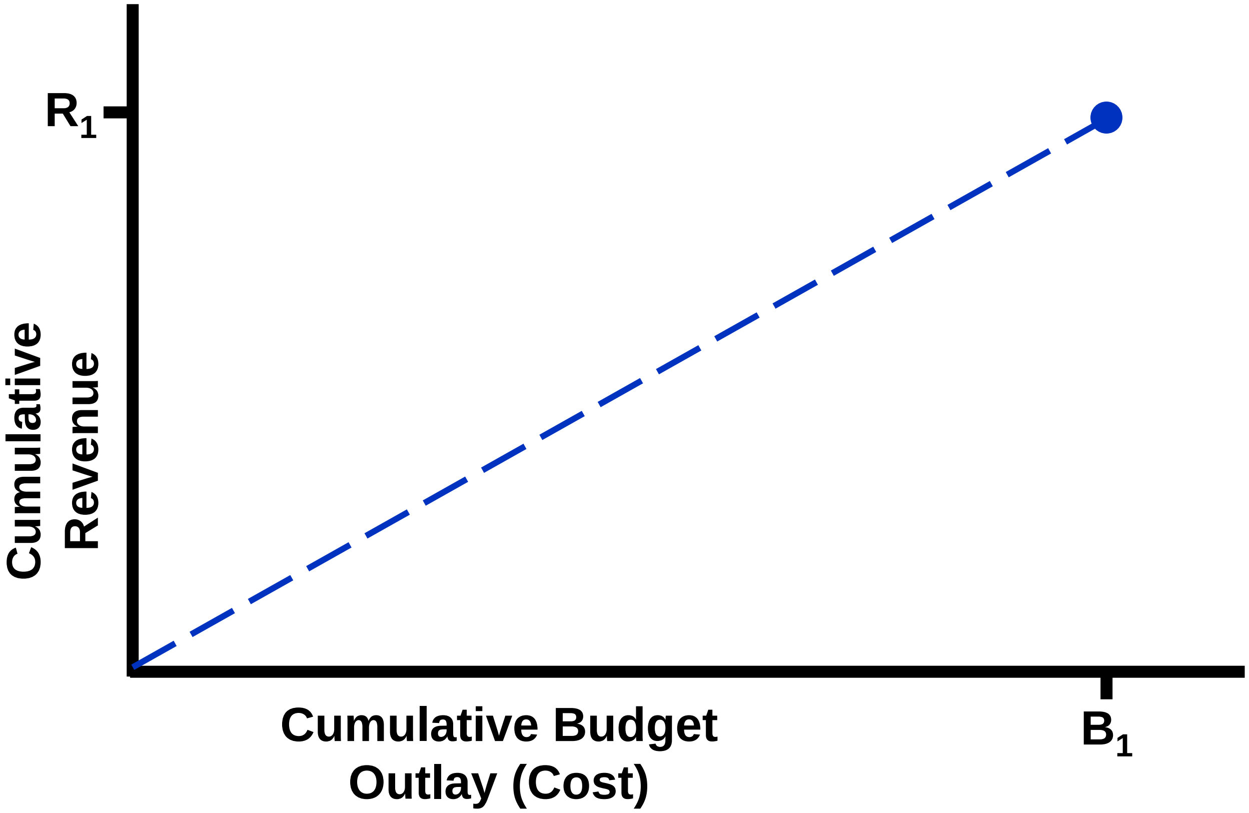
Holtzblatt: “Effect of Recent Reductions in the IRS’s Appropriations on Revenues”

Concerns About the Control



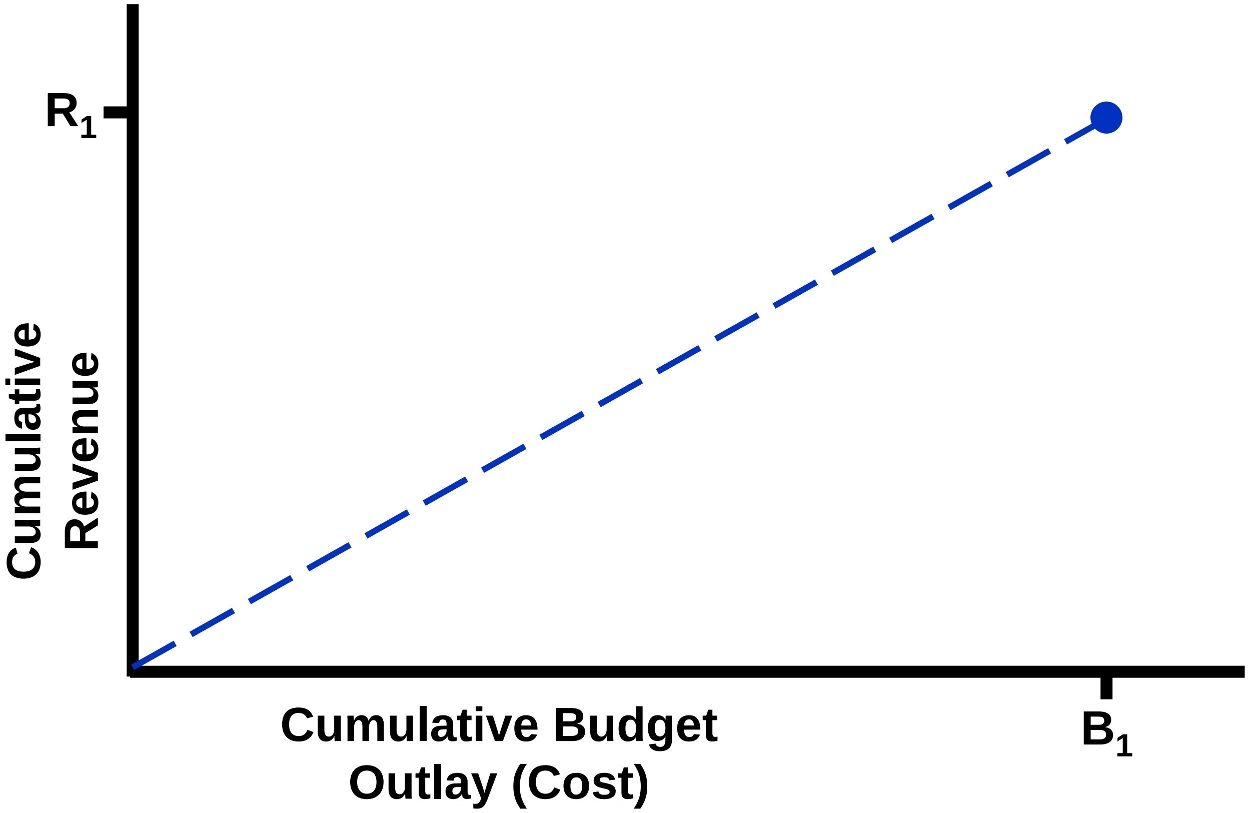
The impact of a budget reduction is the revenue we observe after the budget cut minus the revenue we *would have* observed without the budget cut.

Concerns About the Control



ROI = Average Revenue/Cost
$= R_1/B_1$
(the slope of the dashed line)

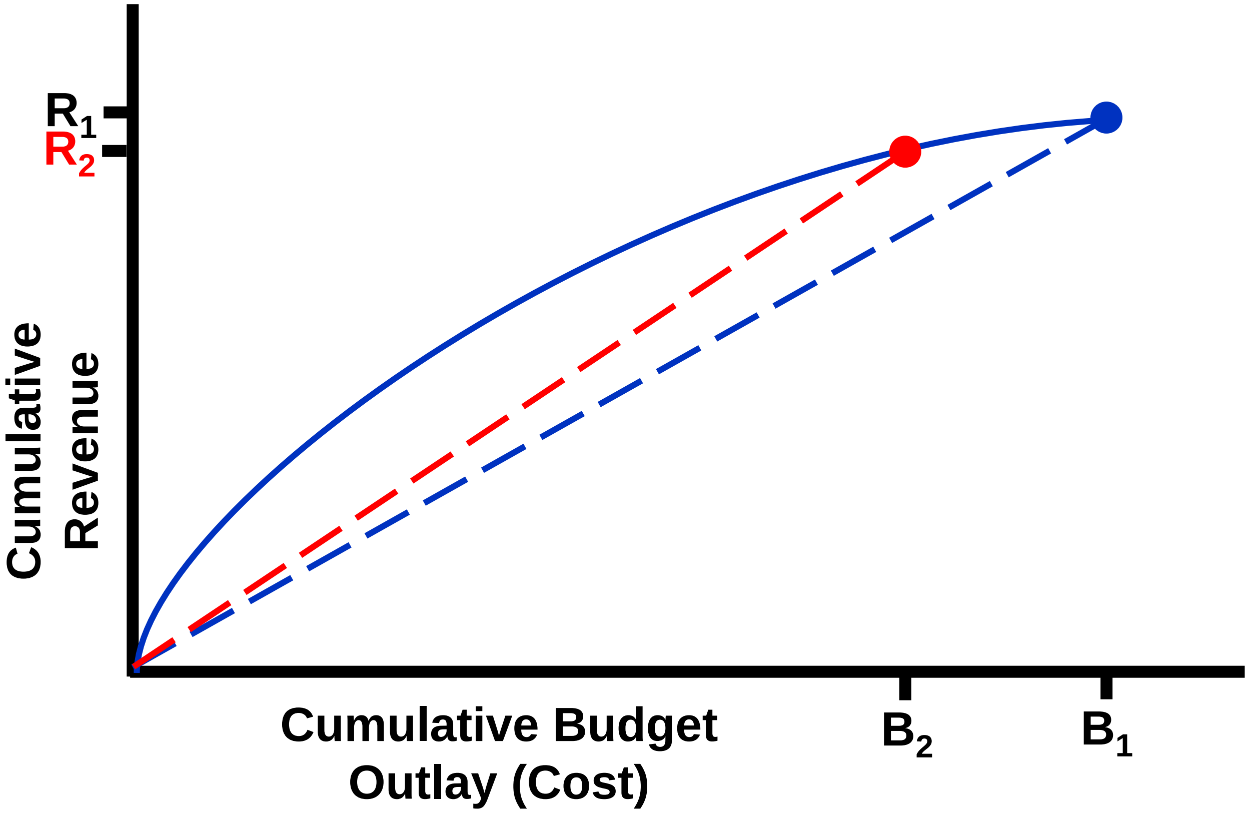
Concerns About the Control



Assuming constant Revenue/Cost ratio appropriate only if enforcement cases are selected randomly.

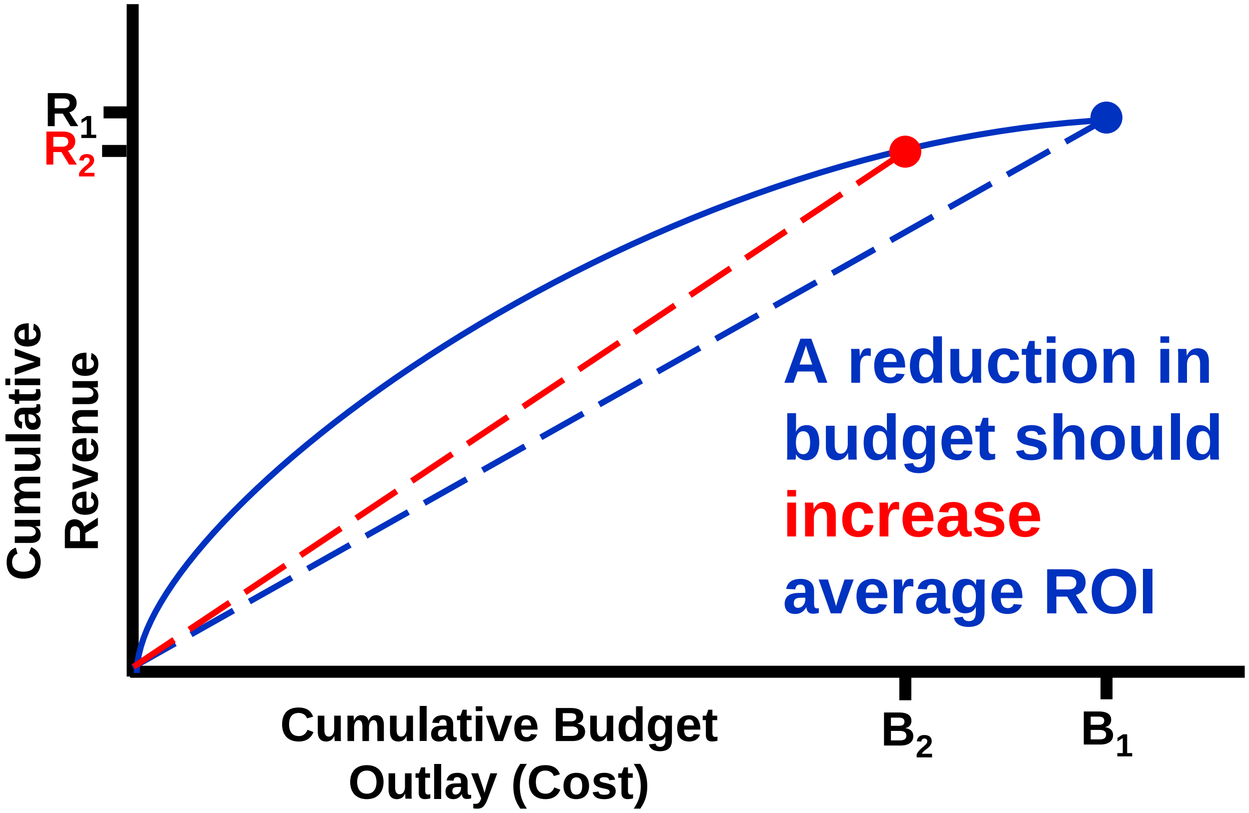
Holtzblatt: "Effect of Recent Reductions in the IRS's Appropriations on Revenues"

Concerns About the Control



Since enforcement cases are selected according to expected risk of noncompliance, the average Revenue/Cost changes as a function of Budget level.

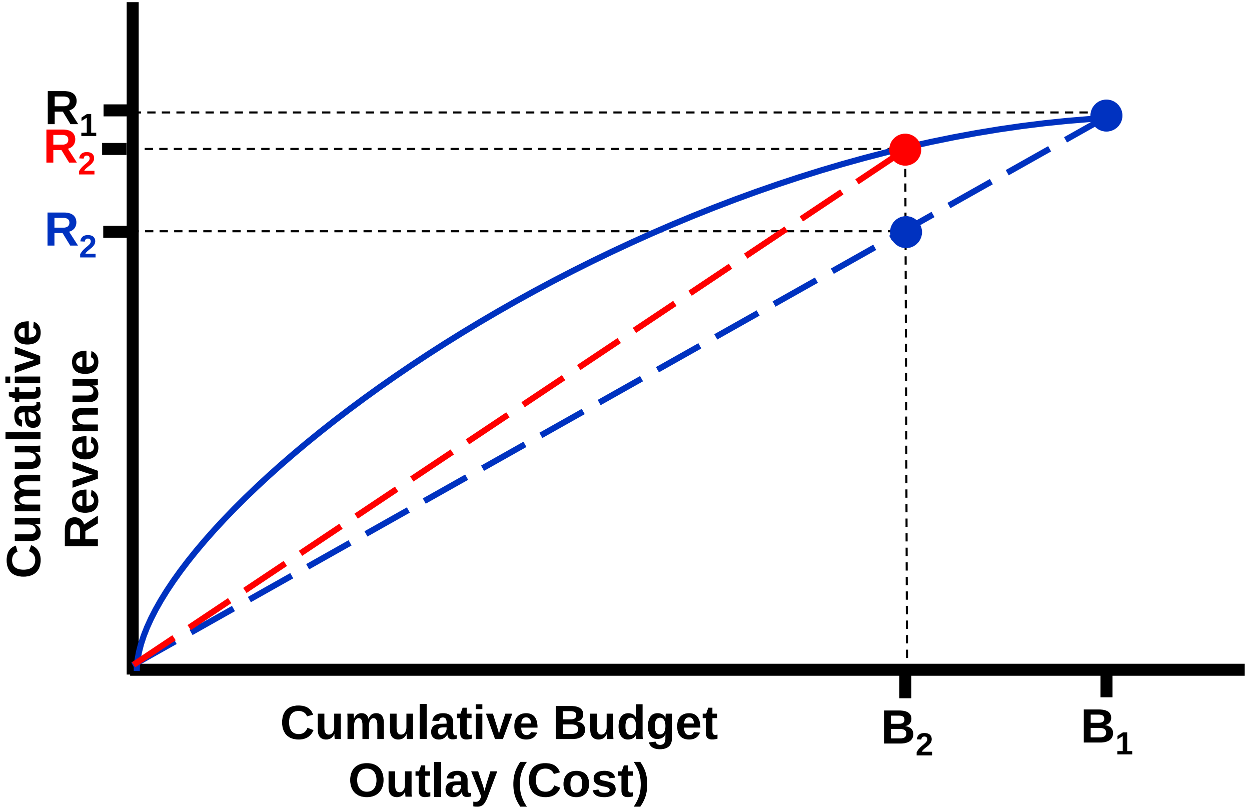
Concerns About the Control



A reduction in budget should increase average ROI

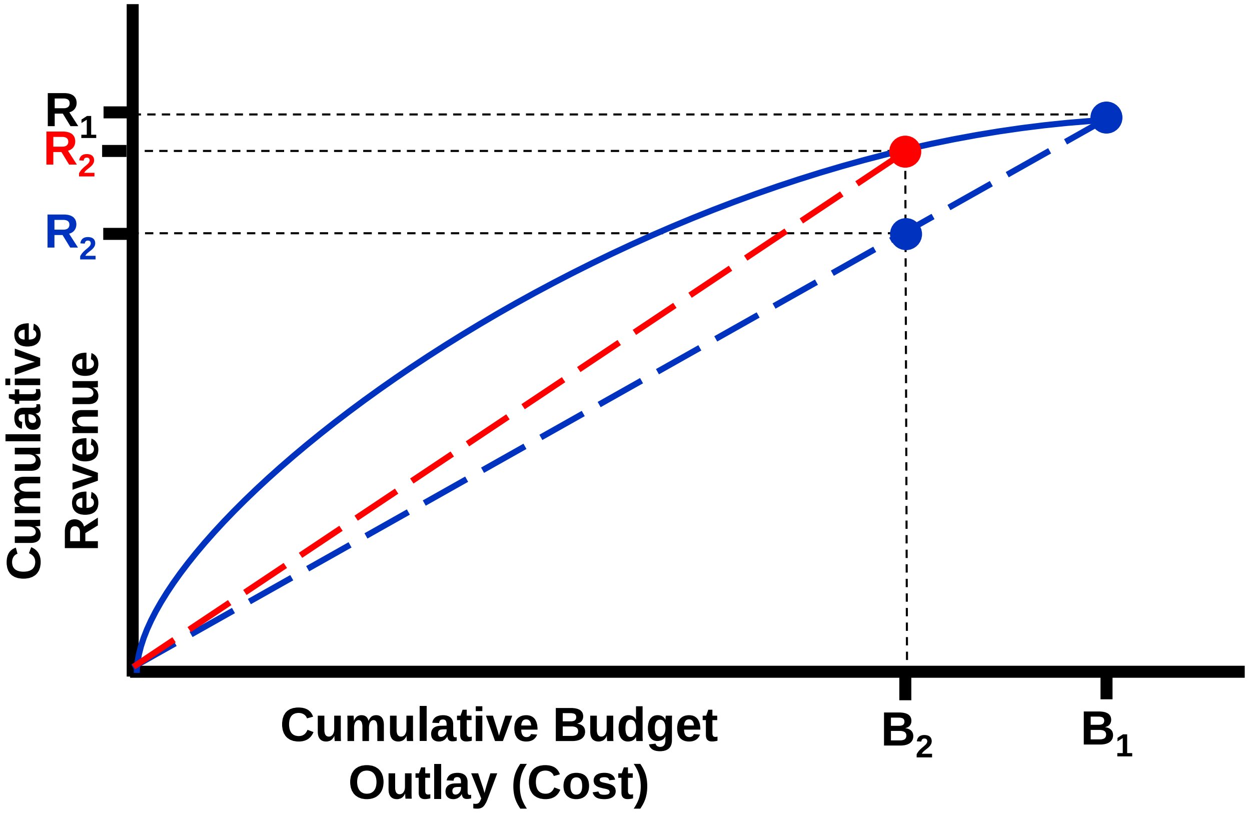
Since enforcement cases are selected according to expected risk of noncompliance, the average Revenue/Cost changes as a function of Budget level.

Concerns About the Control



The marginal change (R_2 – R_1) is less than what would be expected if the average Revenue/Cost didn’t change (R_2 – R_1) .

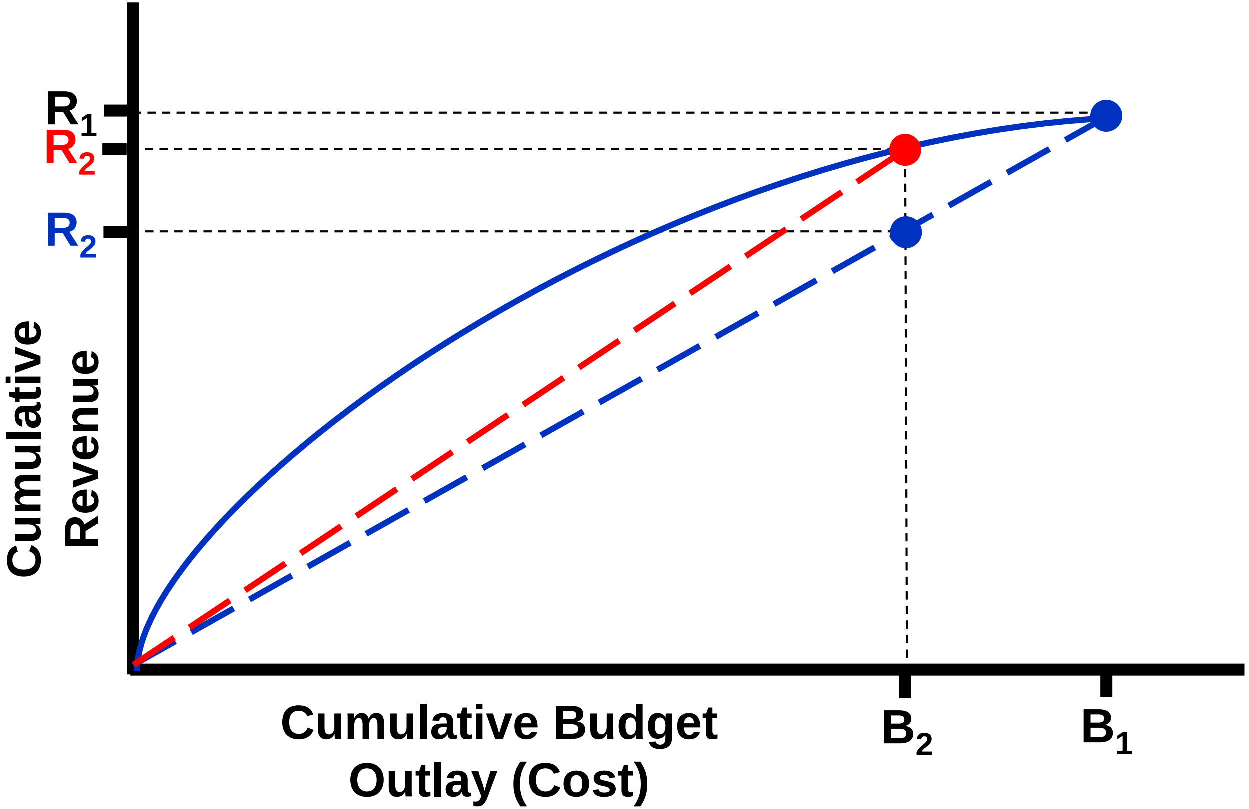
Concerns About the Control



This seems to be true for Correspondence audits, but not Field audits.

(Not enough time for the 2017 cohort's results?)

Concerns About the Control



The authors estimate the forgone revenue as = $ROI_1*(B_2 – B_1)$

But that’s $(R_2 – R_1)$

rather than $(R_2 – R_1) = ROI_2*B_2 – ROI_1*B_1$

Concerns About the Control

- IRS enforcement is a fruit salad: apples, oranges, bananas, etc. You can’t assume that the mix of fruit stays the same (even with a fixed budget).
- The mix has a huge impact on outcomes.
- Better to study each category separately.
- But even if you did that, the ROI should increase from a budget cut, so the marginal loss in revenue would be less than if ROI remained constant.

Notes / Questions

- Restricting 2010 sample to those completed by March 2012 likely doesn’t exclude corporation carry-forwards/backs since 3/2012.
- I would exclude interest & penalties (we shouldn’t rely on them to increase ROI)
- How to isolate Collection costs related solely to Examinations?
- AUR = **Automated** (not automatic) Underreporter program
- ERIS = Enforcement Revenue **Information** (not income) System

IRS Research, Applied Analytics, and Statistics

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Session 2. The Influence of External Factors on Compliance

Moderator:	***George Contos*** *IRS, Communications & Liaison*
Recent Changes in the Paid Return Preparer Industry and EITC Compliance	***Emily Y. Lin*** *Treasury Office of Tax Analysis*
Taxpayer Responses to Third-party Income Reporting: Evidence from Spatial Variation across the U.S.	***Bibek Adhikari*** *Illinois State University*
Effect of Recent Reductions in the Internal Revenue Service's Appropriations on Revenues	***Janet Holtzblatt*** *Tax Policy Center*
Discussant:	***Alan Plumley*** *IRS:RAAS*

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Session 3. Improving the Digital Taxpayer Experience

Moderator:	***Alcora Walden*** *IRS, Office of Online Services*
Online Account User Testing	***Heather Gay*** *Mediabarn Inc.*
Accessible Authentication for All: An Evaluation Framework for Assessing Usability and Accessibility of Authentication Methods	***Ronna ten Brink*** *MITRE Corporation*
Customer Experience Research Leads to Better Design and Increased Adoption	***Nikki Kerber*** *Booz Allen Hamilton*
Discussant:	***Courtney Rasey*** *IRS, Wage & Investment Division*

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Online Account User Testing

Improving the User Experience through iterative design and research

Office of Online Services

June 20, 2019

- What Is Online Account?
- Overview of User Testing
  - Methodology
  - What We’ve Tested So Far
  - Simple, Impactful Improvements
  - What We’ve Learned – Key Themes
- The Future of Online Account

Agenda

What Is
Online Account?

Vision and Purpose

“For taxpayers who have to interact with the IRS (e.g., balance due, notice, refund), Account is a one-stop shop for personalized tax assistance that enables taxpayers to serve themselves.”

Business priorities established in 2014 and reaffirmed in 2018:

- Make Online Account easy to use so that it is spontaneously used by taxpayers and they can help themselves.
- Reduce the number of phone calls to the IRS and save taxpayers money.
- Increase public trust in the IRS through secure access to your own tax data.
- Improve voluntary compliance.

Balance Due

Check total balance owed to the IRS and see details by tax year.

Make A Payment

Make payments (hands off to other systems).

See Payments

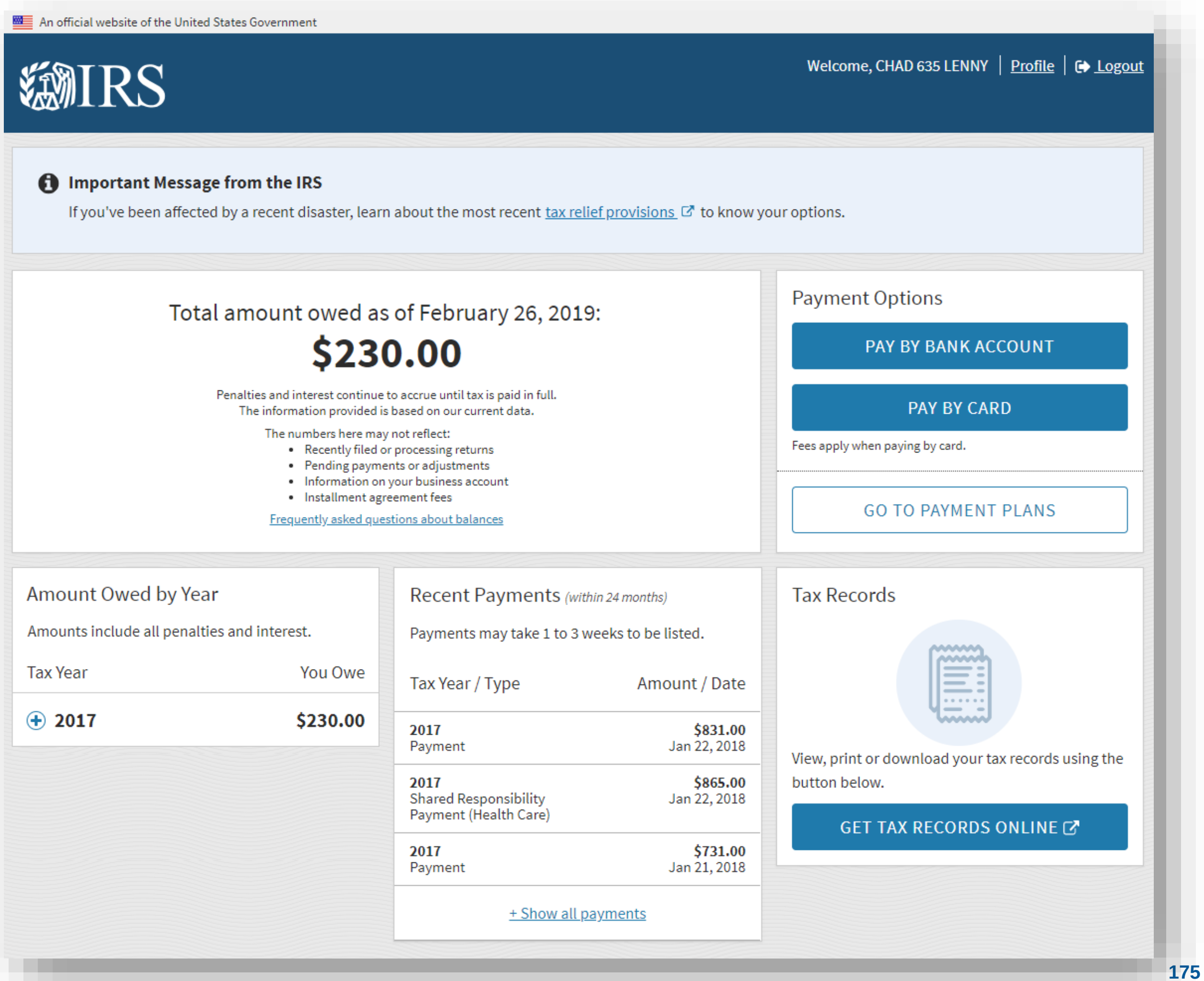
See recent payments made to the IRS.

Tax Records

View tax records.

Key Features

Online Account – Current Design



An official website of the United States Government

Important Message from the IRS

If you've been affected by a recent disaster, learn about the most recent tax relief provisions to know your options.

Total amount owed as of February 26, 2019:

$230.00

Penalties and interest continue to accrue until tax is paid in full.
The information provided is based on our current data.

The numbers here may not reflect:

- Recently filed or processing returns
- Pending payments or adjustments
- Information on your business account
- Installment agreement fees

Frequently asked questions about balances

Payment Options

Fees apply when paying by card.

Amount Owed by Year

Amounts include all penalties and interest.

Tax Year	You Owe
2017	**$230.00**

Recent Payments *(within 24 months)*

Payments may take 1 to 3 weeks to be listed.

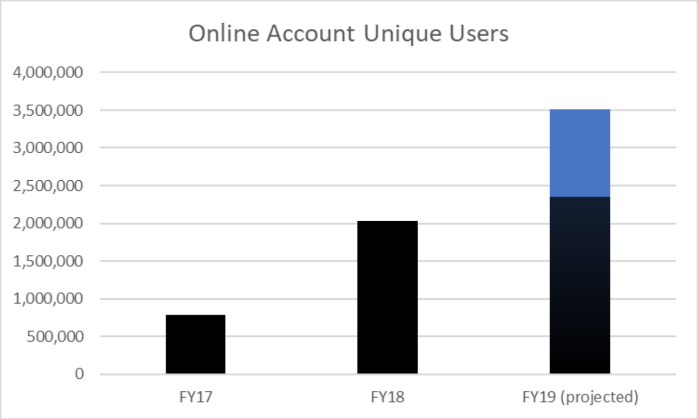
Tax Year / Type	Amount / Date
2017 Payment	**$831.00** Jan 22, 2018
2017 Shared Responsibility Payment (Health Care)	**$865.00** Jan 22, 2018
2017 Payment	**$731.00** Jan 21, 2018

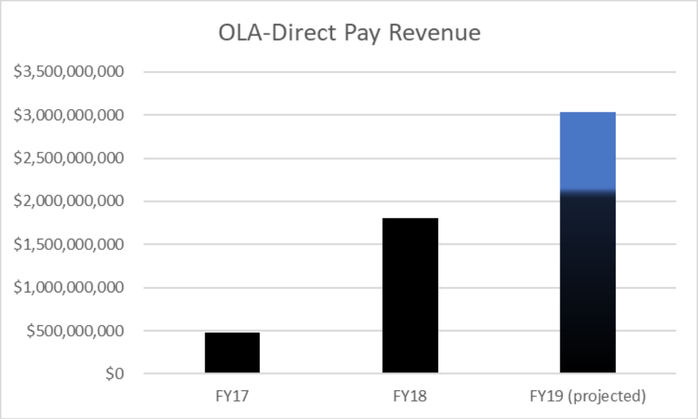
Tax Records

View, print or download your tax records using the button below.

Online Account Facts & Stats

- Over 5 million unique users tracked since Online Account launched in Nov 2016
- Clicks from Online Account to IRS Direct Pay (i.e., “Pay by Bank Account”) have resulted in transactional value of $4.3 billion from launch through May 31, 2019
  - In addition, almost 198K installment agreements have been established by Online Account users





Overview of User Testing

Methodology

Qualitative Research

One-on-one moderated interviews.

Design Prototype

Establish design hypotheses/problems to be tested.

Small Sample Size

Targeted recruiting of 8-12 participants per round of testing.

Iterative

Findings from frequent rounds of testing inform the questions and design hypotheses in future rounds.

What We’ve Tested So Far

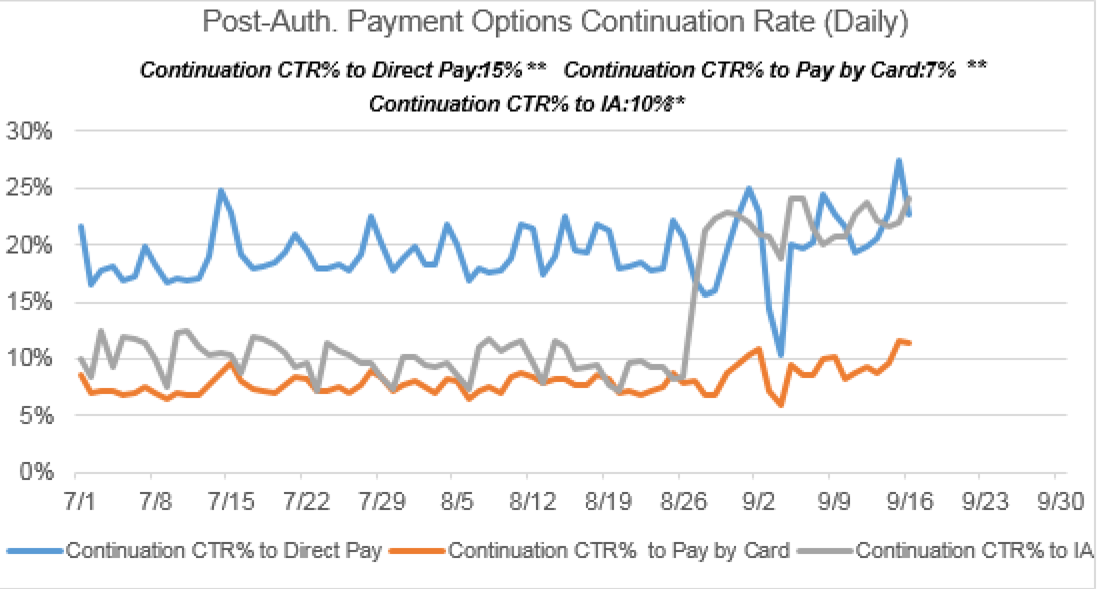
- Online account page layout – modular view and transactional view
- Payment option flows – non-modal pages / wizards to include IRS Direct Pay, Pay1040.com, and a path to Payment Plans
- Future Balance Due Calculator
- Overview by Tax Year / Amount Owed by Year table
- Recent Payments table
- Tax Records / Get Transcript module
- Frequently Asked Questions link – supported by Taxpayer Advocate Service
- Expand widgets in table views
- Desktop and mobile layouts
- Text/language of buttons, links, and educational copy

Simple, Impactful Improvements

Initial Copy	Copy Revised after User Testing
GET TRANSCRIPT ONLINE	GET TAX RECORDS ONLINE
- Minimize payments	- Show fewer payments
NEED MORE TIME TO PAY?	GO TO PAYMENT PLANS

Impact of User Testing

- Based on user testing, we uncovered that changing the wording on a button label (from “Need More Time to Pay?” to “Go to Payment Plans”) increased Online Account sessions continuing on to Installment Agreement by over 100% (from 10% to 22%) overnight – without cannibalizing click-throughs to Direct Pay or Pay by Card.



What We’ve Learned – Key Themes

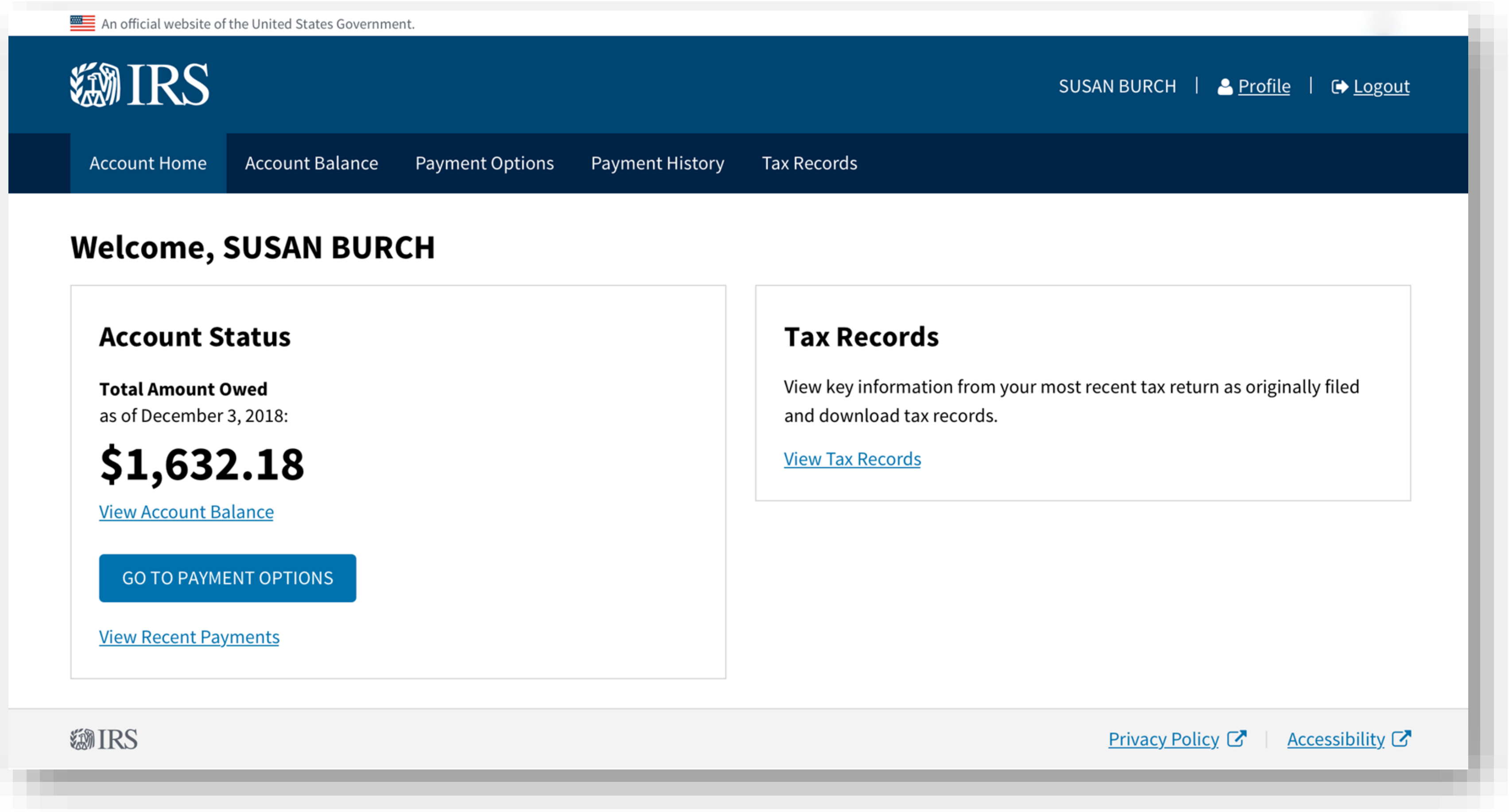
- Taxpayers regard the IRS as a financial institution.
- There is an unmet and increasing taxpayer need for digital communication and solutions from the IRS.
- Taxpayers want to see more of a connection between balance due and payments made.
- Taxpayers want to see all payment options before deciding how to pay.
- When faced with owing a balance, taxpayers consider how much to pay, when to pay, and then form of payment.
- Taxpayers expect Account to be one integrated system.

Future of Online Account

Integration of New Features

- The ultimate goal for Online Account is to offer individualized/personalized information.
- To address taxpayers' needs and expectations, Online Account needed to evolve from a single-page application to something more robust.
- The integration of new features – such as Installment Agreement, payment APIs, and receiving digital notices – necessitated that the structure of Online Account offer more flexibility.

Online Account – Design Launching June 2019



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Welcome, SUSAN BURCH

Account Status

Total Amount Owed
as of December 3, 2018:

$1,632.18

View Account Balance

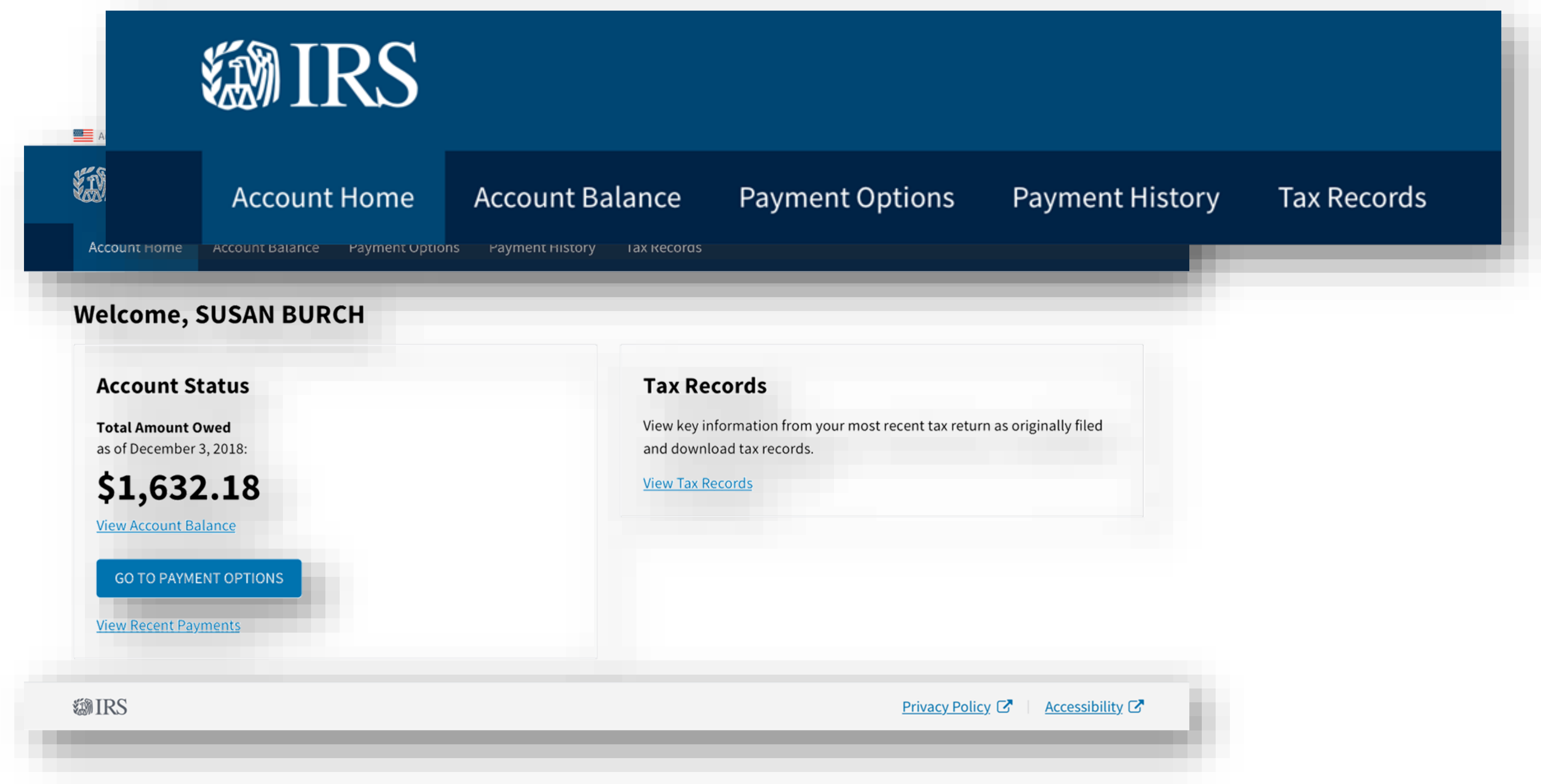
View Recent Payments

Tax Records

View key information from your most recent tax return as originally filed and download tax records.

View Tax Records

New Navigation Tabs



Welcome, SUSAN BURCH

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View Tax Records

Timeline

2014

Conception

Online Account was defined.

Nov 2016

Launch

Online Account was launched.

Aug 2017

Navigation

IRS.gov releases new global navigation.

June 2019

Enhancement

New version of Online Account.

IRS

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Usability of Biometric Authentication Methods for Citizens with Disabilities

The MITRE Corporation
Ronna ten Brink
Becca Scollan
Katja Sednew

MITRE

MITRE Is Solving Problems for a Safer World

- MITRE is a not-for-profit company chartered in 1958 to work solely in the public interest
- MITRE works across the whole of government to tackle difficult problems that challenge the safety, stability, security and wellbeing of our nation through its operation of Federally Funded R&D Centers, as well as public-private partnerships

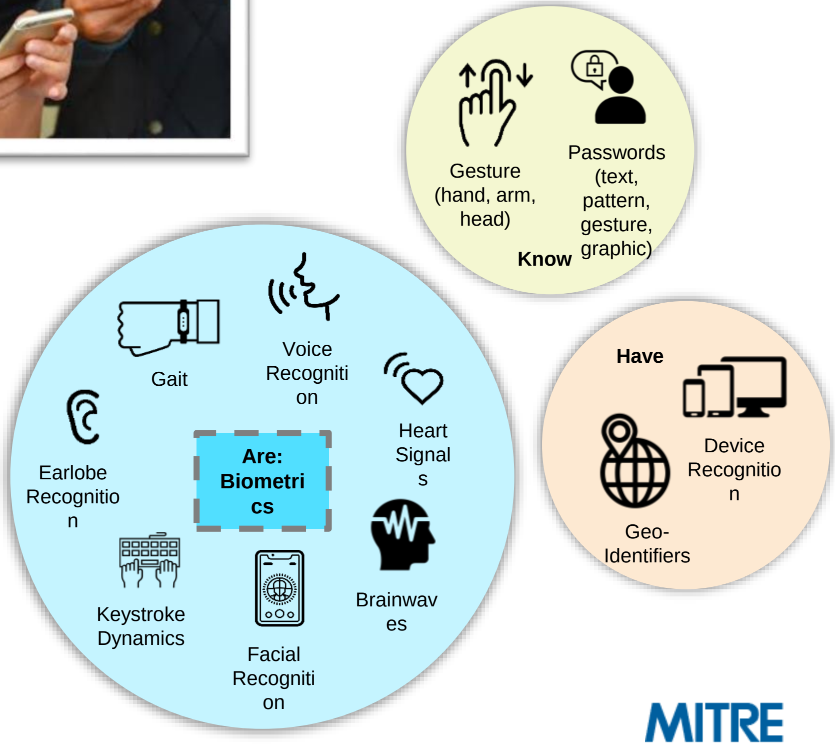
Background

Authentication and identity proofing are critical touchpoints for online government services

- Citizen-facing federal agencies (e.g., IRS, VA) increasingly move services online
- Touchpoints are “gatekeepers” to access
- Growing challenge of *customer experience* and *serving users with disabilities*

Future trends in authentication and ID proofing for federal government favor smartphone-based access, multi-factor authentication, and biometrics

- Widespread smartphone ownership, NIST recommendations, security needs



Related Work

- *Performance and perceived usability metrics:* time on task, success rates, error rates; System Usability Scale (SUS), modified SUS
- Comparisons of traditional “know” authenticators and biometrics; and of “know” and “have”
- Few authentication studies include participants with disabilities

Observations from literature

- Accessibility has not received adequate attention in biometric system design (Sasse & Krol, 2013)
- Recommended SUS as standard measure (Ruoti et al., 2015)
- Important to provide appropriate feedback for proper facial biometric alignment, to reduce errors and recognition time (Trewin et al., 2012)
- Found participants with visual disabilities disliked face biometric (Blanco-Gonzalo et al., 2018)

Vision: Remove Barriers to Government Services Access

Goal: Contribute empirical usability results to federal agencies’ customer experience modernization efforts

- There is a *notable gap* of “generally accepted guidance on designing usable, accessible, and secure interfaces.” (W3C Web Security Context Working Group Chair Mary Ellen Zurko)

Goal: Contribute to the development of a standardized methodology to evaluate the usability and accessibility of authentication technologies intended for use with public government services

- Future: Interactive authentication system design decision-making tool

Research Vision

Comparative usability study on PIN and biometric authentications

- Methods chosen for current popularity and future usage potential

Hearing loss

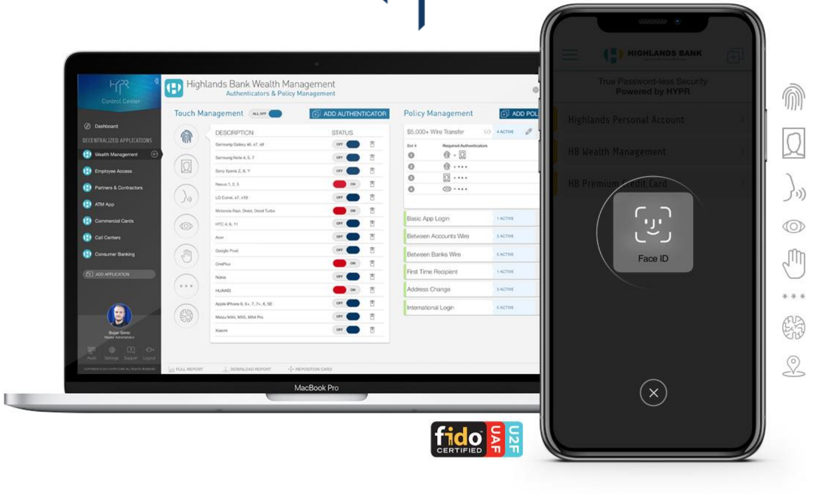
Vision loss

No disabilities

Non-biometric: PIN
Biometrics: Finger
Eye
Palm

Partnership with HYPR

- HYPR offers a multi-factor, decentralized authentication solution designed to eliminate passwords and shared secrets as a means for authenticating users more securely with an easier user experience
- HYPR provided a real, working system and hosting resources to support a prototype of several modes of biometric authentication on iOS and Android devices
- The user’s device application allows six authentication schemes for “unlocking” a private key: PIN, palm, face, a combination of face and voice (iOS), fingerprint, and eye



After enrolling one or more authenticators, a dashboard was enabled for participants, showing icons representing each authenticator enrolled.

Study Design

PIN is considered a baseline similar to passwords

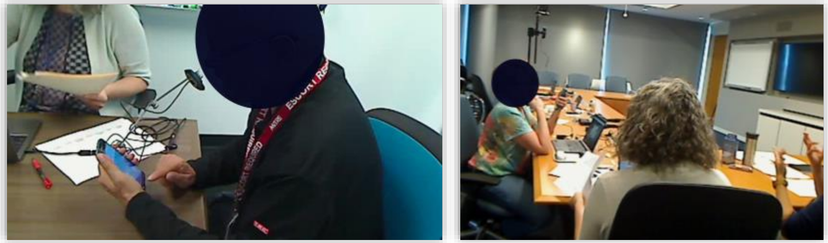
New proposed positioning categorization for biometrics:

- *Dynamic positioning*

- *Non-dynamic-positioning*

Three predictions:	
H1	PIN and biometric schemes will cause different performance
H2	Positioning biometrics (eye, palm) will cause different performance than non-positioning biometrics (fingerprint) will
H3	For the user group with visual impairments, non-positioning biometrics will lead to better performance than positioning biometrics will

Participants and Metrics



Participants

- **Vision loss:** 9
- **Hearing loss:** 11
- **Control:** 9

- **Gender balance:** 13 female, 16 male

	Age range (years)				
	25-34	35-44	45-54	55-64	65+
Number of participants	1	6	8	5	9

Metrics

- **Perceived Usability:** self-reported UMUX-LITE item ratings
  1. This system's capabilities meet my requirements.
  2. This system is easy to use.
- **Efficiency:** success trial response time
- **Effectiveness:** task completion rate
  - "Trial success" included *independent success* and *success with some guidance*
  - "Trial failure" included *success with heavy guidance* and *failure*

Method

1. Before session, participant completes survey on demographics, technology experience, and authentication behaviors
2. Participant installs application and registers authentication schemes on personal smartphone
3. Facilitator describes scenario of authenticating to a fictional gov service
4. Participant completes 2 trials per task (scheme). Task order is randomized.
5. After 1 or 2 trials, participant rates usability of that scheme
6. After all trials are completed, participants share their thoughts about the schemes with the facilitator in structured interviews

Scenario:

- Use mobile device to log in to a gov service called MyUSA Account to download a digital copy of your latest tax returns

Ethics & Privacy:

- MITRE IRB-approved
- Privacy precautions taken
- Accessibility accommodations made
- Participants with disabilities used their normal assistive tech

Results: Perceived Usability

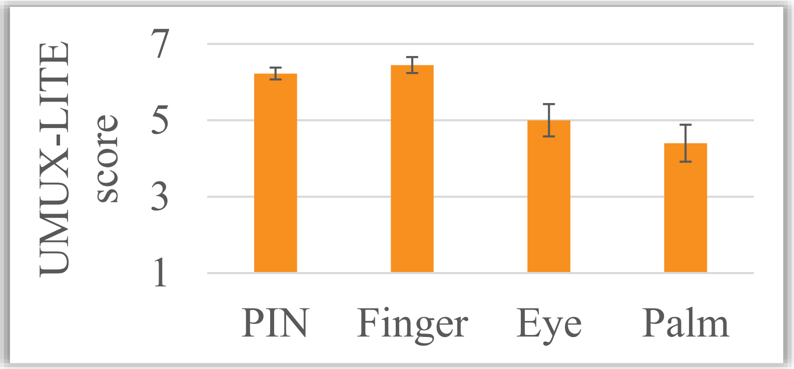
No statistically significant differences in ratings between the different populations, for either item

Meets My Requirements. Significant differences between:

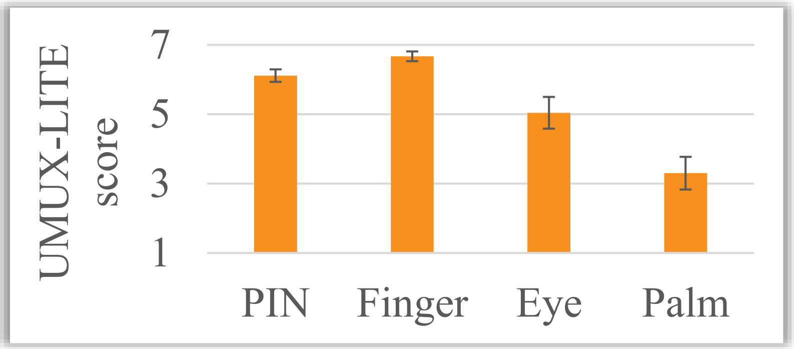
- PIN and palm; fingerprint and eye; fingerprint and palm
- Vision loss group: fingerprint scored significantly higher than eye and palm

Easy to use. Significant differences between:

- PIN and fingerprint; PIN and palm; fingerprint and eye; fingerprint and palm; eye and palm
- Vision loss group: fingerprint scored significantly higher than eye and palm



Mean UMUX-LITE **requirements** item scores across all populations, with standard error shown.



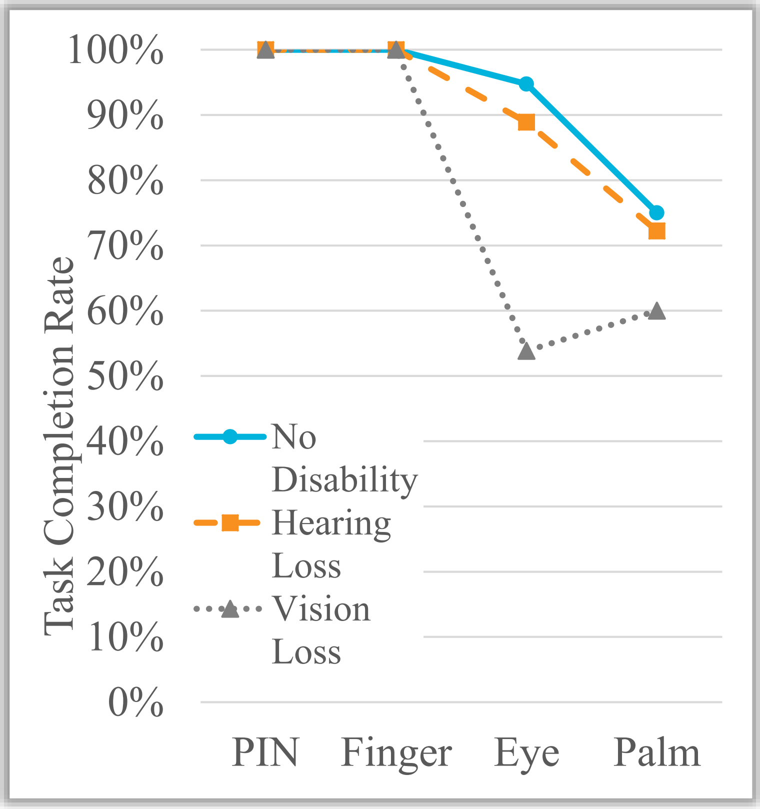
Mean UMUX-LITE **ease** item scores across all populations, with standard error shown.

Results: Effectiveness

Population was found to have an effect
Control participants were 3.690 times more likely to be successful than those with vision loss

No significant differences between completion rates due to mechanism, although:

- Every participant who registered PIN and fingerprint was able to successfully complete PIN and fingerprint tasks, regardless of participant group
- No participant group had 100% task completion rates for eye and palm tasks



Mean completion rates across participant groups.

Results: Efficiency

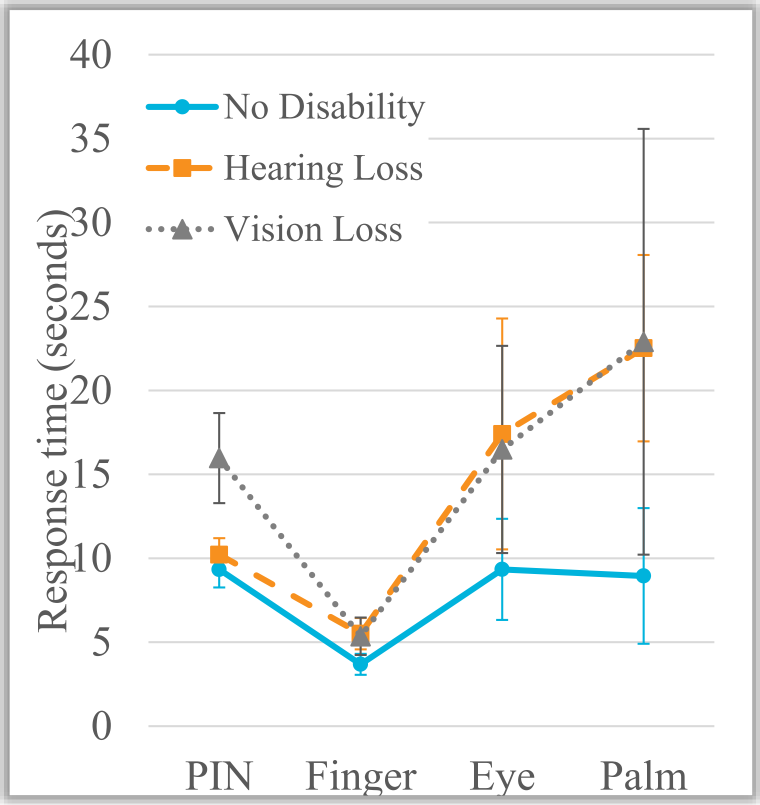
Population had no significant effect

Scheme had no significant effect

- However, **lack of power** (η = 0.546) may have limited the ability to find a significant effect.

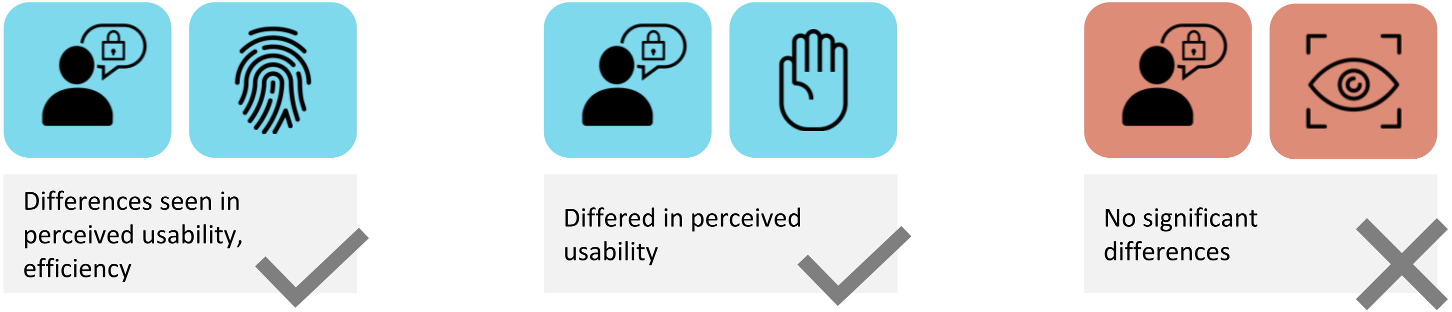
Planned post-hoc tests were still performed on scheme comparisons

- Found fingerprint had significantly faster reaction times than all other schemes
- No significant differences for vision loss group



Mean response time in seconds from all success trials across participant groups, with standard error shown.

Findings: Traditional Authentication and Biometric Authentication



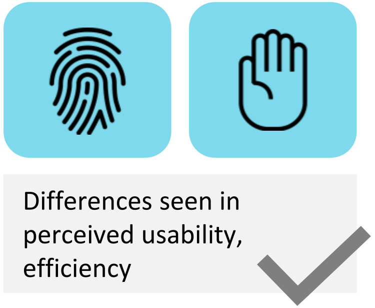
Differences seen in perceived usability, efficiency ✓

Differed in perceived usability ✓

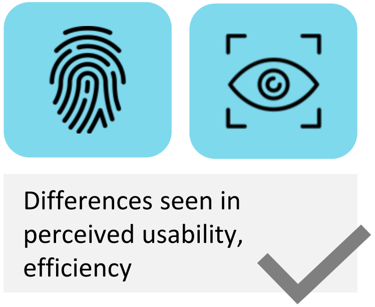
No significant differences ✗

- Perhaps there are key interaction differences between traditional and certain biometric authentication schemes – recall and spatial monitoring
- Suggests there might not be a clear usability divide between traditional authentication methods and biometric schemes
  - Alternately – there may be distinct usability differences between traditional methods and some biometrics, but grouping the biometrics examined here into a single usability category could be an overreach

Findings: Dynamic Positioning Interactions in Authentication



Differences seen in perceived usability, efficiency ✓



Differences seen in perceived usability, efficiency ✓

Dynamic positioning difference

- Requirement of continuously monitoring spatial information vs. simply locating and selecting a single, non-moving target with tactile breakpoints and bracing
- Should be researched further to confirm this split and explore its nature

Population affected completion rate

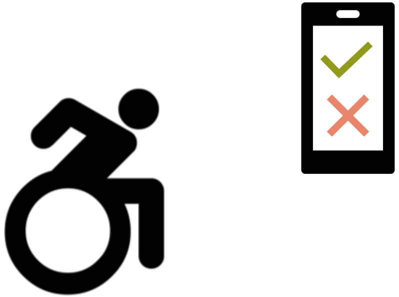
- With greater power, we might see effects occurring with fingerprint/eye and fingerprint/ palm
- Suggests that dynamic positioning is an important aspect of biometric usability and accessibility for users with low or no vision

Additional Observations

Completion rate did not vary statistically significantly due to scheme

- Surprising in light of seemingly drastic scheme differences
- Possibly because:
  - Not enough power to see a significant effect (small sample size)
  - Prior familiarity with the schemes may have affected completion rate results

Population significantly affected completion rate results. **We recommend completion rate as an additional consideration in assessing a technology’s accessibility.**



Future Research Directions and Current Limitations

Recommendations

- Automate performance data capture; collect enrollment performance data
- Address potential effects of scheme familiarity
- Larger sample size; more granular severity groups within disability groups

Observations

- Some metrics may be better suited to testing *across* disabilities and some to testing *between* disabilities
- Possibility of a minimum RT threshold for affecting perceived usability

Future Research Directions

- Focus on ability/interaction requirement relationships for more immediate value
- Further explore dynamic positioning aspect
- Expand into more types of disabilities, severity levels within disabilities, more biometrics
- Explore directionality of usability differences for evidence-based system design guidance
- Usability for participants with multiple disabilities
- How learnability may play a role in biometric accessibility

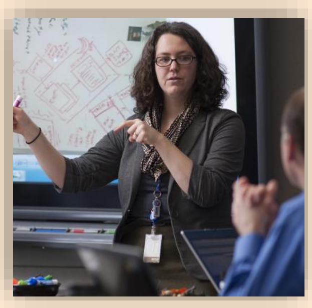
Conclusion

We contribute empirical findings and expand the body of work on usability of biometric authentication schemes for users with disabilities.

We propose dynamic device positioning as a new accessibility consideration for biometric usability evaluations.

- Operationalized as *actionable recommendations* for citizen-facing federal authentication process design:
  - A dynamic positioning biometric should never be the sole authentication scheme.
  - Multi-factor authentication using biometrics should offer at least one non-dynamic positioning biometric. Fingerprint is a good option until other schemes are empirically shown to be more accessible.

Authors



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Ronna ten Brink is a Senior Human Factors Engineer at The MITRE Corporation. She earned a B.S. in Engineering Psychology and Computer Science from Tufts University. She researches the usability of authentication methods for people with disabilities; studies human-machine teaming with a focus on calibrated trust; and performs user experience design and research across a variety of government domains. Other interests include gestural and tactile HCI, ubiquitous computing, and the intersection of usability and privacy.

MITRE

Presentation References

Background

1. D. M. Taylor, "Americans With Disabilities: 2014," November 2018. [Online]. Available: https://www.census.gov/content/dam/Census/library/publications/2018/demo/p70-152.pdf. [Accessed 1 March 2019].
2. "Disability Language Style Guide," 29 March 2019. [Online]. Available: https://ncdj.org/style-guide/.
3. A. W. Roberts, S. U. Ogunwole, L. Blakeslee and M. A. Rabe, "The Population 65 Years and Older in the United States: 2016," October 2018. [Online]. Available: https://www.census.gov/content/dam/Census/library/publications/2018/acs/ACS-38.pdf. [Accessed 1 March 2019].
4. J. Bonneau, C. Herley, F. M. Stajano and P. C. v. Oorschot, "Passwords and the Evolution of Imperfect Authentication," 2014.
5. Pew Research Center, "Mobile Fact Sheet," 5 February 2018. [Online]. Available: http://www.pewinternet.org/fact-sheet/mobile/. [Accessed 1 March 2019].
6. O. Aleksandr, S. Bezzateev, N. Mäkitalo, S. Andreev, T. Mikkonen and Y. Koucheryavy, "Multi-factor authentication: A survey.," Cryptography 2, no. 1, p. 1, 2018.
7. W. Newhouse, B. Johnson, S. Kinling, B. Mulugeta and K. Sandlin, "Multifactor Authentication for E-Commerce Risk-Based, FIDO Universal Second Factor Implementations for Purchasers," NIST; NCCOE, 2018.
8. J. James Comer, "21st Century Integrated Digital Experience Act Floor Speech," 29 November 2018. [Online]. Available: https://votesmart.org/public-statement/1306374/21st-century-integrated-digital-experience-act#.XHjELlNKjfb. [Accessed 1 March 2019].
9. "H.R.5402," [Online]. Available: https://www.congress.gov/bill/115th-congress/house-bill/5402. [Accessed 1 March 2019].
10. "IT Modernization Centers of Excellence," [Online]. Available: https://coe.gsa.gov/. [Accessed 1 March 2019].
11. F. Konkel, "Bill Would Create Federal Customer Service Standards," 4 April 2018. [Online]. Available: https://www.nextgov.com/cio-briefing/2018/04/bill-would-create-federal-customer-service-standards/147197/. [Accessed 1 March 2019].
12. "President's Management Agenda," [Online]. Available: https://www.performance.gov/PMA/Presidents_Management_Agenda.pdf. [Accessed 1 March 2019].
13. J. Carrigan, "The IDEA Act would require agencies to upgrade their websites to meet basic security and usability standards, but lawmakers did make some changes.," 29 November 2018. [Online]. Available: https://www.nextgov.com/it-modernization/2018/11/house-passes-bill-improve-governments-digital-services/153162/. [Accessed 1 March 2019].
14. J. Cardello and S. Farrell, "HealthCare.gov's Account Setup: 10 Broken Usability Guidelines," 27 July 2017. [Online]. Available: https://www.nngroup.com/articles/affordable_care_act_usability_issues/. [Accessed 1 March 2019].
15. F. Konkel, "It Costs Taxpayers $41 Per Phone Call To IRS," 9 February 2018. [Online]. Available: https://www.nextgov.com/emerging-tech/2018/02/it-costs-taxpayers-41-phone-call-irs/145870/. [Accessed 1 March 2019].
16. [Online]. Available: https://www.section508.gov/. [Accessed 1 March 2019].
17. "S.3050 - 21st Century IDEA," [Online]. Available: https://www.congress.gov/bill/115th-congress/senate-bill/3050/text. [Accessed 1 March 2019].
18. P. A. Grassi, J. L. Fenton, E. M. Newton, R. A. Perlner, A. R. Regenscheid, W. E. Burr, J. P. Richer, N. B. Lefkovitz, J. M. Danker, Y.-Y. Choong, K. K. Greene and M. F. Theofanos, "NIST Special Publication 800-63B," June 2017. [Online]. Available: https://doi.org/10.6028/NIST.SP.800-63b. [Accessed 1 March 2019].
19. L. Kessem, "IBM Study: Consumers Weigh in on Biometrics, Authentication and the Future of Identity," 29 January 2018. [Online]. Available: https://securityintelligence.com/new-ibm-study-consumers-weigh-in-on-biometrics-authentication-and-the-future-of-identity/. [Accessed 1 March 2019].

Related work

- M. A. Sasse and K. Krol, "Usable biometrics for an ageing population In: Age Factors in Biometric Processing," IET, 2013.
- S. Ruoti, B. Roberts and K. Seamons, "Authentication Melee: A Usability Analysis of Seven Web Authentication Systems," Proceedings of the 24th International Conference on World Wide Web, pp. 916-926, 2015.
- S. Trewin, C. Swart, L. Koved, J. Martino, K. Singh and S. Ben-David, "Biometric authentication on a mobile device: a study of user effort, error and task disruption," Proceedings of the 28th Annual Computer Security Applications Conference, pp. 159-168, 2012.
- R. Blanco-Gonzalo, C. Lunerti, R. Sanchez-Reillo and R. M. Guest, "Biometrics: Accessibility challenge or opportunity?," PLOS ONE, 2018.

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Thank you

Appendix

Study Design: Participants

	Age range (years)				
	25-34	**35-44**	**45-54**	**55-64**	**65+**
Number of participants	1	6	8	5	9

		Impairment Type and Level						
		Visual		**Hearing**			**None**	**All participants**
		Total	**Moderate**	**Total**	**Severe**	**Moderate**		
	Total participants	6	3	4	2	5	9	29
		9		11			9	
Participants who enrolled in…	**PIN**	7		11			9	27
	Finger print	7		11			9	27
	Eye print	7		9			9	25
	Palm print	5		9			6	20
	Face	*1*		*2*			*3*	*6*
	Voice / Face	*1*		*6*			*6*	*13*

Results: Prior Experience with Biometrics

Participant responses to questionnaire items about prior experience with authentication methods.	Amount of "yes" responses to the following questionnaire items:	
	… secure your personal devices to access a web service?	…secure your personal accounts to access a web service?
Passwords	30	30
Pin or pattern	25	24
2-factor using code received by email	23	22
2-factor using security question	21	22
2-factor using code received by personal cellphone or smartphone	20	19
Two-factor using standalone device with digital key	7	5
Two-factor using a code received by landline phone	6	8
Two-factor using an online or software digital key (e.g., Google Authenticator, Duo)	4	4
Biometric – fingerprint	25	19
Biometric – voice	3	2
Biometric – face	2	1
Biometric – iris	0	0
Other	0	0

Research, Applied Analytics, and Statistics

TAX POLICY CENTER
URBAN INSTITUTE & BROOKINGS INSTITUTION

9TH ANNUAL IRS/TPC JOINT RESEARCH CONFERENCE ON TAX ADMINISTRATION

#LiveAtUrban

Booz | Allen | Hamilton®

CUSTOMER EXPERIENCE RESEARCH LEADS TO BETTER DESIGN AND INCREASED ADOPTION

Presented by: Nikki Kerber

Nikki Kerber, Kristen Papa, and Jake Sauser (Booz Allen Hamilton)

IRS TPC Joint Research Conference | June 20th, 2019

“Most Americans may not think about the Federal Government every day — but when they need Government services, they expect them to work” - PMA

WHAT IS CUSTOMER EXPERIENCE?

- Forrester, an American market research company that provides advice on existing and potential impact of technology, defines Customer Experience, or CX, as how customers perceive their interactions with an organization.
- CX is not just about one great product or experience - it's about continuously deploying seamless interactions across different processes and technology platforms to establish an orchestrated ecosystem across people, processes and technology that meet customers' needs at the time they need it.
- Includes external consumers of a product or service AND front-line employees who interact and deliver the experience to those customers (e.g., call center customer service representatives and IT help desk agents).

Creating a memorable and satisfactory CX takes into account these considerations from the perspective of the customer:

Are they useful (deliver value)?

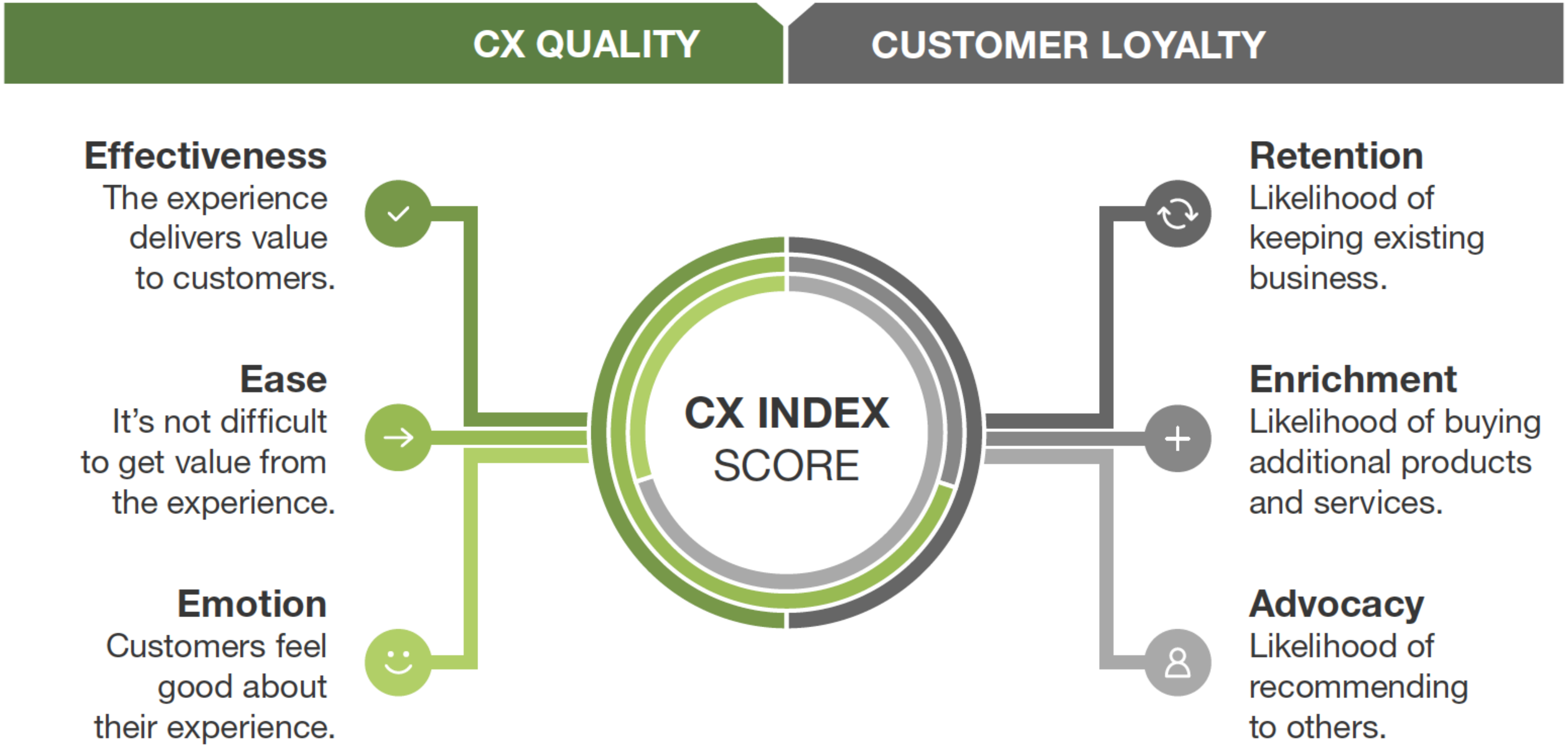
Are they usable (make it easy to find and engage with the value)?

Are they enjoyable? (emotionally engaging so that people want to use them)

RESEARCH OBJECTIVE AND THE ESTABLISHMENT OF A CX FRAMEWORK

- In partnership with the IRS, our primary objective is to understand taxpayers' perceptions of the agency and ultimately how that perception translates into engagement, and advocacy.
- Through a framework that focuses on people, process and technology, the IRS seeks to uncover taxpayer needs, wants, and opinions to better understand the challenges they may face now and in the future.
- The establishment of a CX framework at the IRS requires customers and stakeholders to be involved throughout the research, design, and deployment processes.
- As a result, our framework aims to understand how the organization's functions and processes work to get an accurate picture of the back-end operations driving the experience.

MEASURING CUSTOMER EXPERIENCE



CX QUALITY
CUSTOMER LOYALTY
Effectiveness
The experience delivers value to customers.
Ease
It's not difficult to get value from the experience.
Emotion
Customers feel good about their experience.
CX INDEX SCORE
Retention
Likelihood of keeping existing business.
Enrichment
Likelihood of buying additional products and services.
Advocacy
Likelihood of recommending to others.

Image credit: Forrester - The US Customer Experience Index, 2018

MEASURING CUSTOMER EXPERIENCE IN THE FEDERAL GOVERNMENT

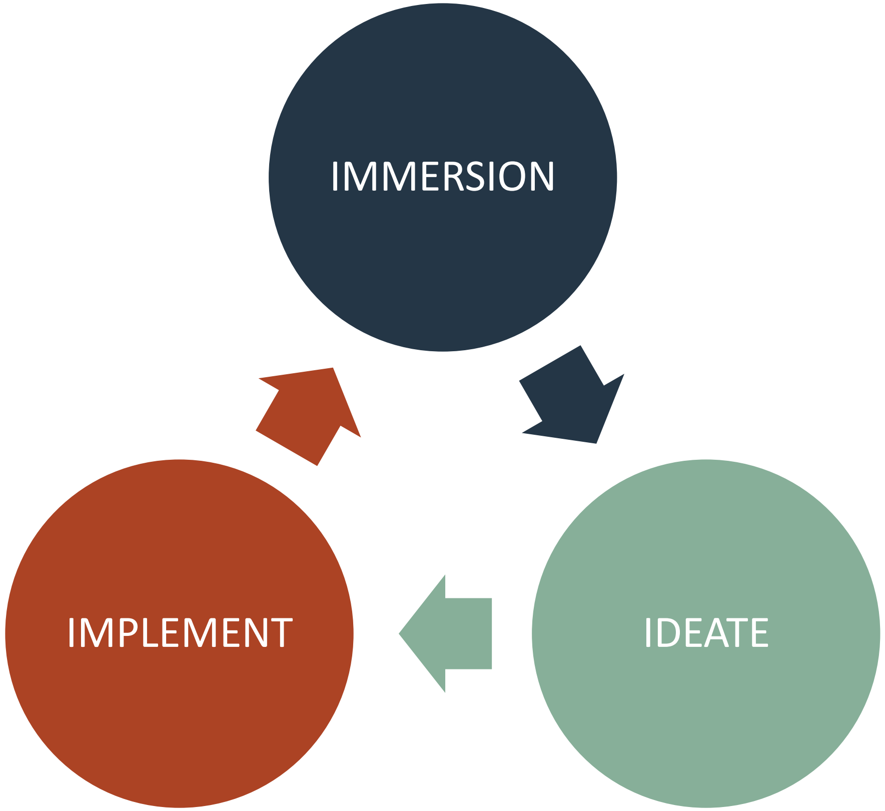
- Since 2015, government agencies' average Customer Experience Index score for digital channels has remained flat while the average score for non-digital channels has risen by three points.
- Customers consider their experiences with federal digital channels to be ineffective, difficult, and emotionally negative.
- The IRS ranks near the bottom of government agencies in terms of public perception and customer satisfaction.
- In the 2017 American Customer Satisfaction Index (ASCI) Federal Government Report, the Department of Treasury received a score of 61, well below the government average of 69.7.
- Forrester's U.S. Federal CX Index, 2018: Rankings of U.S. Federal Government Agencies report ranks the IRS as "very poor" with a rank of 12 out of 15.
- The private sector average score for Customer Experience (CX) is 69 whereas the federal average score is 59.

CUSTOMER EXPERIENCE IN TAX ADMINISTRATION

- The Federal Government is now required to consider customer experience and satisfaction when delivering services and must deliver customer experiences that the citizen is able to take advantage of regardless of location, task complexity or touchpoint.
- **President's Management Agenda (PMA)**
  - The Office of Management and Budget (OMB) introduced a new aspect of its Circular A-11 in June 2018 that instructs government agencies to craft customer experience frameworks. The changes guide agencies on how to manage their customer experience efforts and requires that agencies report certain Key Performance Indicator. (KPI's) starting in the first quarter of fiscal year 2019.
  - CAP Goal 4, "Improving Customer Experience with Federal Services", mandates that Treasury and related agencies comply with the following objectives:
    - Transform the customer experience by improving the usability and reliability of our Federal Government's most critical digital services;
    - Create measurable improvements in customer satisfaction by using the principles and practices proven by leading private sector organizations;
    - Increase trust in the Federal Government by improving the experience citizens and businesses have with Federal services whether online, in-person, or via phone.
- **21st Century Integrated Digital Experience Act**
  - Passed in Congress in December 2018, this policy aims to increase efficiencies by promoting data-driven, secure, personalized and mobile-friendly websites. The law establishes minimum standards for federal websites and encourages agencies to digitize manual processes and accelerate the usage of electronic signatures.
- **Taxpayer First Act of 2019**
  - Passed in the House in April 2019, this policy is an amendment to the IR Code of 1986 to modernize and improve the IRS.
  - Provisions that the IRS develop a comprehensive customer service strategy within one year of the bill passing

METHODOLOGY USED TO ESTABLISH CUSTOMER EXPERIENCE FRAMEWORK

- **Immersion**
  - Gather and analyze previously conducted research
  - Conduct a gap analysis, listing topics and questions for further research
  - Write a research plan and obtain approvals
  - Recruit taxpayers to engage in user research activities
  - Listen and learn directly from taxpayers
- **Ideate**
  - Synthesize feedback and insights
  - Identify potential areas of opportunity
  - Update/Establish user personas and journey maps
  - Conceptualize potential solutions
- **Implementation**
  - Design and test solutions to meet taxpayer needs



UNDERSTANDING TAXPAYER AUDIENCE SEGMENTS

- Before deploying the CX Framework into a known service or product, it was imperative to deeply understand the various audiences that the IRS served.
- Since the IRS serves several different audience segments, we came up with a coordinated prioritization strategy with IRS stakeholders to efficiently and effectively analyze customer needs and goals. As a result, individual taxpayers within the following categories were identified as a priority audience segment. Specifically:
  - Taxpayers who identify as having “straightforward” taxes
  - Taxpayers who identify as having “complex” tax situations
  - Taxpayers who owe back-taxes
  - Low-income taxpayers
  - Atypical taxpayers who file using non-standard processes
- To understand the needs, wants, goals, concerns and frustrations of individual taxpayers, user research activities such as one-one-one interviews, usability testing sessions, facilitated design workshops and deploying/analyzing survey data were utilized.

OPTIMIZING IRS.GOV AND ONLINE ACCOUNT TO PAY TAXES

- Through pre-study analysis, several potential challenges to the customer, or “pain points,” were uncovered with the payment process.
- **Business Goal**
  - Allow individual taxpayers to setup or revise installment agreements from within their existing online account so that they can manage multiple aspects of their interactions with the IRS from one user experience, while simultaneously decreasing telephone and paper requests.
- **Research Focus**
  - To identify and understand the needs, challenges, and opportunities related to integrating Online Payment Agreement (OPA) into Online Account (OLA).
- **Hypothesis**
  - Enabling individual taxpayers to easily make payments and/or set up a payment plan online instead of via paper or over the phone, which would help deflect the number of calls to the IRS call center and ultimately increase overall tax compliance.
- **Study Objectives**
  - Understand the points of greatest anxiety in the taxpayer journey when paying the IRS.
  - Understand the mindset of taxpayers who owe money to the IRS and gain insight into what may be hindering them from making a payment and/or setting up a payment plan online.
  - Obtain taxpayer feedback and behavioral data on select payment scenarios.
  - Validate if taxpayers who owe money to the IRS understand the concept of existing IRS nomenclature terms and phrases.

USER RESEARCH ARTIFACTS: PERSONAS AND JOURNEY MAPS

- **Personas**
  - A fictional character who represents the qualities of average users within an audience segment.
  - Are not “made up”, rather they are discovered as a by-product of the investigative user research process. In essence, personas are the voice of our customer when they are not in the room with us.
  - Intended to be living, breathing documents, and as such should be updated based on new research findings.
- **Journey Maps**
  - Tells the story of the customer’s experience from initial contact through the process of engagement and into a long-term relationship. It may focus on a particular part of the story or give an overview of the entire experience.
  - Identifies key interactions that the customer has with the organization. It discusses the user’s feelings, motivations and questions for each of these touchpoints.
  - Overall goal is to teach an organization about their customers and identify opportunities to improve the customer’s overall experience.

SUSAN

Exasperated Tax Ower

Confident Self-Preparer: Owes over $1,000 After Filing
Individual Taxpayer

STORY/NARRATIVE

Susan is married and a mother of two high school aged children. She works full-time as an office manager, but also started freelance writing for various publications. This year, Susan received a notice informing her she owed taxes after filing which was more than she could afford. She's not sure how to adjust her payment plan or check her balance. Overall, Susan and her husband thinks the IRS makes filing and paying taxes too complicated. They wish the process could be simpler for their busy family.

- Prepares and files taxes using TurboTax
- Did not make quarterly tax payments this year
- Works with an accountant to set up a monthly payment plan

> *"Last year when I filed, I thought I did my taxes right. I ended up getting audited and now I owe the IRS more than $3,000."*

- .I want to make sure that I do not owe money at the end of next year
- I want to pay back what I owe in a way that fits my financial situation
- I want to take advantage of college savings plan tax benefits

GOALS

- Find out how much I currently owe
- Easily set up a payment plan online, make recurring payments, and view my payment history and activities online
- Find out the right amount of income tax to be withheld from my paycheck

TASKS

- Has started saving money in preparation for next tax filing season
- Busy parent of two kids and relies on quick and simple processes where possible
- Juggling unexpected taxes owed against my regular budgeted expenses

MOTIVATIONS/BEHAVIOURS

- Owing more money than able to afford
- Worried about the IRS going after them
- Receiving inconsistent information on a balance owed (notices, IRS call center, online, etc.)
- Getting audited again
- Feels that government agencies are demanding and unapproachable

CONCERNS

23%
of taxpayers are considered Confident Self-Preparers

44%
of taxpayers filed Schedule A Form (Itemized Deductions)

67%
of taxpayers have awareness of IRS.gov but not online account

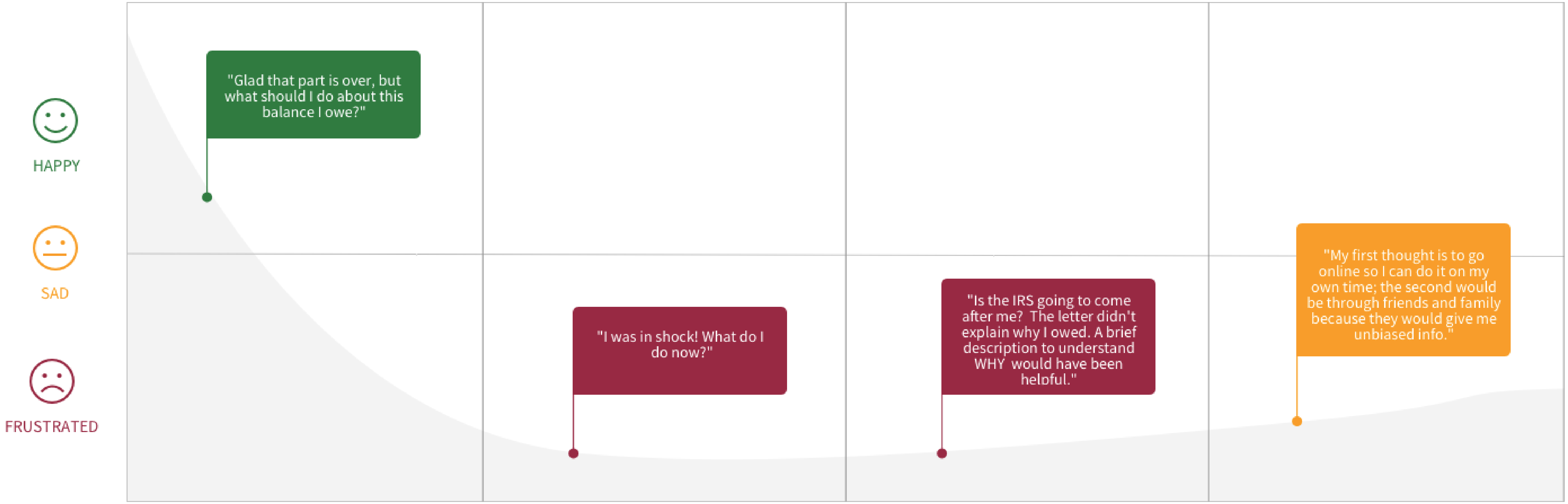
756K
payment plans were set up via Online Payment Aggeement (OPA) in 2018

Citations

1. 2017 National Taxpayer Experience Survey National Report
2. IRS.gov Google Analytics, May 2019

IRS

Updated Last: 06/01/2019



"Glad that part is over, but what should I do about this balance I owe?"

"I was in shock! What do I do now?"

"Is the IRS going to come after me? The letter didn't explain why I owed. A brief description to understand WHY would have been helpful."

"My first thought is to go online so I can do it on my own time; the second would be through friends and family because they would give me unbiased info."

DISCOVER

ACTIVITIES

**Possible activity a taxpayer may encounter; not all taxpayers will experience this step.*

File Return

- Taxpayer files taxes and submits return to the IRS

Discovers Balanced Owed

- Taxpayer discovers that they owe the IRS money during the filing process

Gets Notice*

- Taxpayer receives IRS letter in the mail stating they owe money

Seeks Info*

- Taxpayer looks for payment information through a variety of resources

RESULTS

- Establishment of an “IRS Audience Yearbook”
  - Meant to serve as a tool to document the various audiences. As work continues in the future, it is likely that more segments will be identified, and audiences may be grouped together when building solutions to meet Customer Needs.

Taxpayers

- Simple Routine Filer
- Exasperated Ower
- First-Time Filer
- Multilingual Student
- Entrepreneur
- Low Income Filer
- Independent Farmer
- Gig Economy Worker
- Independent Consultant

Tax Professionals

- CPA/Enrolled Agent
- Attorney
- Reporting Agent
- Return Preparer

Informational

- Policy/Academic
- Lobby/Adv/Trade
- Media
- Tax Prep Software Manufacturer
- IRS IT Help Desk Rep

Businesses

- Small Business Rep
- Large Business Rep
- Global High Wealth

Tax-Exempt Organizations

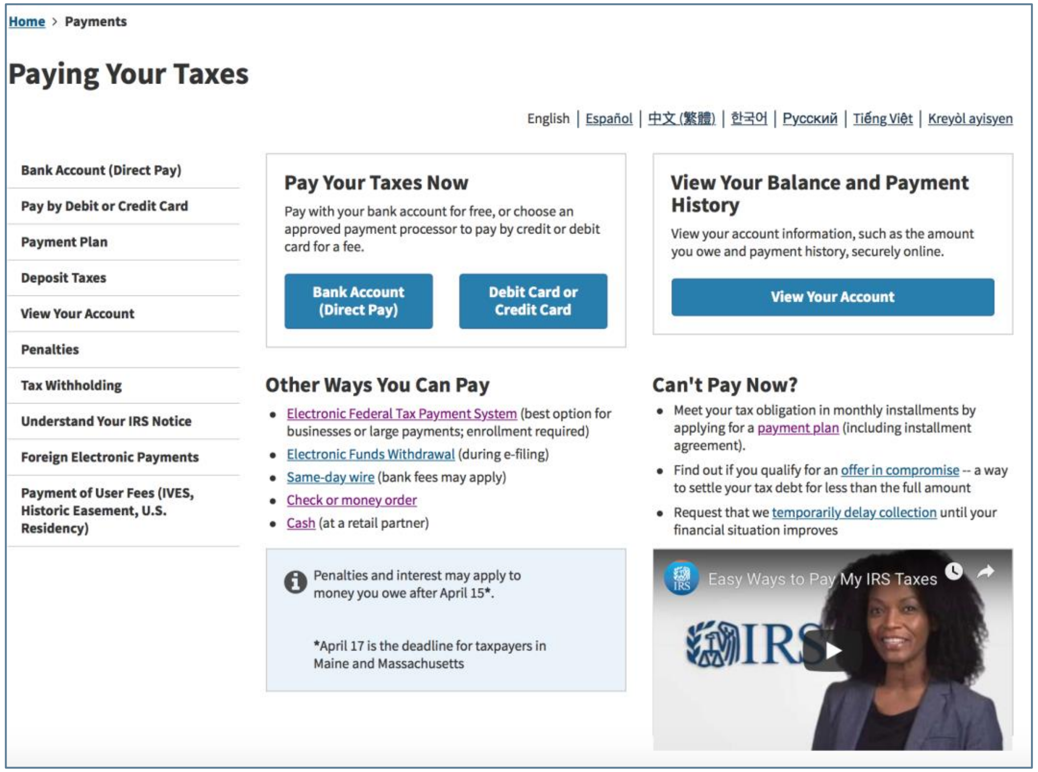
- Small Non-profit Volunteer
- Non-profit Employee

Gov’t Entities

- State Agency
- Local Municipality
- US Fed Agency
- Foreign Gov’t
- Indian Tribal Nation

RESULTS (CONTINUED)

- Findings and recommendations are now being implemented to improve content on payments-related pages on IRS.gov.
  - Multiple interview participants used the word “overwhelming” to describe the *Pay Your Taxes by Debit or Credit Card* page, causing uncertainty on which option to select in the payment process.
  - To address the issue of content overload, OLS in partnership Online Engagement, Operations & Media (OEOM) is actively working on design enhancements to better display debit and credit card processor information on the page.
- Deeper understanding of mental models individual taxpayers have regarding payments.
  - Modify Online Account aspects that leverage these insights.
  - Conceptualize and ideate on new products and services that will serve the need of individual taxpayers and even tax professionals.


Home > Payments
English | Español | 中文 (繁體) | 한국어 | Русский | Tiếng Việt | Kreyòl ayisyen
Bank Account (Direct Pay)
Pay by Debit or Credit Card
Payment Plan
Deposit Taxes
View Your Account
Penalties
Tax Withholding
Understand Your IRS Notice
Foreign Electronic Payments
Payment of User Fees (IVES, Historic Easement, U.S. Residency)
Bank Account (Direct Pay)
Debit Card or Credit Card
View Your Account
Easy Ways to Pay My IRS Taxes
IRS

Paying Your Taxes

Pay Your Taxes Now

Pay with your bank account for free, or choose an approved payment processor to pay by credit or debit card for a fee.

View Your Balance and Payment History

View your account information, such as the amount you owe and payment history, securely online.

Other Ways You Can Pay

- Electronic Federal Tax Payment System (best option for businesses or large payments; enrollment required)
- Electronic Funds Withdrawal (during e-filing)
- Same-day wire (bank fees may apply)
- Check or money order
- Cash (at a retail partner)

Penalties and interest may apply to money you owe after April 15*.

*April 17 is the deadline for taxpayers in Maine and Massachusetts

Can't Pay Now?

- Meet your tax obligation in monthly installments by applying for a payment plan (including installment agreement).
- Find out if you qualify for an offer in compromise -- a way to settle your tax debt for less than the full amount
- Request that we temporarily delay collection until your financial situation improves

IRS.gov: Paying Your Taxes content page

CONCLUSION

“Those who lead the way in digital government CX are able to combine people, process, and technology to deliver better experiences that benefit customers and the organization” – Forrester

- Regardless of organization or industry vertical, customer experience research is a constantly evolving, never ending endeavor.
- Our team has only begun to scratch the surface of all the customer interactions, audience segments, touchpoints, and products that the IRS agency offers.
- Taken together, insights gathered now and in the future should be used across the entire agency to improve the customer experience for taxpayers and customer segments.

IRS Research, Applied Analytics, and Statistics

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Wage & Investment

Session 3: Improving Digital Service

2019 IRS/TPC Joint Research Conference

Courtney L. Rasey
Discussant
June 20, 2019

Introduction

- All three papers highlight that improving digital service requires thoughtful consideration of taxpayers and the larger service delivery environment.

- Together, these papers showcase that the IRS incorporates Forrester's "three E's" of customer experience (ease, efficiency, and emotion) in all areas of digital service planning and development.
  - Cultivating a seamless customer experience based on an understanding of taxpayer's motivations and emotions
  - Ensuring digital service is quick and efficient
  - Designing digital products that are easy to access and use

- Other common themes from these papers that demonstrate important principles for improving digital service include:
  - design with the taxpayer in mind,
  - ensure accessibility for taxpayers,
  - understand taxpayer motivation and experience through segmentation, and
  - view digital service within a broader customer experience framework.

IRS Online Account User Testing by MediaBarn

Research Focus: iterative user testing of IRS Online Account

How does this research improve digital service?

- Integrates user experience throughout the design process by testing a demo account with taxpayers using fictional account information.
  - Provides design feedback prior to launch
  - Ability to test ideas without making them visible to the public
  - Quick feedback throughout the design phase
- Bringing the taxpayer into the process as early as possible helps focus future efforts to refine user interfaces, wording, and service features.

What are the limitations of this research?

This study contains the limitations inherent to lab research using scenarios.

- Industry sample size is low, which prohibits segmentation.
- Testing with demos can make it difficult to separate confusion from unfamiliarity with the tax situation from confusion related to design.

IRS Online Account User Testing by MediaBarn

How does this research benefit the entire IRS Online Account design process?

MediaBarn collaborates with Wage & Investment Strategies & Solutions (WISS) through IRS Online Services and their mutual operational customers.

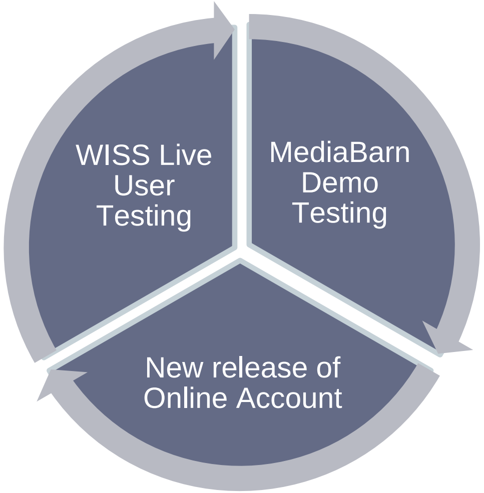
- WISS performs post-release IRS Online Account testing that compliments MediaBarn's work.

Pre-Release Testing:

- MediaBarn completes user testing with demo accounts to inform the next release and test multiple design elements.
- MediaBarn recommends questions for inclusion in post-release testing.

Post-Release Testing:

- WISS tests Online Account with actual users to gather feedback about usability and potential features based on their own tax information.
- With its larger sample size, recruitment and segmentation can occur to answer questions about a particular segment based on service need.
- New designs are tested by MediaBarn prior to release.



Customer Experience Research Leads to Better Design and Increased Adoption by Booze Allen Hamilton

Research Focus: Using personas and journey maps to better understand taxpayers' emotions about and experience with paying the IRS

How does this research improve digital service?

- Personas support investigations of taxpayer motivation and drivers for channel selection by humanizing taxpayer segments.
  - Personas group taxpayers by their attitudes and perceptions to gain a better understanding of their goals, motivation, and concerns.
  - Better understanding these personas assists in development of digital services that accomplish tasks while addressing individual concerns and helping taxpayers reach their overarching goals.
  - In addition, personas aid in development of communication campaigns that effectively motivate taxpayers towards digital service.

- Journey maps are an essential part of understanding what process taxpayers take to complete specific tasks.
  - Having very detailed maps ensures the IRS does not overlook potential barriers to service.

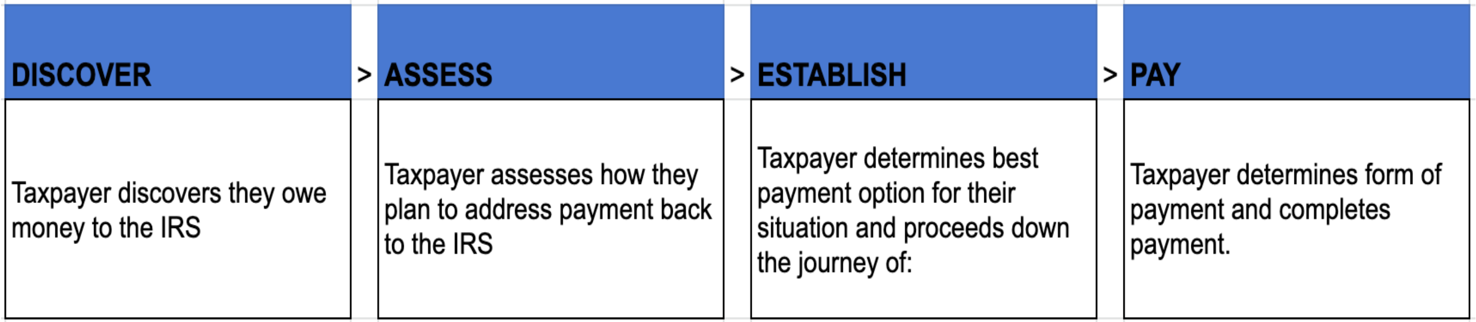
Customer Experience Research Leads to Better Design and Increased Adoption by Booze Allen Hamilton

What should the authors consider in continuing their research?

- Based on previous behavioral research performed by WISS, I think the authors should consider adding two additional components to the payment Journey Map:
  1) finding information about what payment options are available and how they work
  2) being able to access their chosen payment option

- Both of these components can become barriers to digital service use.

Booze Allen Hamilton's Payment Journey Map



DISCOVER	>	ASSESS	>	ESTABLISH	>	PAY
Taxpayer discovers they owe money to the IRS		Taxpayer assesses how they plan to address payment back to the IRS		Taxpayer determines best payment option for their situation and proceeds down the journey of:		Taxpayer determines form of payment and completes payment.

Accessible Authentication for All by MITRE

Research Focus: evaluate usability and accessibility of authentication methods

How does this research improve digital service?

- IRS strives to make digital service options accessible for all taxpayers, including those with specific access barriers.
  - Research about authentication accessibility for taxpayers with disabilities is crucial to ensuring authentication does not bar them from using digital service options.

- MITRE covers Forrester's "Three E's" in their evaluation of authentication methods.

Authentication Measure	Corresponding "E"
Efficiency the time elapsed from when the prototype app instructed the participant to attempt the authentication until indication of task success or failure	Ease
Effectiveness the number of successful task completions out of the number of attempted task completions	Effectiveness
Perceived Usability measured using an established method of assessing a user's *perceived usability* of a system	Emotion

Accessible Authentication for All by MITRE

Research Focus: evaluate usability and accessibility of authentication methods

What other populations could be included in Smartphone authentication and mobile digital product research to increase digital service accessibility?

As Smartphone use in the United States increases, authentication methods that utilize their features and development of mobile products could increase digital service access.

Rural Taxpayers

Mobile technology use has risen rapidly among rural populations since 2011, despite computer ownership having only risen slightly since 2008. *(Pew Research Center. May 2019)*

Low-Income Taxpayers

Many lower-income Americans rely on Smartphones as their only means of internet accessing – completing all tasks on their phone. *(Pew Research Center. May 2019)*

Hispanic & Limited English Proficient Taxpayers

Mobile devices have increased internet access for Hispanics, including those who are Spanish-dominant. Only 21% of Spanish language dominant Hispanics have broadband internet at home, while 71% report accessing the internet on a mobile device. *(Pew Research Center. July 20, 2016)*

Conclusions

- Increasing digital service use requires understanding what drives taxpayer choice and how to make digital services accessible for all taxpayer groups.

- The research presented in this session highlights the importance of designing service ecosystems, website content, and digital products from the taxpayer point of view.
  - It's important to remember that the taxpaying population includes several subgroups with their unique motivations, goals, needs, and barriers to accessing digital services.

- These authors have provided a research framework that mirrors the current IRS strategic view of customer service aimed at:
  - providing seamless customer experience across channels, and
  - ensuring customers quickly get the service they need, when they need it, and through the optimal service channel.

Discussant Information

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IRS

Research, Applied Analytics,
and Statistics

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Session 3. Improving the Digital Taxpayer Experience

Moderator:	***Alcora Walden*** *IRS, Office of Online Services*
Online Account User Testing	***Heather Gay*** *Mediabarn Inc.*
Accessible Authentication for All: An Evaluation Framework for Assessing Usability and Accessibility of Authentication Methods	***Ronna ten Brink*** *MITRE Corporation*
Customer Experience Research Leads to Better Design and Increased Adoption	***Nikki Kerber*** *Booz Allen Hamilton*
Discussant:	***Courtney Rasey*** *IRS, Wage & Investment Division*

IRS Research, Applied Analytics, and Statistics

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Session 4. Understanding the Drivers of Taxpayer Behavior

Moderator:	***Melissa Vigil*** *IRS, RAAS*
Underpayment of Estimated Tax: Understanding the Penalized Taxpayer Population	***Janet Li*** *IRS, RAAS*
The Effect of Audit Burden on Subsequent Tax Evasion	***Ethan LaMothe*** *University of South Carolina*
Using a Graph Database to Analyze the IRS Databank	***Rahul Tikekar*** *IRS, RAAS*
Discussant:	***Brian Erard*** *Brian Erard & Associates*

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DRAFT AS OF MAY 31, 2019

Underpayment of Estimated Tax

Understanding the penalized taxpayer population

Janet Li, Tomas Wind, Alicia M. Miller, Brett Collins,
Victoria L. Bryant, Alex Turk, Stacy Orlett

Research, Applied Analytics & Statistics
Knowledge Development and Application

June 20, 2019

Estimated tax penalty

What is it and why do we care?

U.S. federal income taxes are a pay-as-you-go system

- Most taxpayers have to prepay their tax throughout the year through withholding from their employer or through estimated tax payments.
  - **Withholding** is *mandated* for W-2 wage income, *opt-out* for pensions and IRAs, and *opt-in* for taxable Social Security benefits and unemployment insurance.
  - **Estimated tax payments** must be paid quarterly (typically April 15, June 15, September 15, January 15) on income that is not subject to withholding or if withholding is insufficient.
- The **estimated tax penalty** is assessed on a taxpayer for each quarter that the prepayments are less than 22.5% of the current year's tax or less than 25% of last year's tax (less than 27.5% of last year's tax for higher-income taxpayers). It is set at a rate of 4% of outstanding tax, compounding daily.
- Prepayments are important both for Treasury's fiscal planning and for supporting taxpayers with their overall tax compliance.

The estimated tax penalty is the second most common IRS penalty, and the vast majority are individual, not business, penalties.

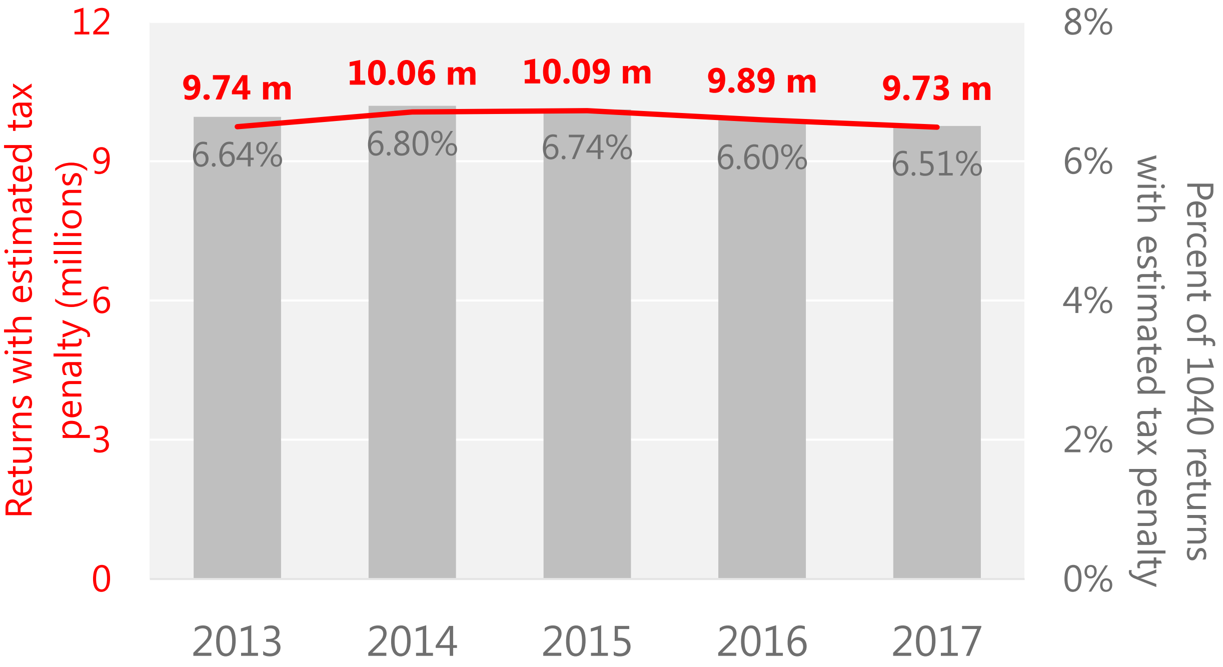
Penalty counts, FY 2017 – FY 2018

	FY 2017	FY 2018
Total penalties	45.60 mil	45.73 mil
Failure to file (Delinquency)	10.7%	10.8%
Failure to pay	46.8%	46.8%
Estimated tax penalty	**23.7%**	**24.1%**
Failure to deposit	3.4%	3.1%
Accuracy related	1.2%	1.4%
Other	14.2%	13.7%

Source: IRS Office of Servicewide Penalties

The percentage of taxpayers getting the estimated tax penalty has remained relatively consistent.

Estimated tax penalty over the last five years (TY 2013 – TY 2017)



Source: Compliance Data Warehouse, IRTF_F1040, IMF_TRANS_HISTORY

A third of taxpayers with the estimated tax penalty enter the Balance Due Notice Process, 21% become Tax Delinquent Accounts, and 13% enter installment agreements.

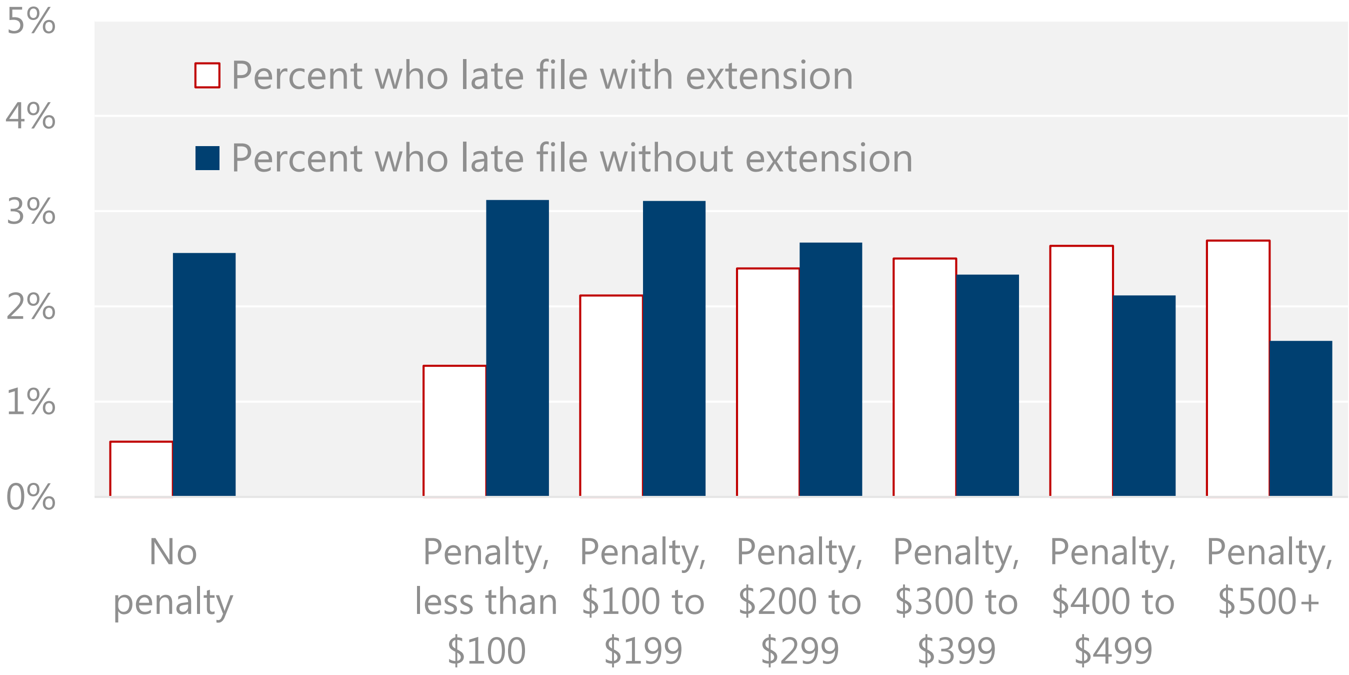
Downstream compliance issues for taxpayers with estimated tax penalty (TY 2017)

	Penalized taxpayers				**All filers**			
	Count (thousands)	% of total	% of those entering Bal Due Notice Process	% of Tax Delinquent Accounts	Count (thousands)	% of total	% of those entering Bal Due Notice Process	% of Tax Delinquent Accounts
Total	9,788	100%			140,955	100%		
Full pay prior to notice	6,442	66%			131,890	94%		
Enter bal due notice process	3,346	34%	100%		9,065	6%	100%	
Resolved out of notice	1,326	14%	40%		3,803	3%	42%	
Tax Delinquent Account	2,021	21%	60%	100%	5,262	4%	58%	100%
Assigned to Automated Collection System	640	7%	19%	32%	1,551	1%	17%	29%
Assigned to Queue	78	1%	2%	4%	131	0%	1%	2%
Assigned to Field	18	0%	1%	1%	27	0%	0%	1%
Installment Agreement	1,285	13%	38%	64%	3,044	2%	34%	58%
Other	255	3%	8%	13%	1,002	1%	11%	19%

Source: Compliance Data Warehouse, ARDI_IMF_MODULE, IMF_STATUS_HISTORY, IRTF_F1040

Taxpayers with an estimated tax penalty file extensions more than unpenalized taxpayers.

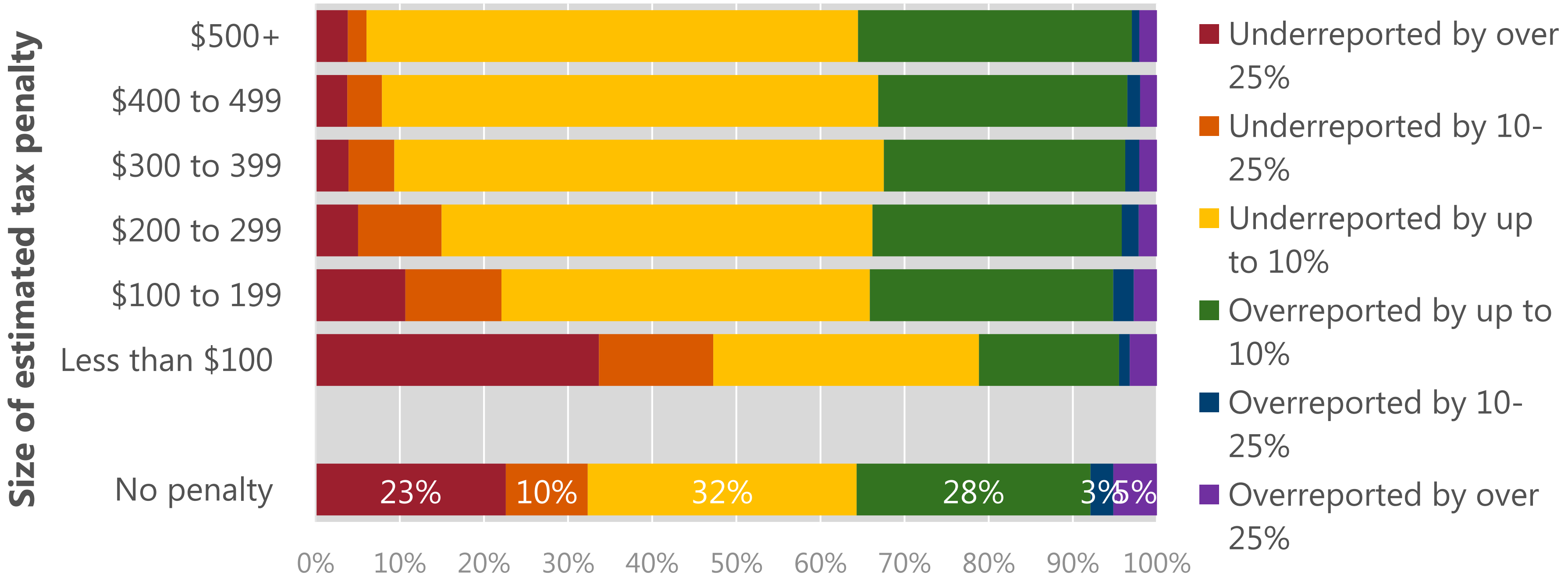
Late filing rates for those and without the estimated tax penalty, TY17



Source: Compliance Data Warehouse, IRTF_F1040

Just over 1 percent of taxpayers misreport their taxable income on their return. The estimated tax penalty is associated with higher underreporting.

Misreporting of taxable income for those who misreported, TY17



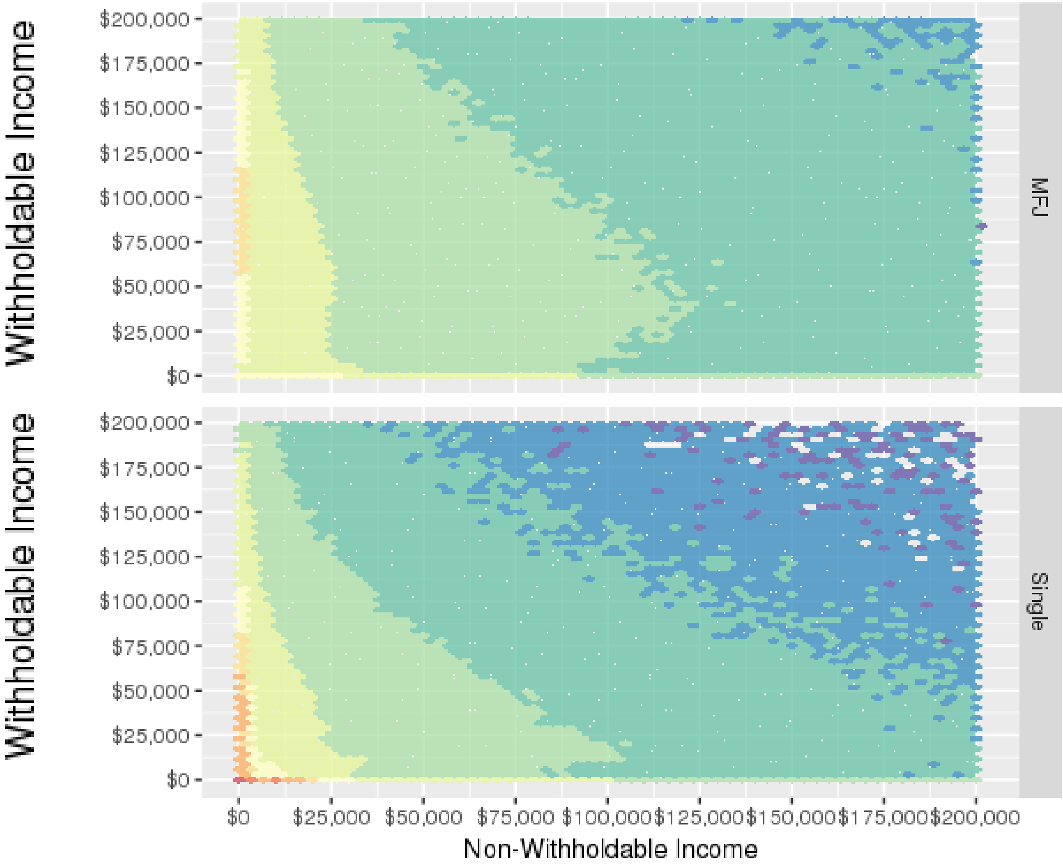
Source: Compliance Data Warehouse, IRTF_F1040

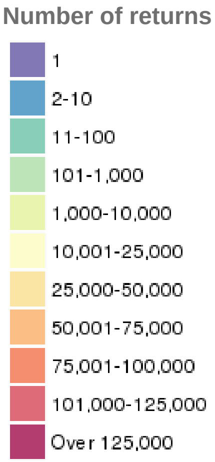
What factors are associated with the estimated tax penalty?

What affects taxpayers’ prepayment behavior?

Looking at all taxpayers, most have income subject to withholding and have lower levels of non-withholdable income.

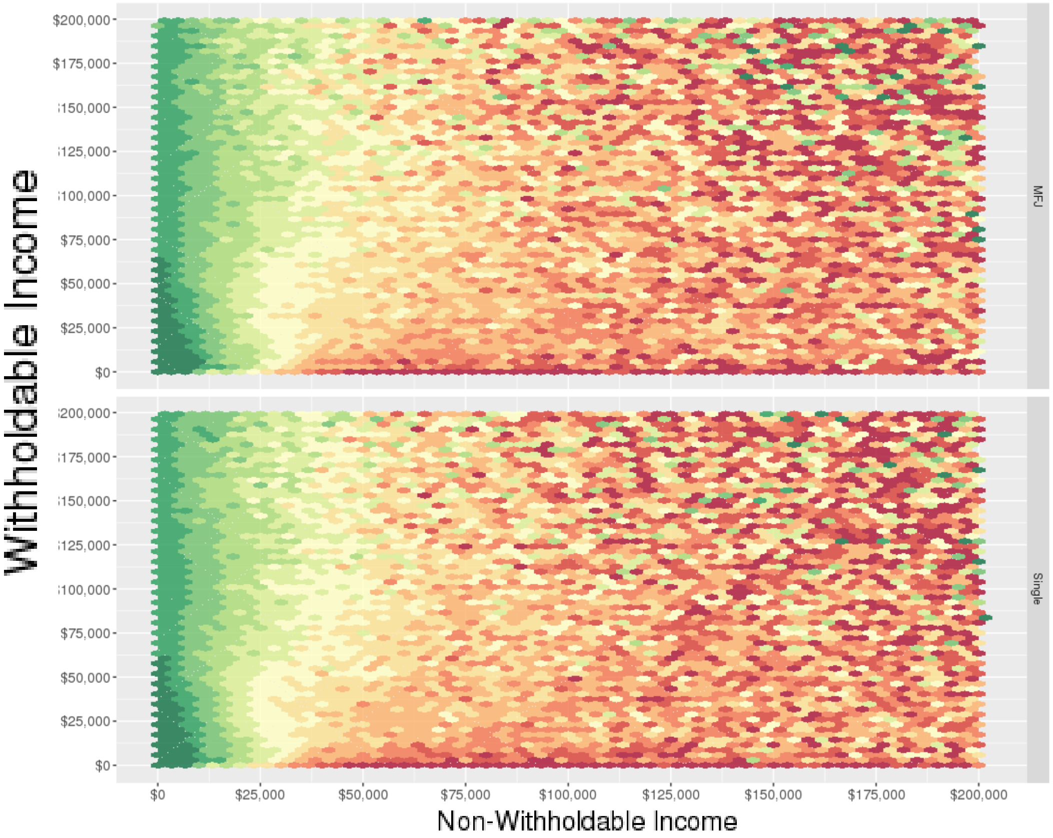
Heat map of overall withholdable vs. non-withholdable income levels by filing status (TY 2017)





Source: Compliance Data Warehouse, IRTF_F1040

The estimated tax penalty is associated with *increasing levels of **non-withholdable income***.

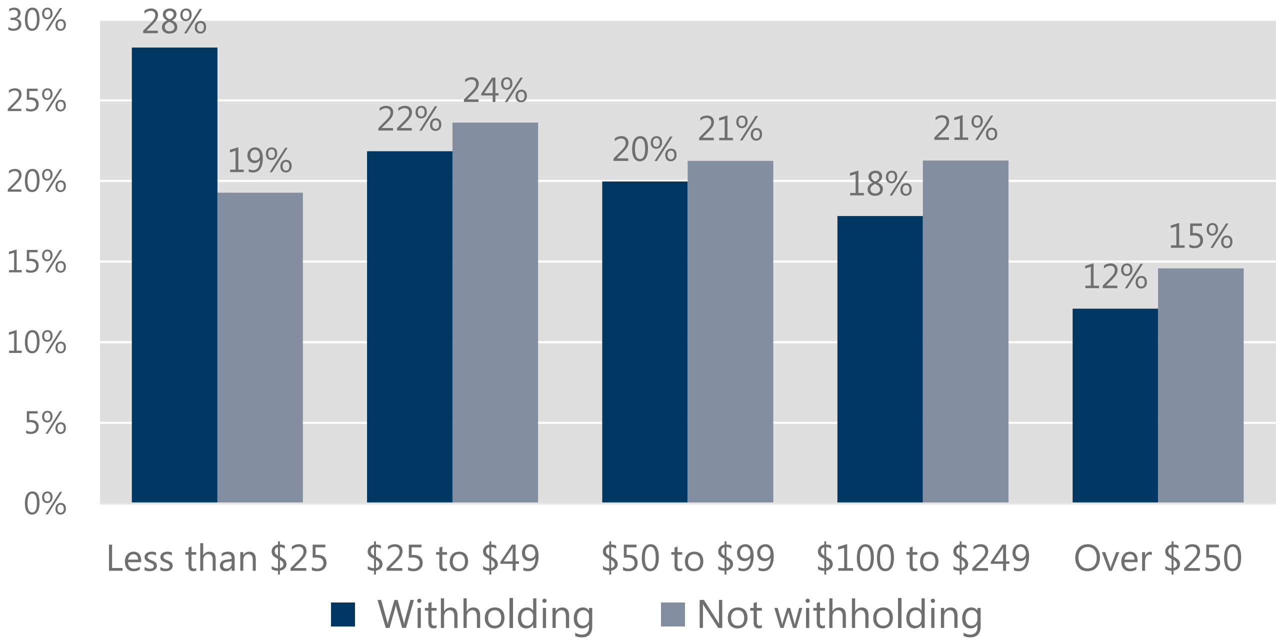


Heat map of penalty rates by withholdable and non-withholdable income levels, by filing status (TY 2017)

Source: Compliance Data Warehouse, IRTF_F1040, IMF_TRANS_HISTORY

Taxpayers with no withholding have ***larger penalties*** than taxpayers who withhold.

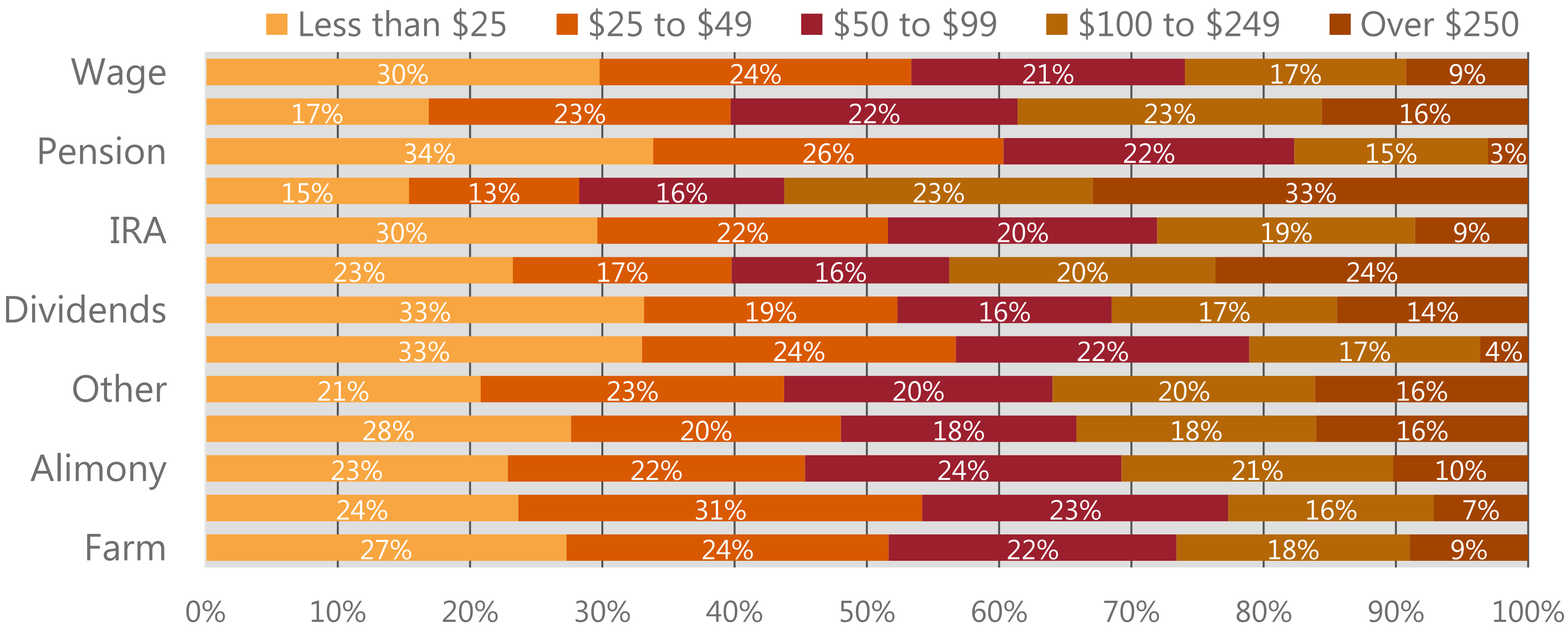
Size of estimated tax penalty for taxpayers by withholding behavior (TY 2017)



Source: Compliance Data Warehouse, IMF_TRANS_HISTORY, IRTF_F1040

While overall small, estimated tax penalties are ***largest*** for those whose primary income is not subject to withholding (Schedule E, Schedule D, Schedule C) and ***smallest*** for those whose primary income is withholdable (pension, Social Security, unemployment compensation, wages).

Size of estimated tax penalty for taxpayers by primary income type (TY 2017)



Source: Compliance Data Warehouse, IMF_TRANS_HISTORY, IRTF_F1040

Taxpayers with estimated tax penalties have on average ***more*** types of income, particularly more types of non-withholdable income.

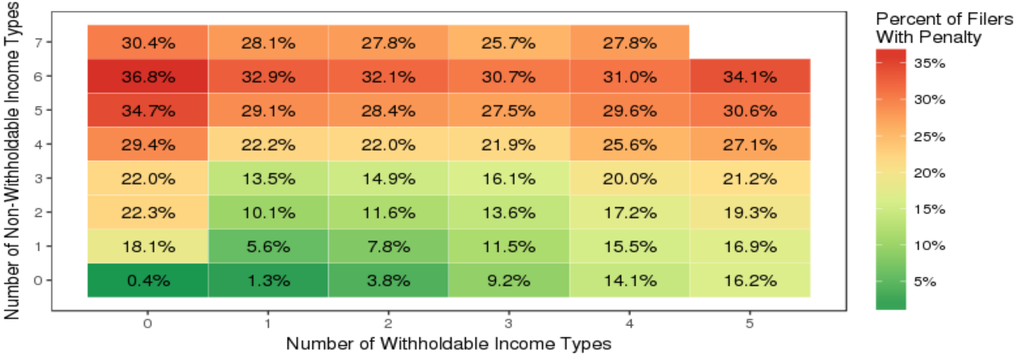
Average number of types of income (TY 2017)

	N	Average # types of income	Average # types of withholdable income	Average # types of non-withholdable income
Taxpayers with estimated tax penalty	9.7	3.36	1.45	1.91
All taxpayers, TY17	149.6	2.05	1.22	0.83

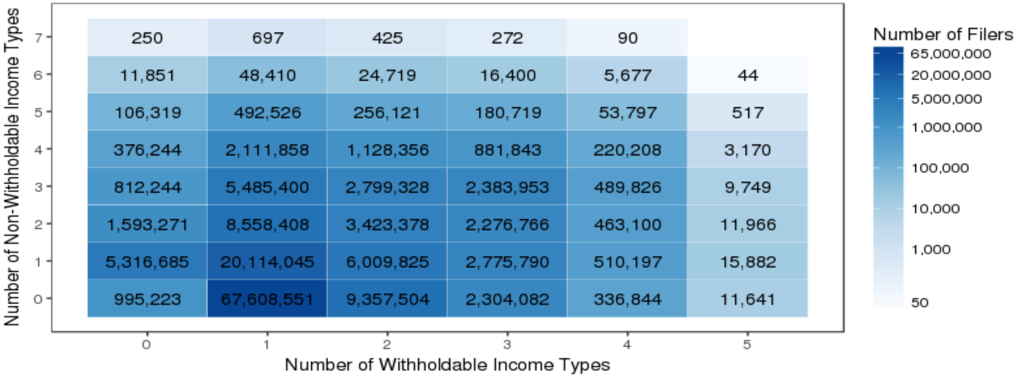
Source: Compliance Data Warehouse, IMF_TRANS_HISTORY, IRTF_F1040

Each additional income type adds more ***complexity*** to an individual’s tax obligation. Penalties increase at a higher rate with additional non-withholdable income vs. withholdable income types.

Estimated tax penalty by number of income types (TY 2017)



	0	1	2	3	4	5
7	30.4%	28.1%	27.8%	25.7%	27.8%	
6	36.8%	32.9%	32.1%	30.7%	31.0%	34.1%
5	34.7%	29.1%	28.4%	27.5%	29.6%	30.6%
4	29.4%	22.2%	22.0%	21.9%	25.6%	27.1%
3	22.0%	13.5%	14.9%	16.1%	20.0%	21.2%
2	22.3%	10.1%	11.6%	13.6%	17.2%	19.3%
1	18.1%	5.6%	7.8%	11.5%	15.5%	16.9%
0	0.4%	1.3%	3.8%	9.2%	14.1%	16.2%



	0	1	2	3	4	5
7	250	697	425	272	90	
6	11,851	48,410	24,719	16,400	5,677	44
5	106,319	492,526	256,121	180,719	53,797	517
4	376,244	2,111,858	1,128,356	881,843	220,208	3,170
3	812,244	5,485,400	2,799,328	2,383,953	489,826	9,749
2	1,593,271	8,558,408	3,423,378	2,276,766	463,100	11,966
1	5,316,685	20,114,045	6,009,825	2,775,790	510,197	15,882
0	995,223	67,608,551	9,357,504	2,304,082	336,844	11,641

Source: Compliance Data Warehouse, IMF_TRANS_HISTORY, IRTF_F1040

What happens after a taxpayer incurs an estimated tax penalty?

Around half of taxpayers (53 percent) incurring the estimated tax penalty in one year ***reincur*** it the following year, and most have a balance due.

Behavior after incurring the estimated tax penalty in TY16: return type

	Estimated tax penalty in TY17 (in thousands)		**No estimated tax penalty in TY17** (in thousands)	
Balance due in TY16	**4,413**	**91.1%**	**3,698**	**85.0%**
Same or higher bal due in TY17	50.5%		13.0%	
Lower bal due	43.1%		35.1%	
Even return	0.2%		2.6%	
Refund	6.1%		49.3%	
Even return in TY16	**15**	**0.3%**	**11**	**0.3%**
Bal due in TY17	61.9%		32.4%	
Even return	12.9%		10.8%	
Refund	25.2%		56.8%	
Refund in TY16	**417**	**8.6%**	**640**	**14.7%**
Bal due in TY17	47.9%		19.2%	
Even return	0.7%		1.1%	
Lower refund	30.5%		45.9%	
Same or larger refund	21.0%		33.9%	

Source: Compliance Data Warehouse, IMF_TRANS_HISTORY, IRTF_F1040

Taxpayers reincurring the estimated tax penalty tend to have higher adjusted gross income compared to the previous year and have more ***income variability*** compared to taxpayers who are not repenalized.

Behavior after incurring the estimated tax penalty in TY16: Income variability

	Estimated tax penalty in TY17		**No estimated tax penalty in TY17**	
	Count (thousands)	**Average TY17 AGI over TY16 AGI**	**Count** (thousands)	**Average TY17 AGI over TY16 AGI**
Total, TY16	**4,846**		**4,349**	
Higher adjusted gross income	59.5%	210%	45.0%	150%
Same adjusted gross income	0.2%	100%	0.2%	100%
Lower adjusted gross income	40.3%	61%	54.8%	79%

Source: Compliance Data Warehouse, IMF_TRANS_HISTORY, IRTF_F1040

Of those who were withholding and got the estimated tax penalty, most of those who came into compliance increased their withholding.

Behavior in the year after incurring the estimated tax penalty: Withholding

	Estimated tax penalty in TY17 (in thousands)		**No estimated tax penalty in TY17** (in thousands)	
Did not withhold in TY17	167		548	
Withheld in TY17	3,218		3,373	
Withheld more	1,818	56%	2,245	67%
Withheld the same	64	2%	40	1%
Withheld less	1,336	42%	1,088	32%

Source: Compliance Data Warehouse, IMF_TRANS_HISTORY, IRTF_F1040

One indicator of a taxpayer’s obligation to make estimated tax payments is having at least $1,000 of tax liability from income from non-withholdable sources.

Using this criterion, the majority of those incurring the penalty (who make at least $10K in non-withholdable income) continue to pay ***zero estimated tax*** the following year. About a quarter increase their estimated tax payments.

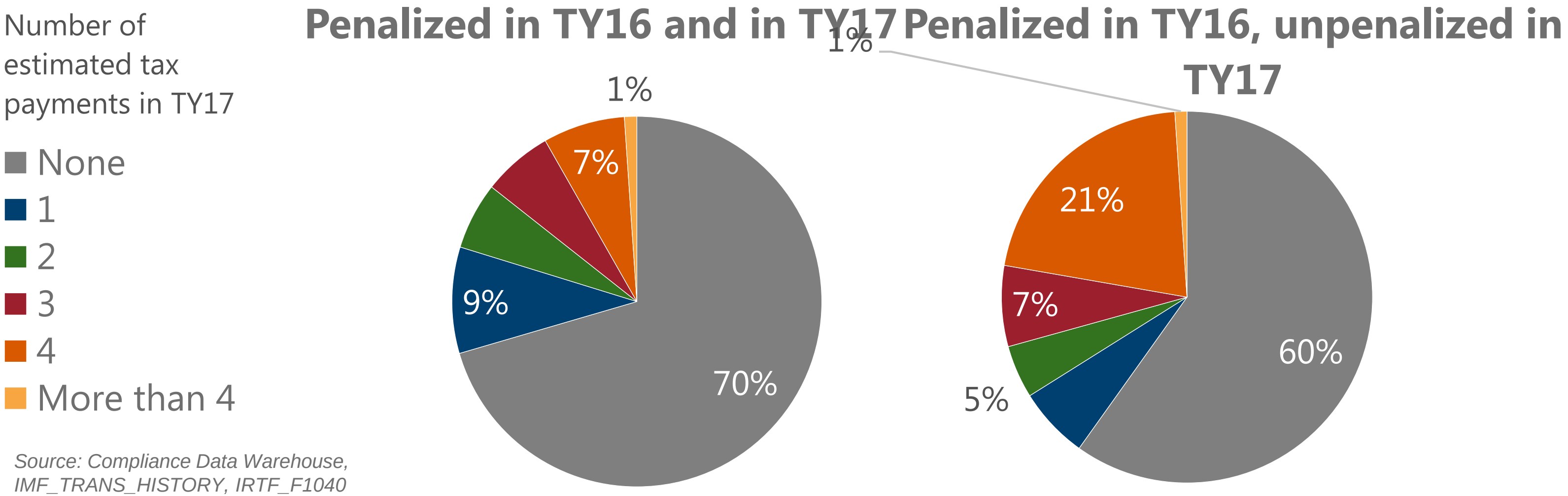
Behavior after incurring the estimated tax penalty in TY17:
Amount of estimated tax payments

Estimated payments in TY17 as compared to TY16	Estimated tax penalty in TY17	No estimated tax penalty in TY17
Zero estimated payments	65%	53%
Higher amount	20%	29%
Same amount	1%	1%
Lesser amount	14%	18%

Source: Compliance Data Warehouse, IMF_TRANS_HISTORY, IRTF_F1040

Many taxpayers who do not reincur the penalty may be complying by increasing their withholding or by having estimated tax liability that is dropping below the threshold needed to make estimated tax payments.

Behavior after incurring the estimated tax penalty in TY16:
Number of estimated tax payments



Source: Compliance Data Warehouse, IMF_TRANS_HISTORY, IRTF_F1040

Summary of descriptive findings

- Three-quarters of taxpayers with the estimated tax penalty have withholding and could adjust their prepayments by increasing their withholding. This would work for the most common taxpayers, who make the majority of their income from wage or retirement sources with withholding and make side nonwithholdable income from self-employment sources.
- Most taxpayers who make nonwithholdable income make low levels of income from these sources, which might preclude them from being required to make estimated tax payments.
- Estimated tax penalties are small in size, particularly for taxpayers who are withholding. Penalty incurrence and size increase for taxpayers with larger amounts of nonwithholdable income and more complexity (i.e., more sources of income and more persons on the return).
- A penalty alone only serves to change the behavior of some taxpayers, but many with estimated tax obligations continue to not make estimated tax payments.
- Return data alone cannot explain the **biggest barriers** to making estimated tax payments for those who are required to make them. Options include: knowing to make them, remembering to make them, calculating them, and submitting them.

Ongoing experimental research

To better understand the compliance behavior of taxpayers with estimated tax obligations

Experimental research

1. Outreach Study

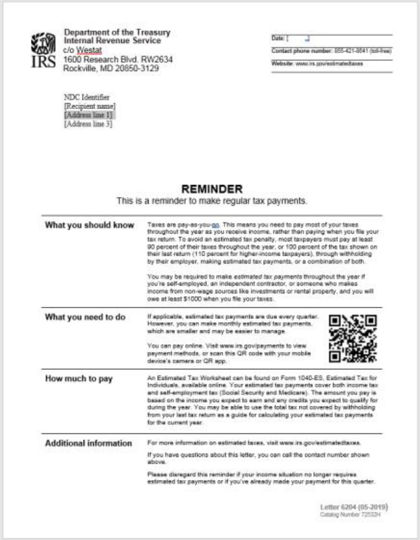
- A randomized controlled experiment sending quarterly estimated payment reminder letters to taxpayers with a previous estimated tax penalty who have not come into compliance
- Behaviorally informed treatments center around the timing and language of the letters, including testing the salience of a penalty vs. a balance due

2. Survey

- A web survey sent to taxpayers who are making estimated tax payments or who have sufficient non-withholdable income and should be making estimated tax payments
- Asks information about taxpayer burden (time, money) for making estimated tax payments, as well as barriers to compliance

Outreach Study: Treatments

1. Baseline



Department of the Treasury
Internal Revenue Service
c/o Westat
1600 Research Blvd. RW2634
Rockville, MD 20850-3129

Date: [ ]
Contact phone number: 855-421-8641 (toll-free)
Website: www.irs.gov/estimatedtaxes

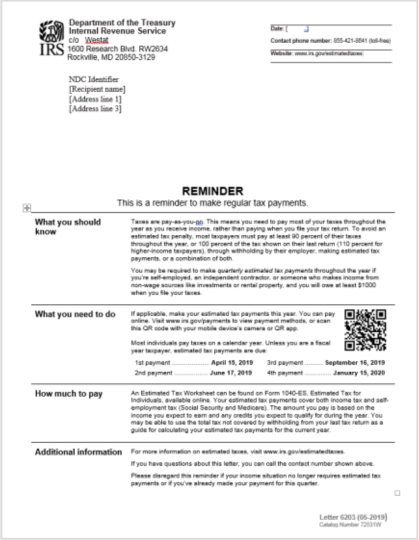
NDC Identifier
[Recipient name]
[Address line 1]
[Address line 3]

REMINDER
This is a reminder to make regular tax payments.

What you should know	Taxes are pay-as-you-go. This means you need to pay most of your taxes throughout the year as you receive income, rather than paying when you file your tax return. To avoid an estimated tax penalty, most taxpayers must pay at least 90 percent of their taxes throughout the year, or 100 percent of the tax shown on their last return (110 percent for higher-income taxpayers), through withholding by their employer, making estimated tax payments, or a combination of both. You may be required to make *estimated tax payments* throughout the year if you're self-employed, an independent contractor, or someone who makes income from non-wage sources like investments or rental property, and you will owe at least $1000 when you file your taxes.
What you need to do	If applicable, estimated tax payments are due every quarter. However, you can make monthly estimated tax payments, which are smaller and may be easier to manage. You can pay online. Visit www.irs.gov/payments to view payment methods, or scan this QR code with your mobile device's camera or QR app.
How much to pay	An Estimated Tax Worksheet can be found on Form 1040-ES, Estimated Tax for Individuals, available online. Your estimated tax payments cover both income tax and self-employment tax (Social Security and Medicare). The amount you pay is based on the income you expect to earn and any credits you expect to qualify for during the year. You may be able to use the total tax not covered by withholding from your last tax return as a guide for calculating your estimated tax payments for the current year.
Additional information	For more information on estimated taxes, visit www.irs.gov/estimatedtaxes. If you have questions about this letter, you can call the contact number shown above. Please disregard this reminder if your income situation no longer requires estimated tax payments or if you've already made your payment for this quarter.

Letter 6204 (05-2019)
Catalog Number 72532H

2. Monthly option



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Rockville, MD 20850-3129

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REMINDER
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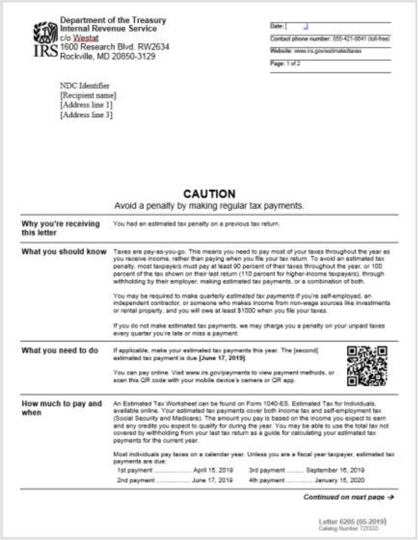
What you should know	Taxes are pay-as-you-go. This means you need to pay most of your taxes throughout the year as you receive income, rather than paying when you file your tax return. To avoid an estimated tax penalty, most taxpayers must pay at least 90 percent of their taxes throughout the year, or 100 percent of the tax shown on their last return (110 percent for higher-income taxpayers), through withholding by their employer, making estimated tax payments, or a combination of both. You may be required to make *quarterly estimated tax payments* throughout the year if you're self-employed, an independent contractor, or someone who makes income from non-wage sources like investments or rental property, and you will owe at least $1000 when you file your taxes.
What you need to do	If applicable, make your estimated tax payments this year. You can pay online. Visit www.irs.gov/payments to view payment methods, or scan this QR code with your mobile device's camera or QR app. Most individuals pay taxes on a calendar year. Unless you are a fiscal year taxpayer, estimated tax payments are due: 1st payment .... **April 15, 2019** 3rd payment .... **September 16, 2019** 2nd payment .... **June 17, 2019** 4th payment .... **January 15, 2020**
How much to pay	An Estimated Tax Worksheet can be found on Form 1040-ES, Estimated Tax for Individuals, available online. Your estimated tax payments cover both income tax and self-employment tax (Social Security and Medicare). The amount you pay is based on the income you expect to earn and any credits you expect to qualify for during the year. You may be able to use the total tax not covered by withholding from your last tax return as a guide for calculating your estimated tax payments for the current year.
Additional information	For more information on estimated taxes, visit www.irs.gov/estimatedtaxes. If you have questions about this letter, you can call the contact number shown above. Please disregard this reminder if your income situation no longer requires estimated tax payments or if you've already made your payment for this quarter.

Letter 6203 (05-2019)
Catalog Number 72531W

3. Avoid a penalty



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1600 Research Blvd. RW2634
Rockville, MD 20850-3129

Date: [ ]
Contact phone number: 855-421-8641 (toll-free)
Website: www.irs.gov/estimatedtaxes
Page: 1 of 2

NDC Identifier
[Recipient name]
[Address line 1]
[Address line 3]

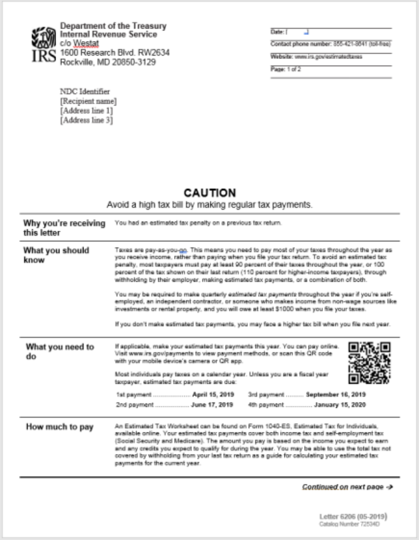
CAUTION
Avoid a penalty by making regular tax payments.

Why you're receiving this letter	You had an estimated tax penalty on a previous tax return.
What you should know	Taxes are pay-as-you-go. This means you need to pay most of your taxes throughout the year as you receive income, rather than paying when you file your tax return. To avoid an estimated tax penalty, most taxpayers must pay at least 90 percent of their taxes throughout the year, or 100 percent of the tax shown on their last return (110 percent for higher-income taxpayers), through withholding by their employer, making estimated tax payments, or a combination of both. You may be required to make quarterly *estimated tax payments* if you're self-employed, an independent contractor, or someone who makes income from non-wage sources like investments or rental property, and you will owe at least $1000 when you file your taxes. If you do not make estimated tax payments, we may charge you a penalty on your unpaid taxes every quarter you're late or miss a payment.
What you need to do	If applicable, make your estimated tax payments this year. The [second] estimated tax payment is due **[June 17, 2019]**. You can pay online. Visit www.irs.gov/payments to view payment methods, or scan this QR code with your mobile device's camera or QR app.
How much to pay and when	An Estimated Tax Worksheet can be found on Form 1040-ES, Estimated Tax for Individuals, available online. Your estimated tax payments cover both income tax and self-employment tax (Social Security and Medicare). The amount you pay is based on the income you expect to earn and any credits you expect to qualify for during the year. You may be able to use the total tax not covered by withholding from your last tax return as a guide for calculating your estimated tax payments for the current year. Most individuals pay taxes on a calendar year. Unless you are a fiscal year taxpayer, estimated tax payments are due: 1st payment .... April 15, 2019 3rd payment .... September 16, 2019 2nd payment .... June 17, 2019 4th payment .... January 15, 2020

Continued on next page →

Letter 6205 (05-2019)
Catalog Number 72533S

4. Avoid a balance due



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Rockville, MD 20850-3129

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Website: www.irs.gov/estimatedtaxes
Page: 1 of 2

NDC Identifier
[Recipient name]
[Address line 1]
[Address line 3]

CAUTION
Avoid a high tax bill by making regular tax payments.

Why you're receiving this letter	You had an estimated tax penalty on a previous tax return.
What you should know	Taxes are pay-as-you-go. This means you need to pay most of your taxes throughout the year as you receive income, rather than paying when you file your tax return. To avoid an estimated tax penalty, most taxpayers must pay at least 90 percent of their taxes throughout the year, or 100 percent of the tax shown on their last return (110 percent for higher-income taxpayers), through withholding by their employer, making estimated tax payments, or a combination of both. You may be required to make quarterly *estimated tax payments* throughout the year if you're self-employed, an independent contractor, or someone who makes income from non-wage sources like investments or rental property, and you will owe at least $1000 when you file your taxes. If you don't make estimated tax payments, you may face a higher tax bill when you file next year.
What you need to do	If applicable, make your estimated tax payments this year. You can pay online. Visit www.irs.gov/payments to view payment methods, or scan this QR code with your mobile device's camera or QR app. Most individuals pay taxes on a calendar year. Unless you are a fiscal year taxpayer, estimated tax payments are due: 1st payment .... **April 15, 2019** 3rd payment .... **September 16, 2019** 2nd payment .... **June 17, 2019** 4th payment .... **January 15, 2020**
How much to pay	An Estimated Tax Worksheet can be found on Form 1040-ES, Estimated Tax for Individuals, available online. Your estimated tax payments cover both income tax and self-employment tax (Social Security and Medicare). The amount you pay is based on the income you expect to earn and any credits you expect to qualify for during the year. You may be able to use the total tax not covered by withholding from your last tax return as a guide for calculating your estimated tax payments for the current year.

Continued on next page →

Letter 6206 (05-2019)
Catalog Number 72534D

- Sample of 60,000 taxpayers who were assessed an estimated tax penalty in TY 2017 and made fewer than four estimated payments in TY18, segmented by making any payments
- Treatments include three waves of reminder letters around the last three quarterly estimated tax deadlines

Estimated Tax Burden Survey

Sections:

- Types of household income
- Awareness of timing of tax payments for different income types
- Frequency of estimated tax payments
- Process of making estimated tax payments
- Time and money spent to make estimated tax payments
- Penalties
- Recordkeeping
- Tax planning and attitudes to taxes
- Self-employment
- Customer service feedback

Appendices available upon request

IRS Research, Applied Analytics, and Statistics

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The Effect of Audit Burden on Subsequent Tax Evasion

Amy M. Hageman, PhD	Kansas State University
Ethan LaMothe	University of South Carolina
Mary E. Marshall, PhD	Louisiana Tech University

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Background

- Traditional models account for audits by incorporating the expected value of the costs of being caught against possible gains.
- Anecdotally, people seem to hate the idea of being audited even if they are completely compliant – **but why?**

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Purpose

- **Audit Burden:** the monetary and non-monetary expenditures associated with a tax audit which are not dependent on an individual's chosen level of compliance.
- **Primary RQ:** How does audit burden influence subsequent compliance behavior?
  - Differences between compliers and evaders?

Summary of Findings

- The effect of audit burden depends on the behavior of the individual under audit on the audited tax return. High burden:
  - **Increases compliance** for those who **evaded** on their audited return
  - **Decreases compliance** for those who **complied** on their audited return
- An apology can help mitigate the negative effects of audit burden for compliers.

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Research on Experiencing Audits

- Audits influence subsequent compliance, but not always in a consistent manner.
  - Sometimes audits **increase** compliance.
    - Experience makes the costs more salient.
  - Sometimes audits **decrease** compliance.
    - Misperception of chance
    - Loss repair
  - Sometimes **it depends** on situational factors.
    - Evaders vs compliers

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Audit Burden

- Audit burden represents a real expenditure of time, resources, stress, etc. and may be viewed similarly to evasion penalties.

- **Mental accounting** suggests the way an expenditure is perceived depends on whether there is an associated benefit.
  - Framed as a **loss if no benefit is received.**
  - Framed as a **cost if a benefit is received.**

Hypotheses 1 and 2

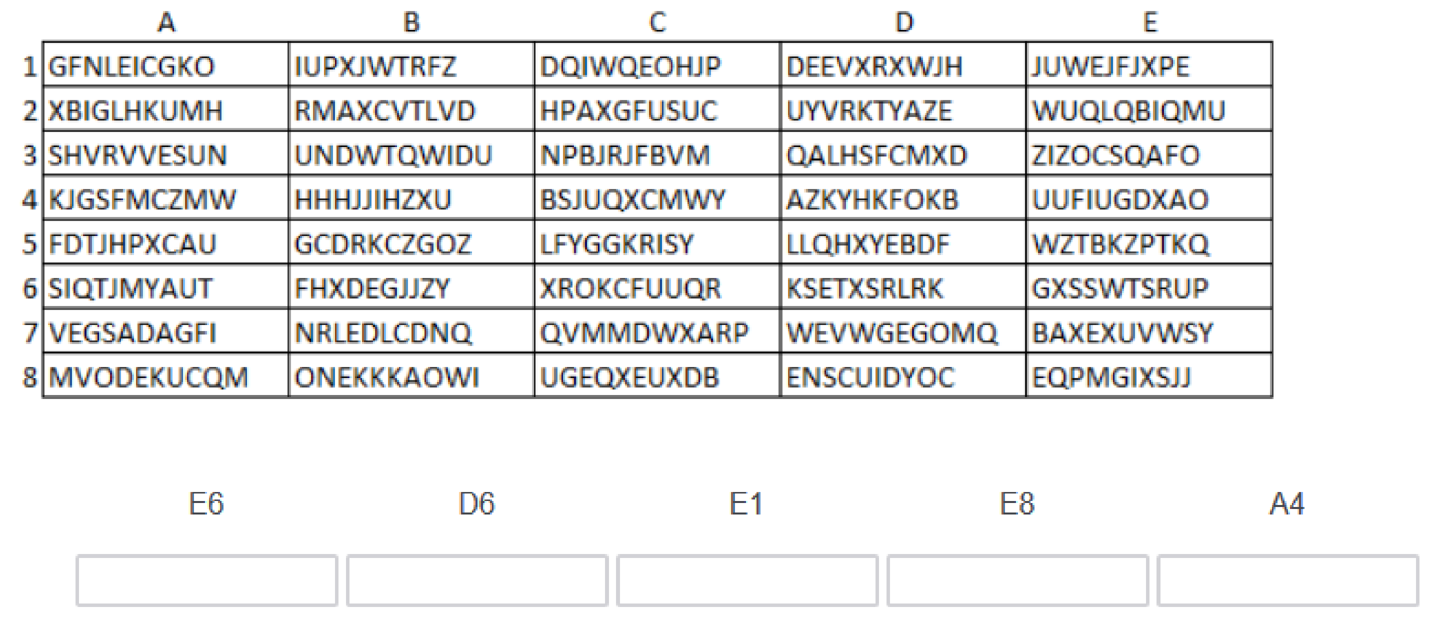
- Evaders:
  - Burden is an additional cost of noncompliance
  - Reinforces the effects of other penalties
  - **H1: ↑Burden → ↑Compliance for evaders**

- Compliers
  - Burden is an undeserved loss
  - Perceived loss triggers loss repair
  - **H2: ↑Burden → ↓Compliance for compliers**

Experiment 1 – Overview

- 2x2 multi round experiment
  - Compliance on audited return (measured)
  - Audit burden (manipulated – stratified)
- 172 participants recruited from Mturk
  - US resident/citizen, >24 years old, 3 years or more of tax return filing experience
- DV: change in income reported

Experiment 1 – Audit Burden



	A	B	C	D	E
1	GFNLEICGKO	IUPXJWTRFZ	DQIWQEOHJP	DEEVXRXWJH	JUWEJFJXPE
2	XBIGLHKUMH	RMAXCVTLVD	HPAXGFUSUC	UYVRKTYAZE	WUQLQBIQMU
3	SHVRVVESUN	UNDWTQWIDU	NPBJRJFBVM	QALHSFCMXD	ZIZOCSQAFO
4	KJGSFMCZMW	HHHJJIHZXU	BSJUQXCMWY	AZKYHKFOKB	UUFIUGDXAO
5	FDTJHPXCAU	GCDRKCZGOZ	LFYGGKRISY	LLQHXYEBDF	WZTBKZPTKQ
6	SIQTJMYAUT	FHXDEGJJZY	XROKCFUUQR	KSETXSRLRK	GXSSWTSRUP
7	VEGSADAGFI	NRLEDLCDNQ	QVMMDWXARP	WEVWGEGOMQ	BAXEXUVWSY
8	MVODEKUCQM	ONEKKKAOWI	UGEQXEUXDB	ENSCUIDYOC	EQPMGIXSJJ

E6	D6	E1	E8	A4

Experiment 1 – Results

Panel B. ANOVA Table

Source	df	Mean Square	F-statistic	*p*-value
Complier/Evader	1	345,004,019	24.94	< 0.0001
Audit Burden	1	9,655,508	0.70	0.4047
Interaction	1	138,275,317	9.99	0.0019
Error	168	13,834,618		

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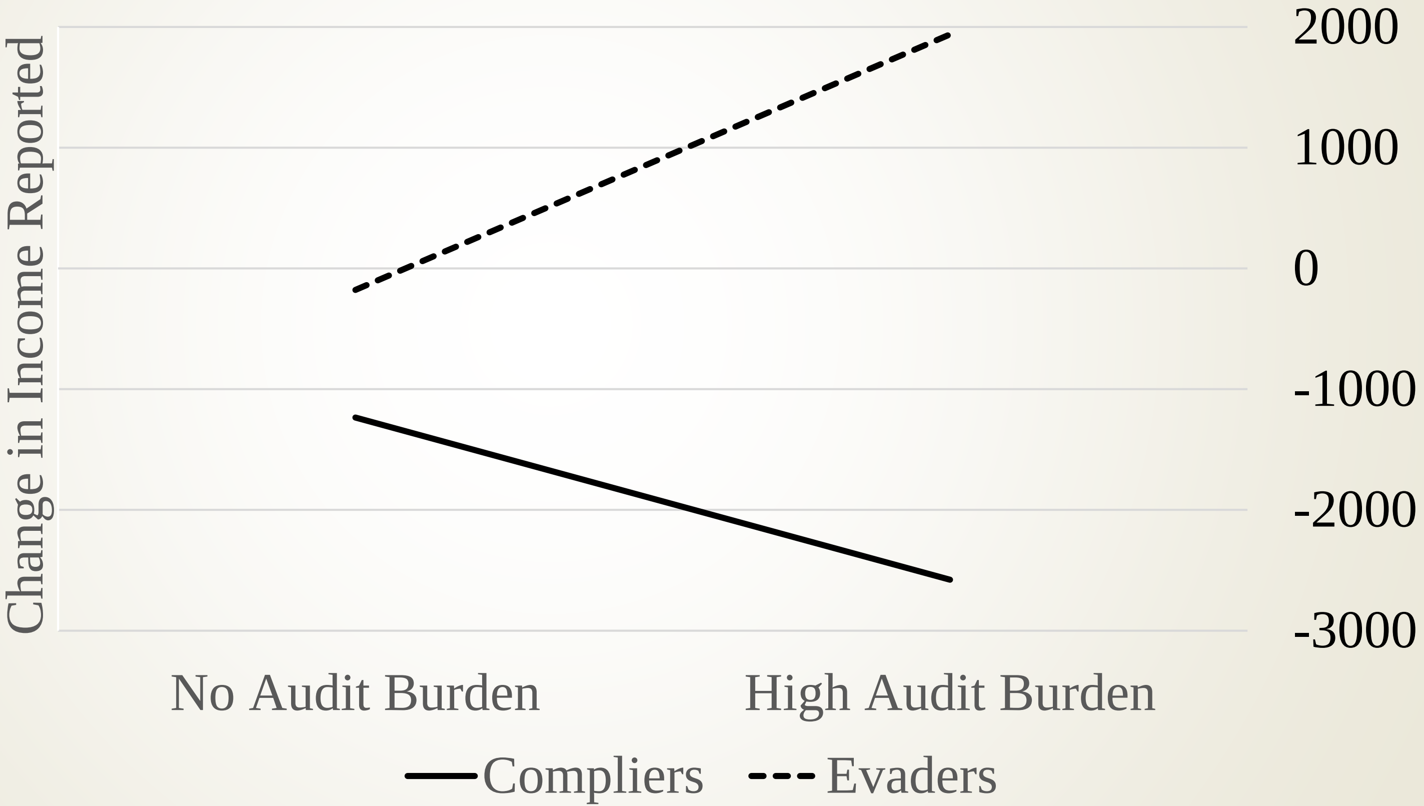
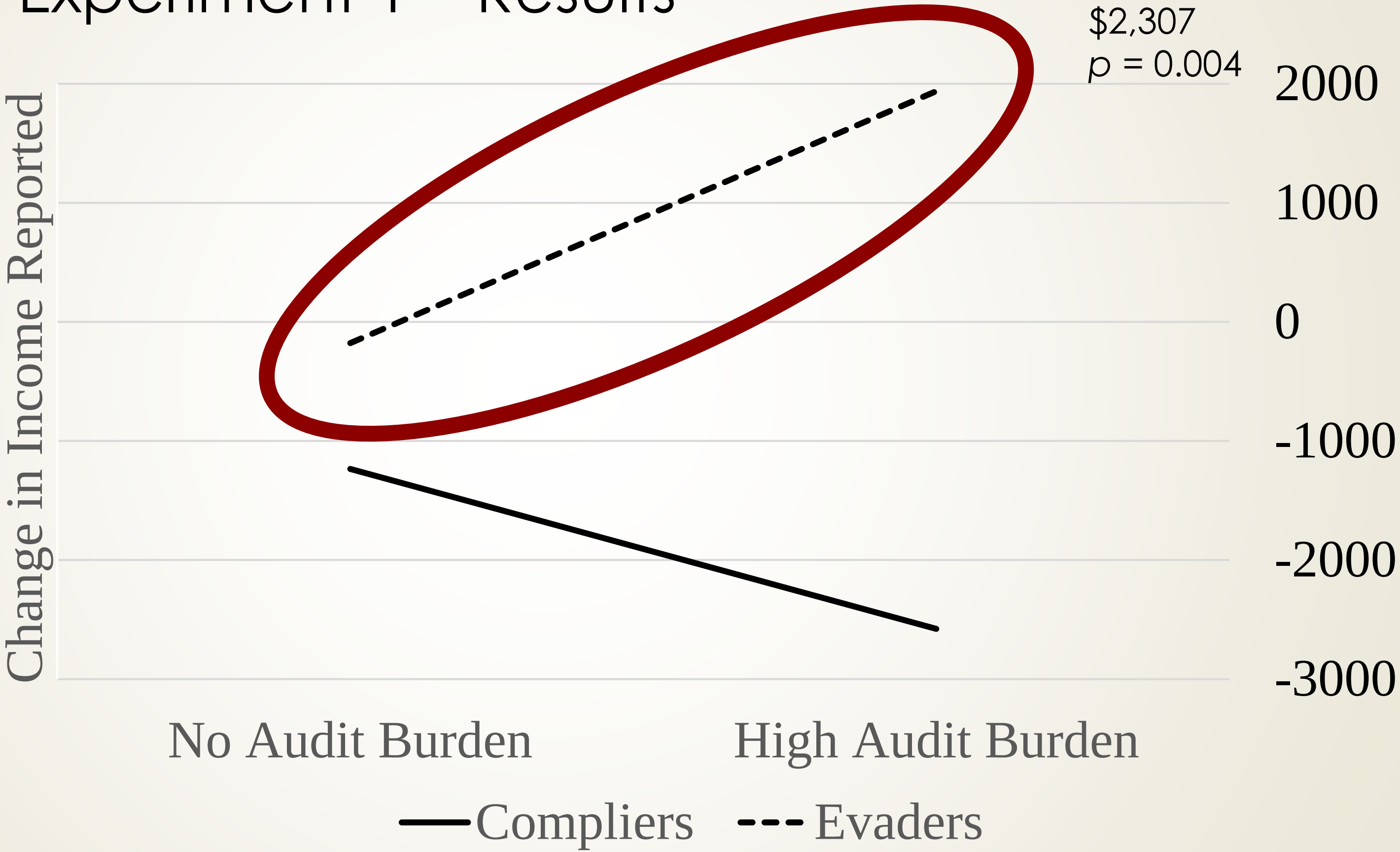
Experiment 1 – Results



Experiment 1 – Results



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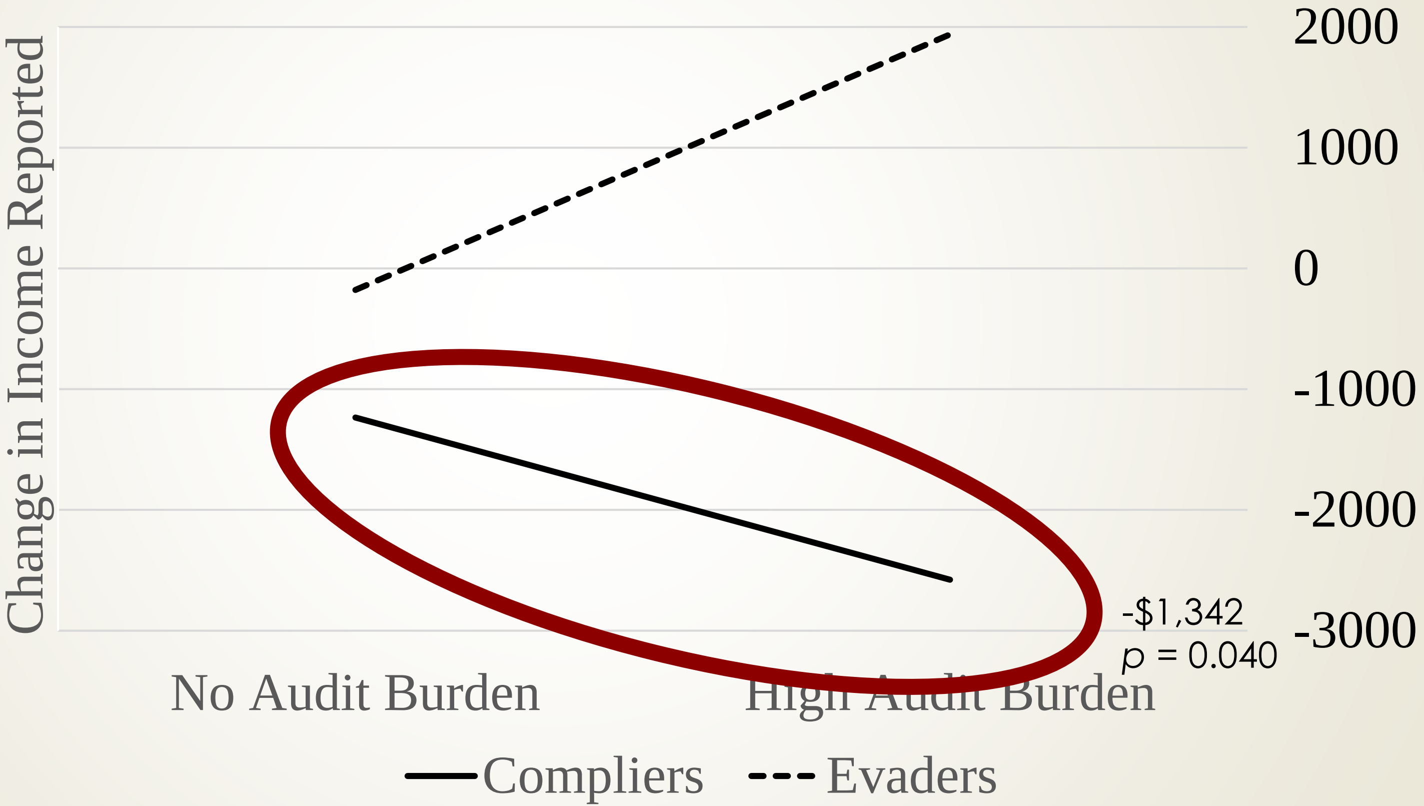
Experiment 1 – Results



-$1,342
p = 0.040

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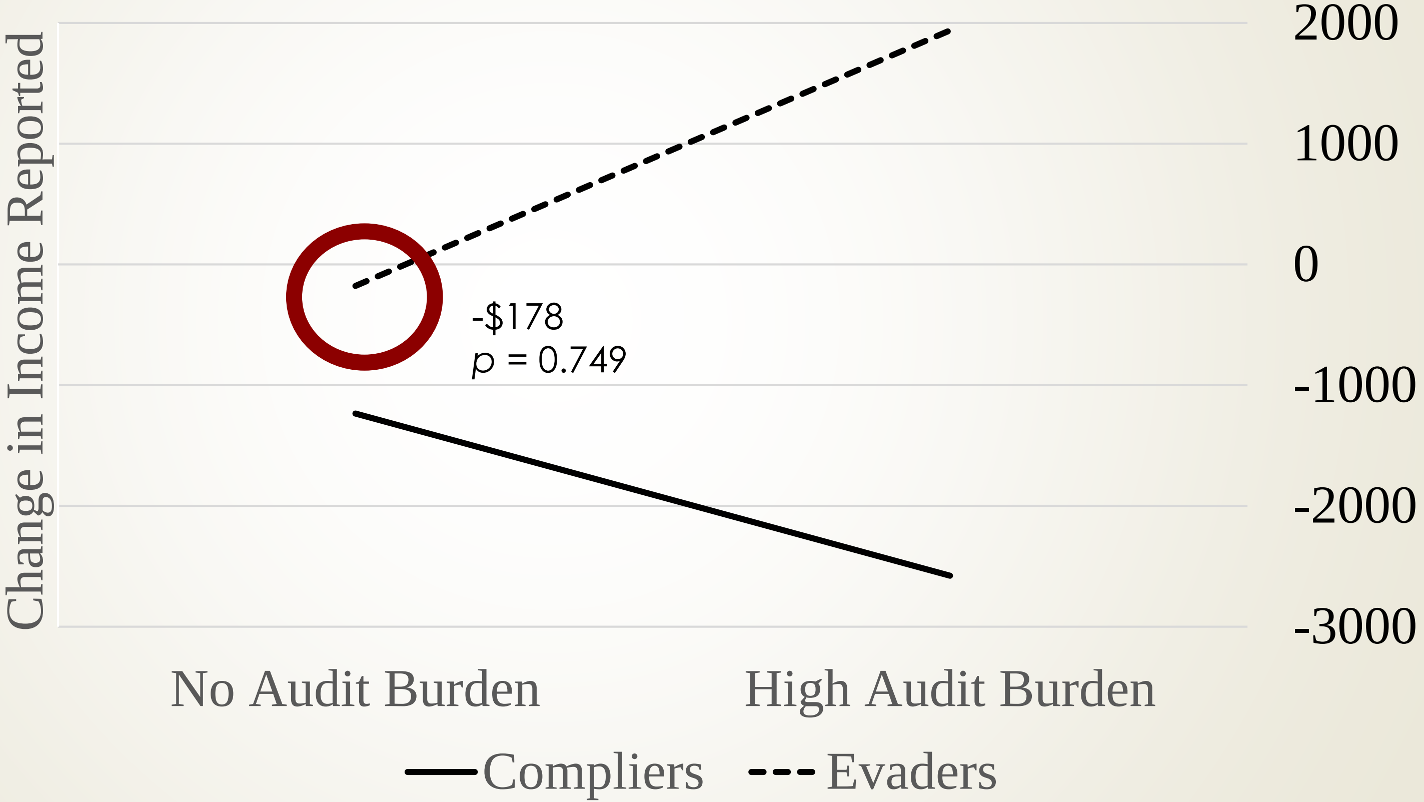
Results



-$178
$p = 0.749$

Hypothesis 3

- Given the negative effect of high burden audits on compliers, can an intervention reduce the effect of the perceived loss?
  - **Acknowledgment of burden** – service oriented procedure to increase compliance.
  - **H3:** Individuals who did NOT evade on an audited tax return, but were subjected to a burdensome audit, are less likely to decrease the amount of income they subsequently report (i.e., evade less) when the taxing authority apologizes for the undue audit.

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Experiment 2 – Overview

- Structurally identical to experiment 1

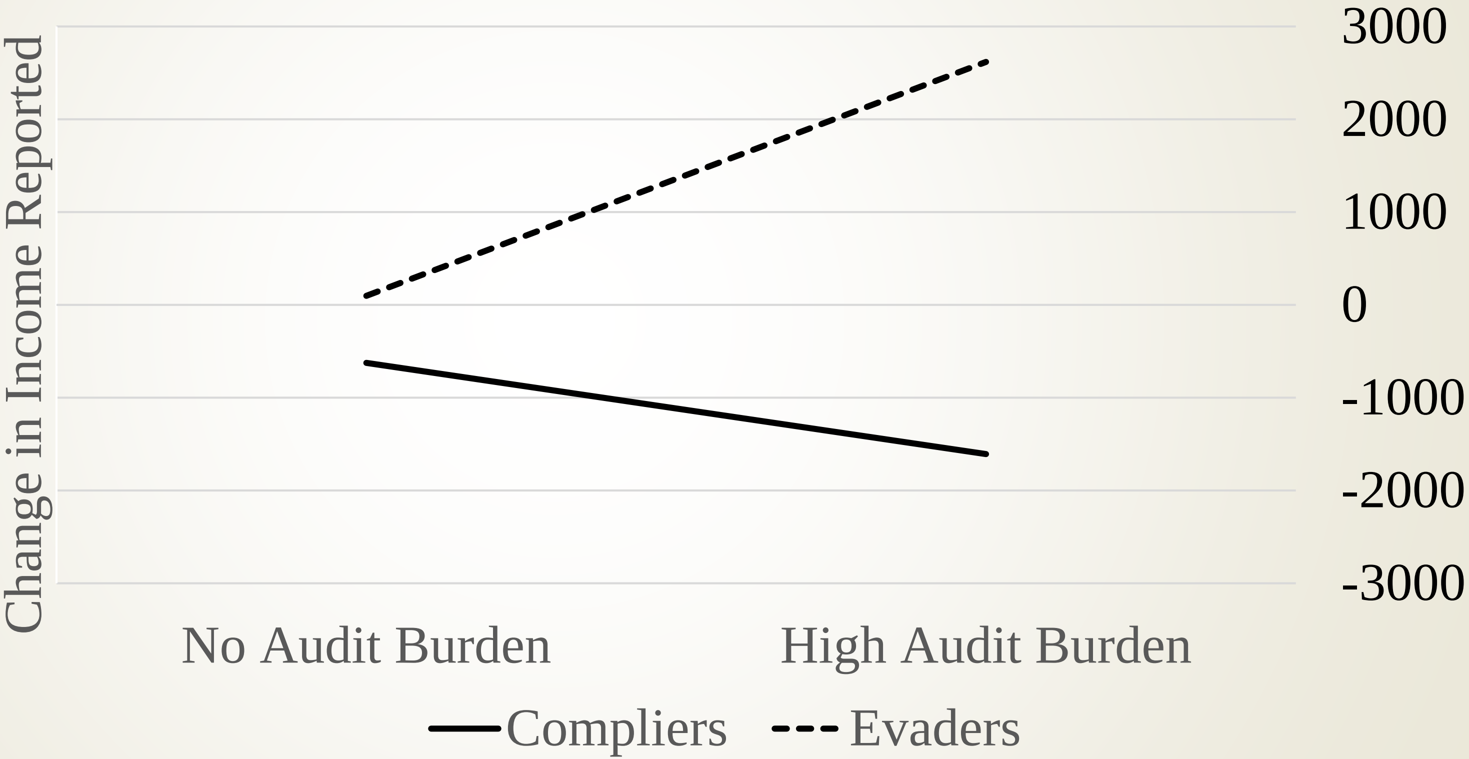
- Half of the compliers view an apology:
  - “Thank you for properly reporting all of your income. We sincerely apologize for any inconvenience due to your audit. Unfortunately, audits are necessary to ensure other taxpayers don’t cheat. Again, thank you for your truthfulness.”

Experiment 2 – Results (Replication)

Panel B. ANOVA Table

Source	df	Mean Square	F-statistic	*p*-value
Complier/Evader	1	379,557,948	30.61	<0.001
Audit Burden	1	36,680,895	2.96	0.087
Interaction	1	190,271,544	15.34	<0.001
Error	261	12,400,138		

Experiment 2 – Results (Replicaton)

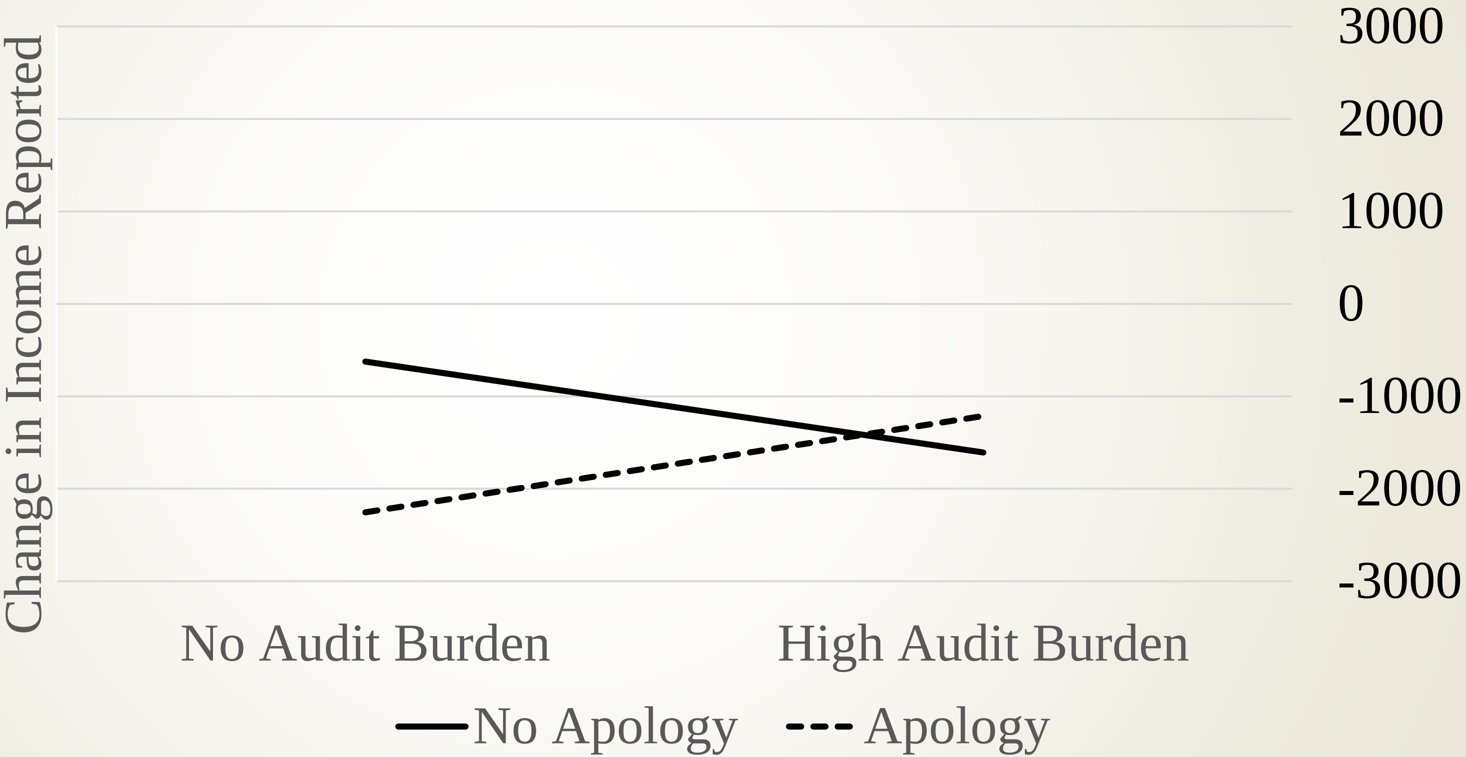


Experiment 2 – Results (Primary)

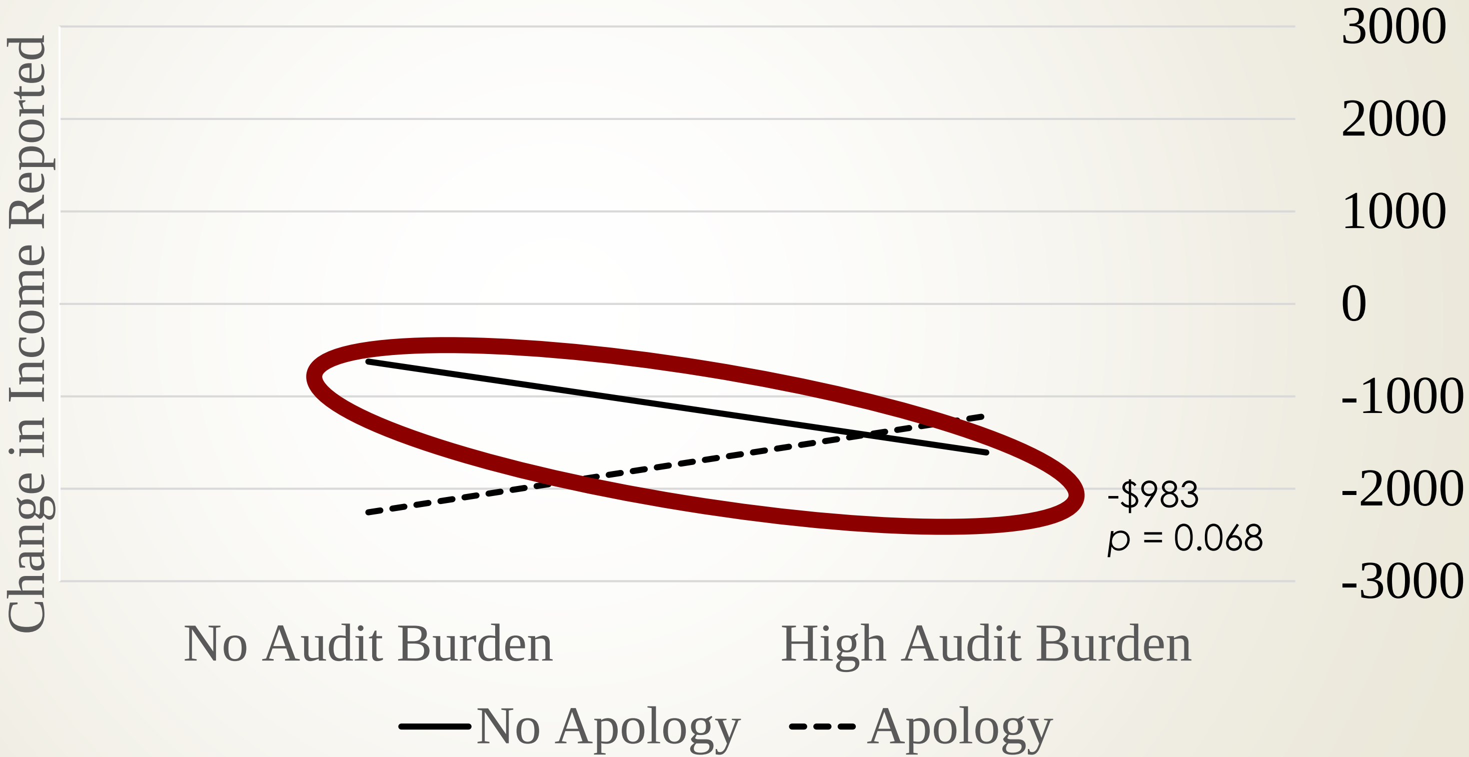
Panel B. ANOVA Table

Source	df	Mean Square	F-statistic	*p*-value
Apology	1	19,194,832	1.80	0.182
Audit Burden	1	46,200	0.00	0.978
Interaction	1	51,785,119	4.85	0.029
Error	198	10,685,688		

Experiment 2 – Results (Primary)

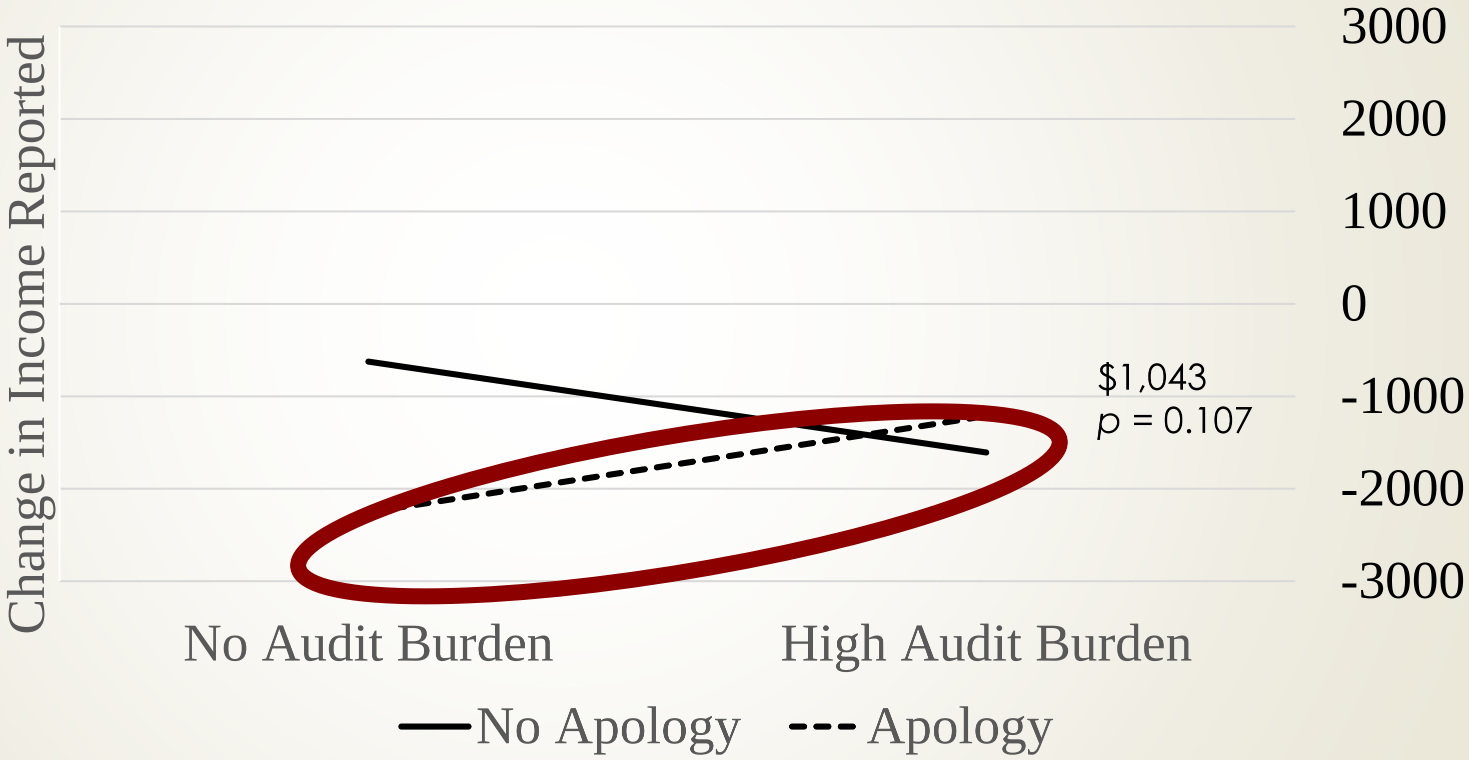


Experiment 2 – Results (Primary)



-$983
p = 0.068

Experiment 2 – Results (Primary)



$1,043
p = 0.107

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Conclusion

- Contribution
  - Literature on effects of being audited
  - Informative to tax authorities
  - Provides insights into cost-loss framing in contexts involving compulsory (as compared to voluntary) expenditures of resources

Thank You!

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Using a Graph Database to Analyze the IRS Databank

Ririko Horvath and Rahul Tikekar

Research, Applied Analytics and Statistics (RAAS)

Internal Revenue Service

Background: IRS Databank

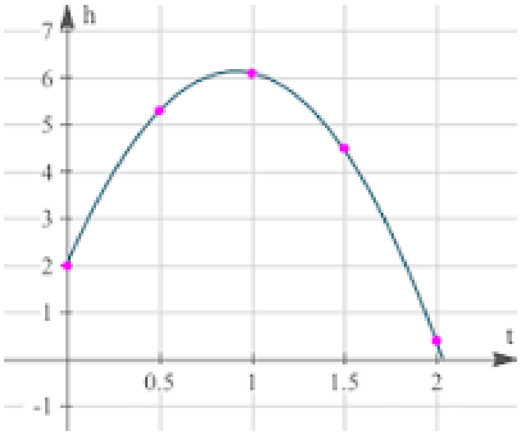
- Subset of the Compliance Data Warehouse (CDW)
- Large dataset starting from 1996
  - Currently administered by Raj Chetty and John Friedman
- Tracks over 200 attributes relating to a taxpayer
  - SSN, Spouse(s), Dependent(s), Wages, etc.
- Provides a detailed picture of the American taxpayer; longitudinal in nature:
  - Taxpayer linked to dependents; dependents linked to their dependents, etc.
  - Unique opportunity to analyze taxpayer behavior

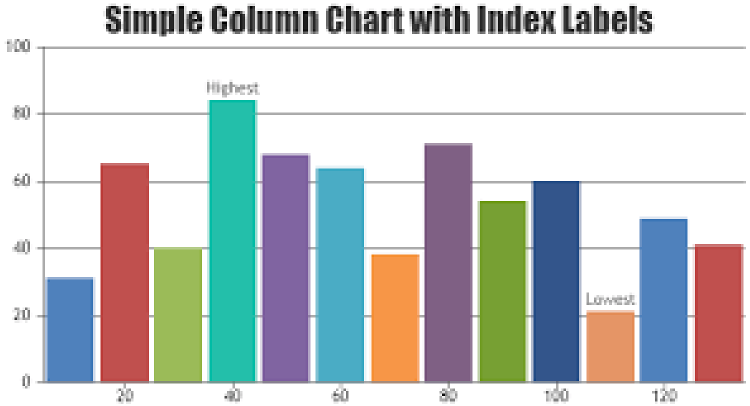
Motivation

- Conceptually the databank is arranged in a longitudinal manner
- Implementation: databank is stored as a relational database
  - Data is stored in tables (Sybase, Oracle, MySQL, etc.)
  - Need SQL to extract data
- Using a relational database for longitudinal data is neither efficient nor intuitive
  - Must use recursive SQL to “connect” taxpayers to their dependents
  - Like trying to find the manager of each employee
- Relational databases are good for transactional data
  - Retail stores

Graphs

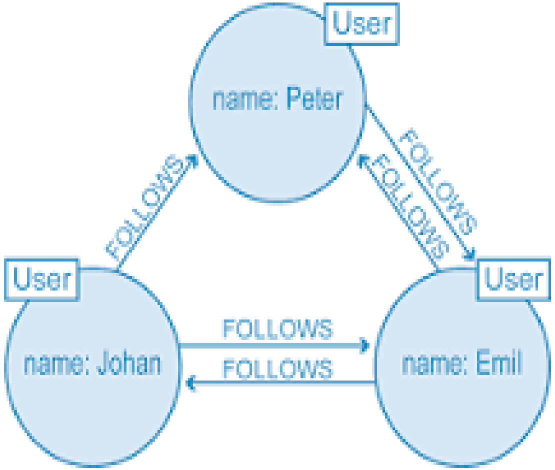
- No, not these





Graphs and Graph Databases

- Table is the basic unit of a Relational Database
- Graph is the basic unit of a Graph Database (nodes and links)
- More natural to visualize, model, and query
- From tax administration perspective, rather than just a snapshot of a taxpayer's situation for a given year, the graph database can show changes in a tax payer's situations **over** a **span of** many **years**



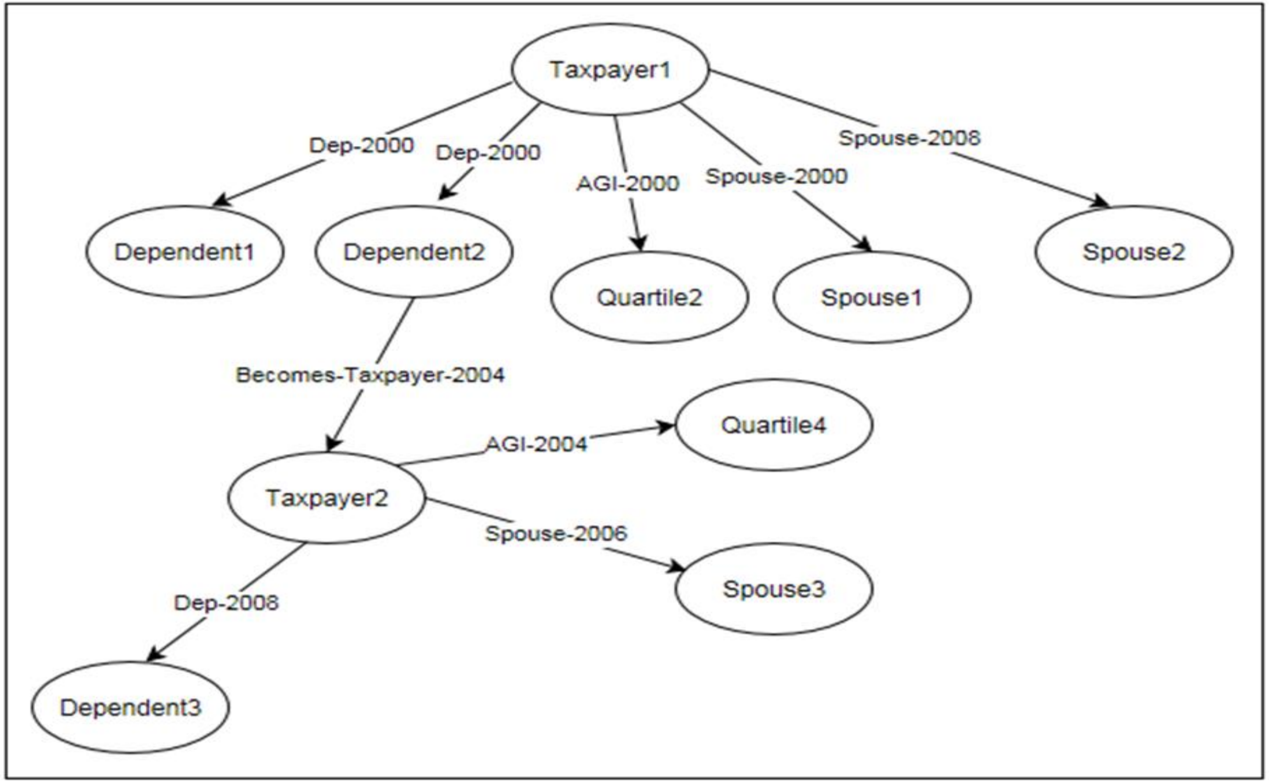
From neo4j.com

Why Graph Database, and When?

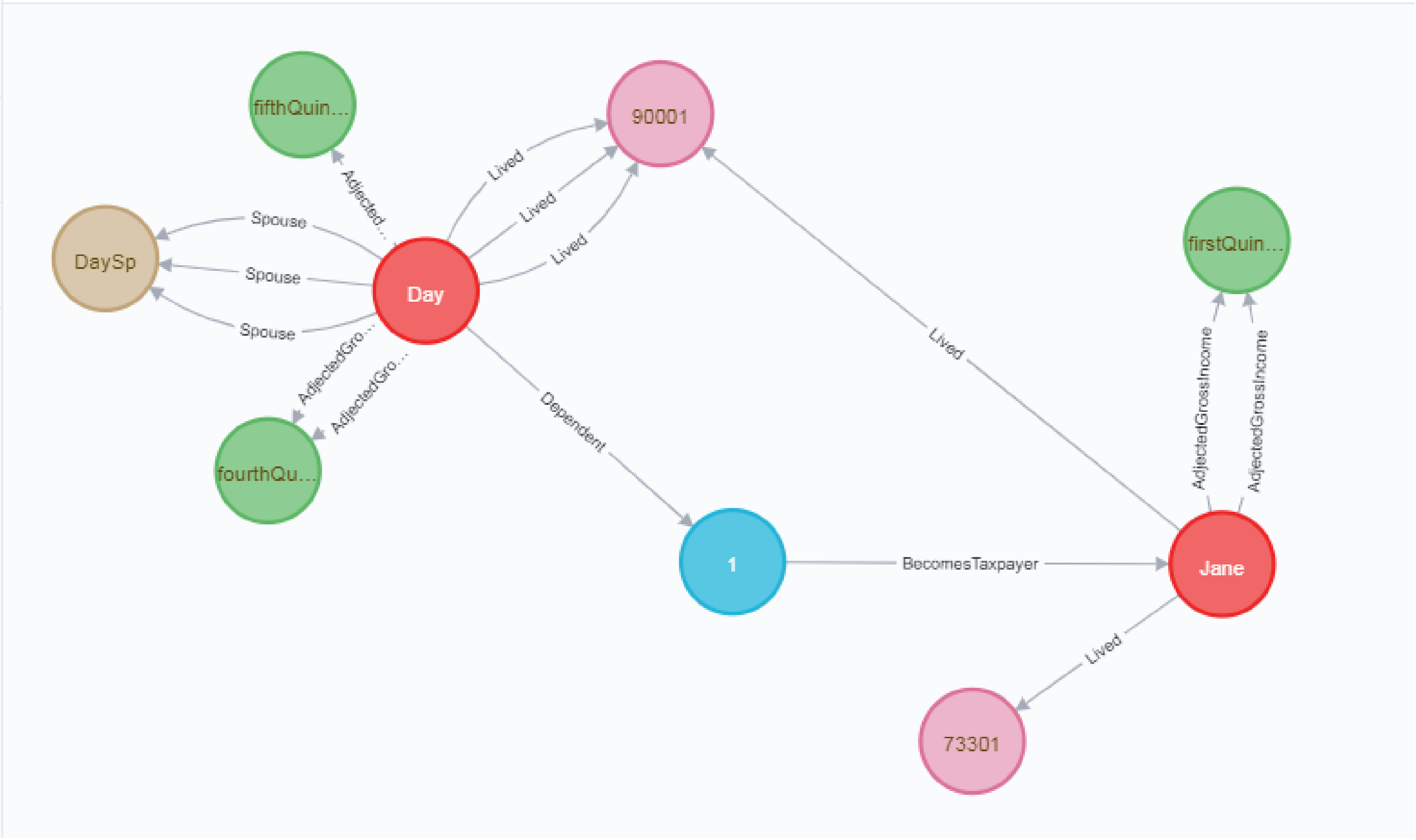
- Highlight links and relationships; stores properties for nodes and links
  - Person: name, age, income, etc.
  - Follows: from
- Very useful for highly connected data (deep vs bushy)
- Very efficient when following links
  - Join operation in relational databases is very expensive and time consuming
- Graph-based analytics (shortest path, connectedness, centrality, recommender systems, etc.) are becoming popular
- Generally not useful when data is changing frequently
  - Transactional databases

Databank as a Graph Database

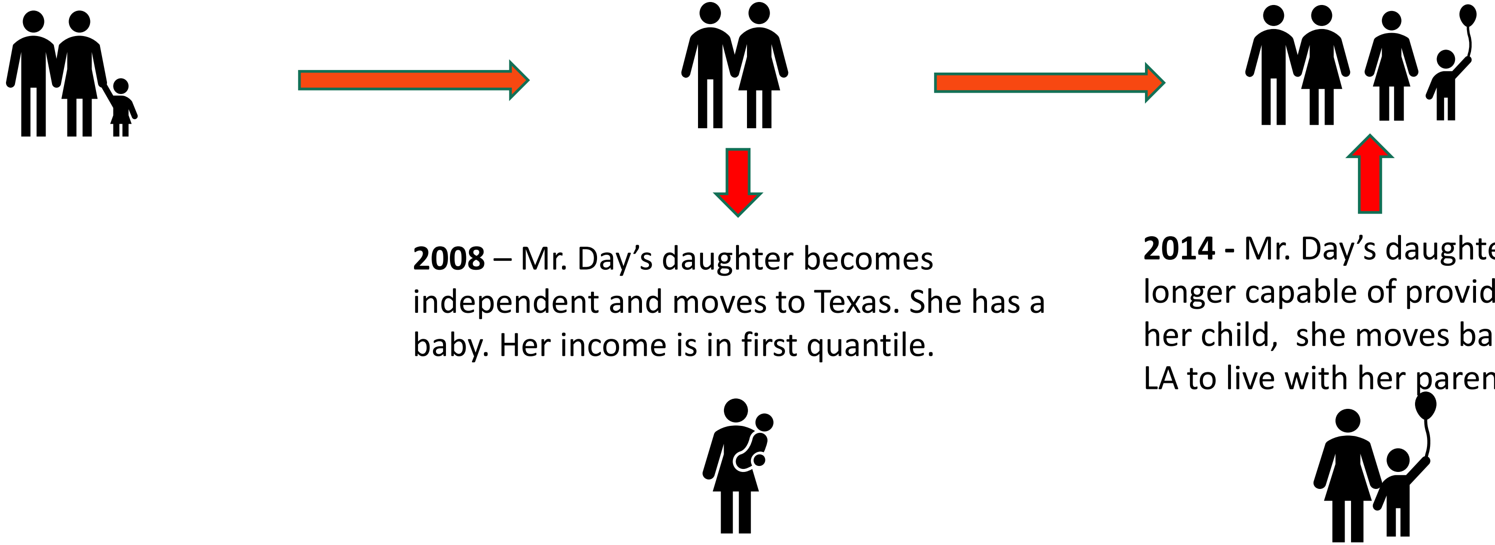
- A simplified model



DEMO


fifthQuin...
90001
DaySp
Day
firstQuin...
fourthQu...
1
Jane
73301
Adjected...
Lived
Lived
Lived
Spouse
Spouse
Spouse
AdjectedGro...
AdjectedGro...
Dependent
Lived
AdjectedGrossIncome
AdjectedGrossIncome
BecomesTaxpayer
Lived

Scenario 1: Taxpayer claims grandchild as dependent

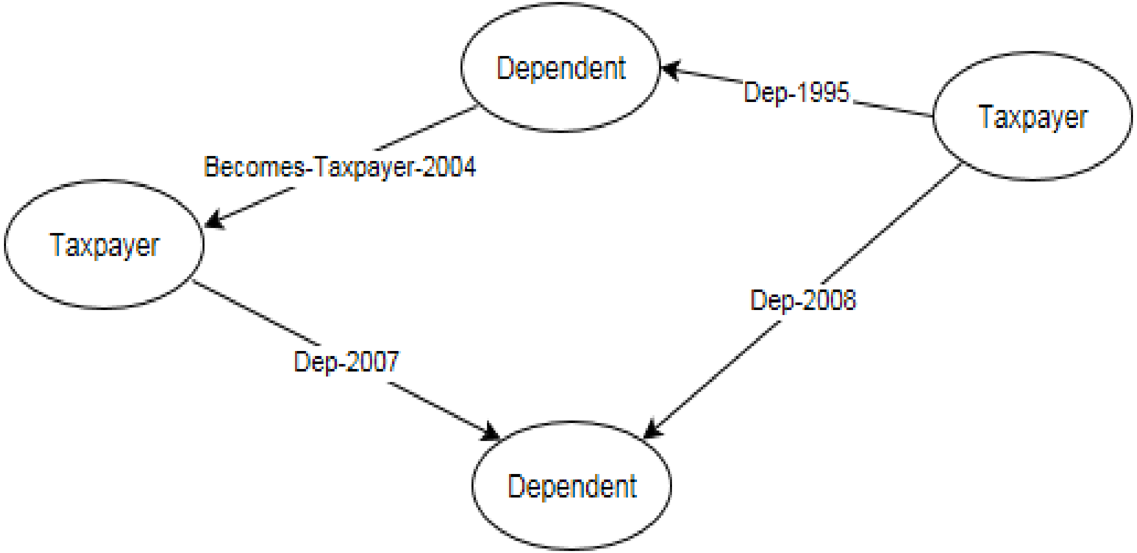


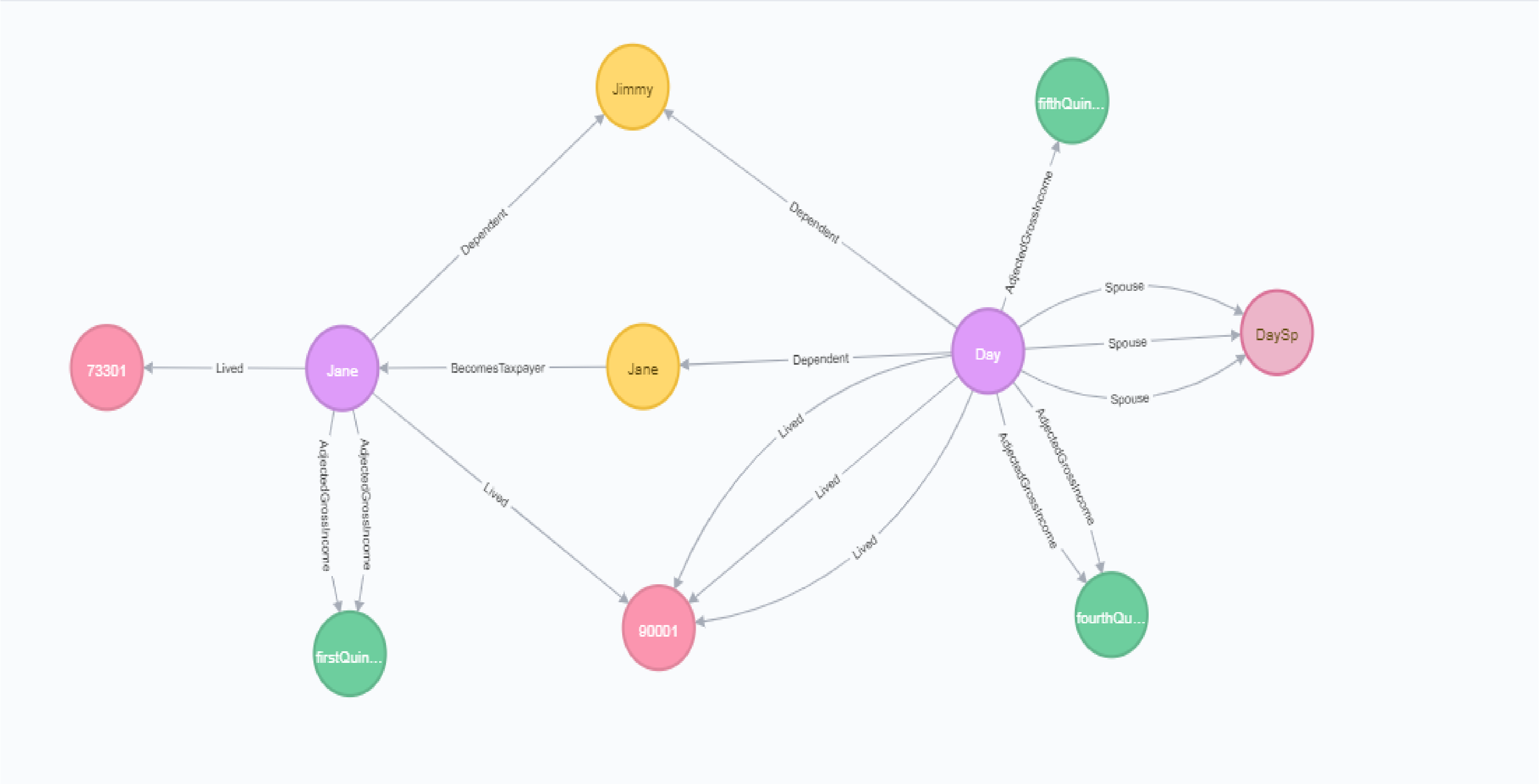
1996 - Mr. Day is married and living in LA . He claims his daughter as dependent. Mr. Day’s income is in fourth quantile.

2008 – Mr. Day’s daughter becomes independent and moves to Texas. She has a baby. Her income is in first quantile.

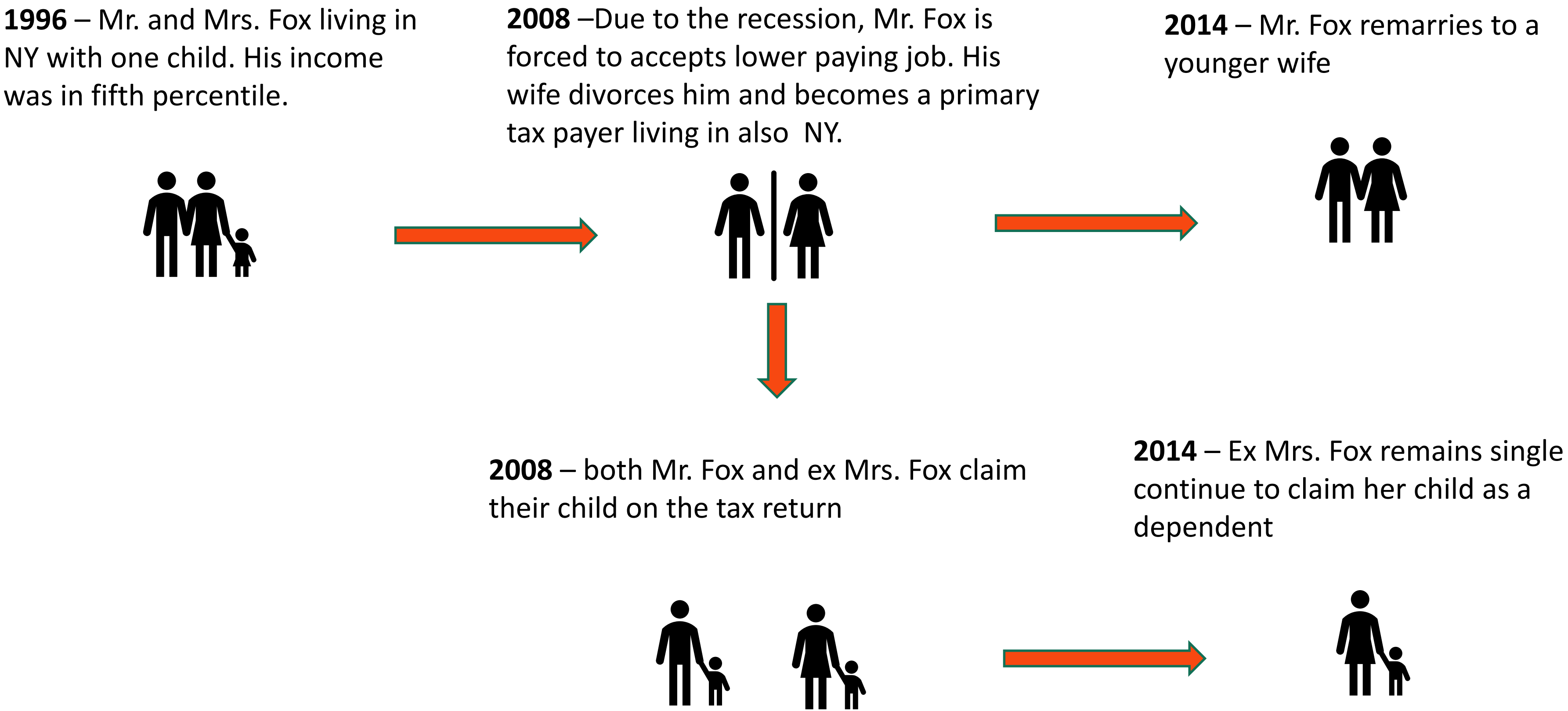
2014 - Mr. Day’s daughter no longer capable of providing for her child, she moves back to LA to live with her parents.

2014 - Mr. Day claims his grandchild as a dependent.


Dependent
Dep-1995
Taxpayer
Becomes-Taxpayer-2004
Taxpayer
Dep-2008
Dep-2007
Dependent


Jimmy
fifthQuin...
Dependent
Dependent
AdjectedGrossIncome
Spouse
Spouse
Spouse
DaySp
73301
Lived
Jane
BecomesTaxpayer
Jane
Dependent
Day
AdjectedGrossIncome
AdjectedGrossIncome
AdjectedGrossIncome
AdjectedGrossIncome
Lived
Lived
Lived
Lived
firstQuin...
90001
fourthQu...

Scenario 2: A dependent claimed by two taxpayers



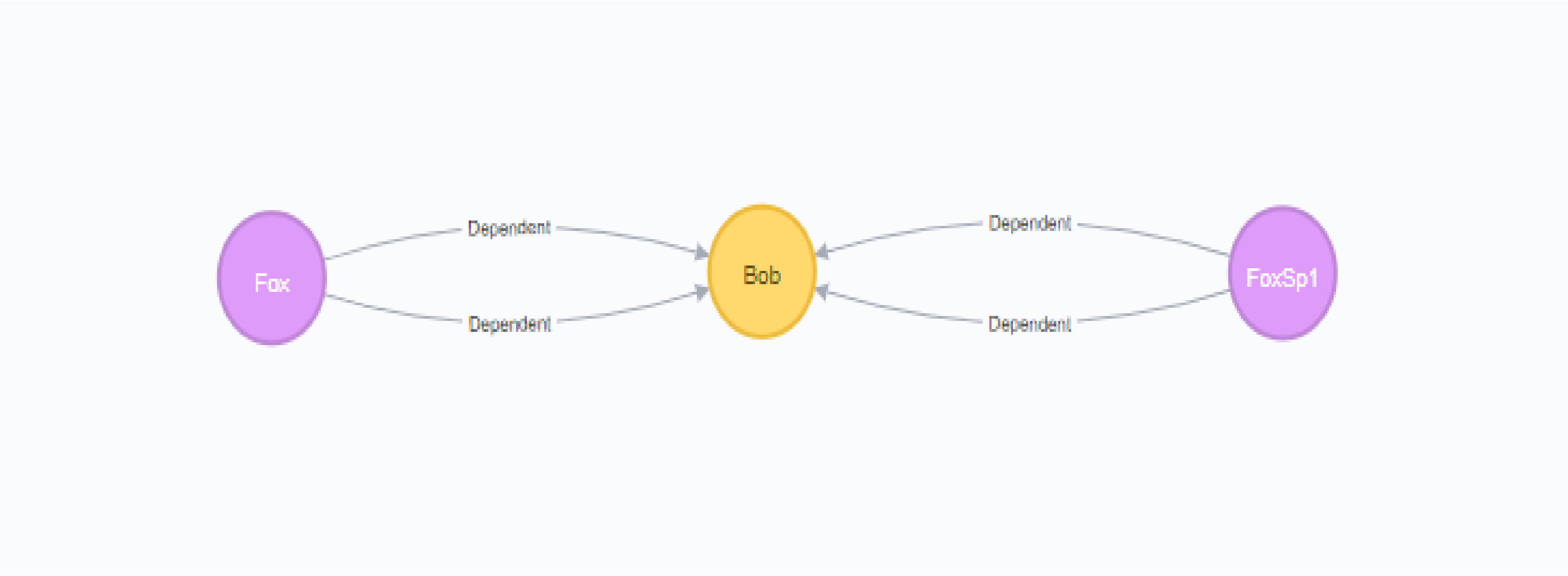
1996 – Mr. and Mrs. Fox living in NY with one child. His income was in fifth percentile.

2008 –Due to the recession, Mr. Fox is forced to accepts lower paying job. His wife divorces him and becomes a primary tax payer living in also NY.

2014 – Mr. Fox remarries to a younger wife

2008 – both Mr. Fox and ex Mrs. Fox claim their child on the tax return

2014 – Ex Mrs. Fox remains single continue to claim her child as a dependent


Dependent
Dependent
Dependent
Dependent
Fox
Bob
FoxSp1

Scenario 3: Taxpayer claiming parent as dependent

1996 – Mr. May Sr. living alone independently in Illinois

→

2008 – Mr. May Sr age 67, losses his job with no saving

→

2014 – Mr. May Sr passes away

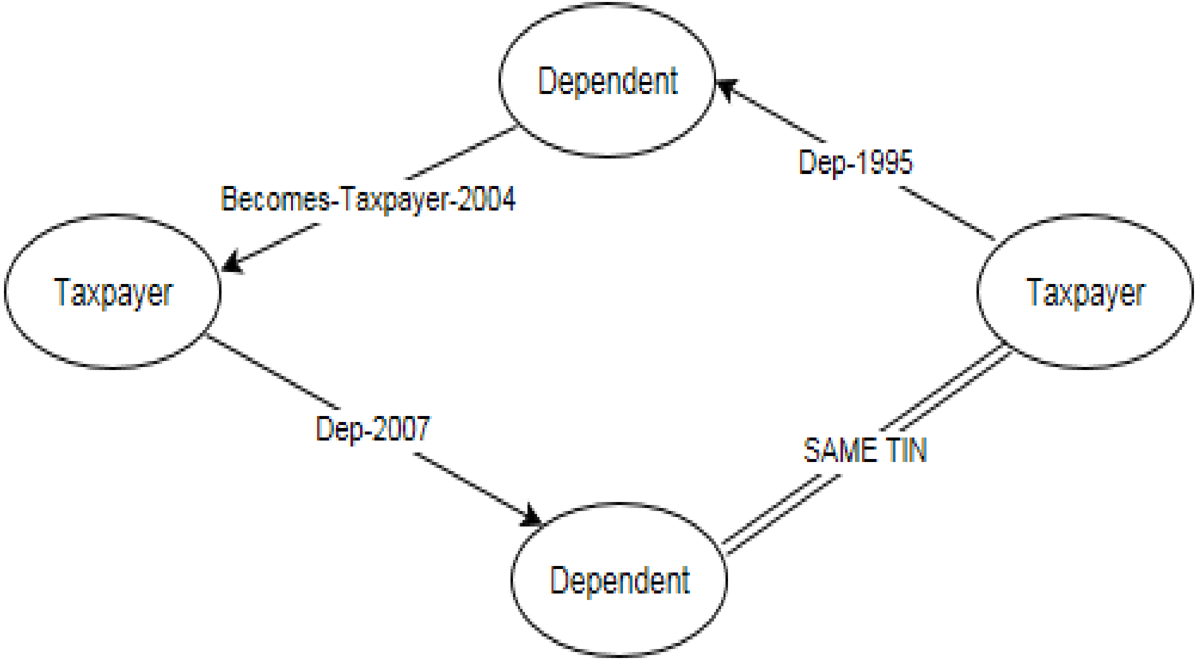
1996 – Mr. May Jr married with two children was living in in Illinois

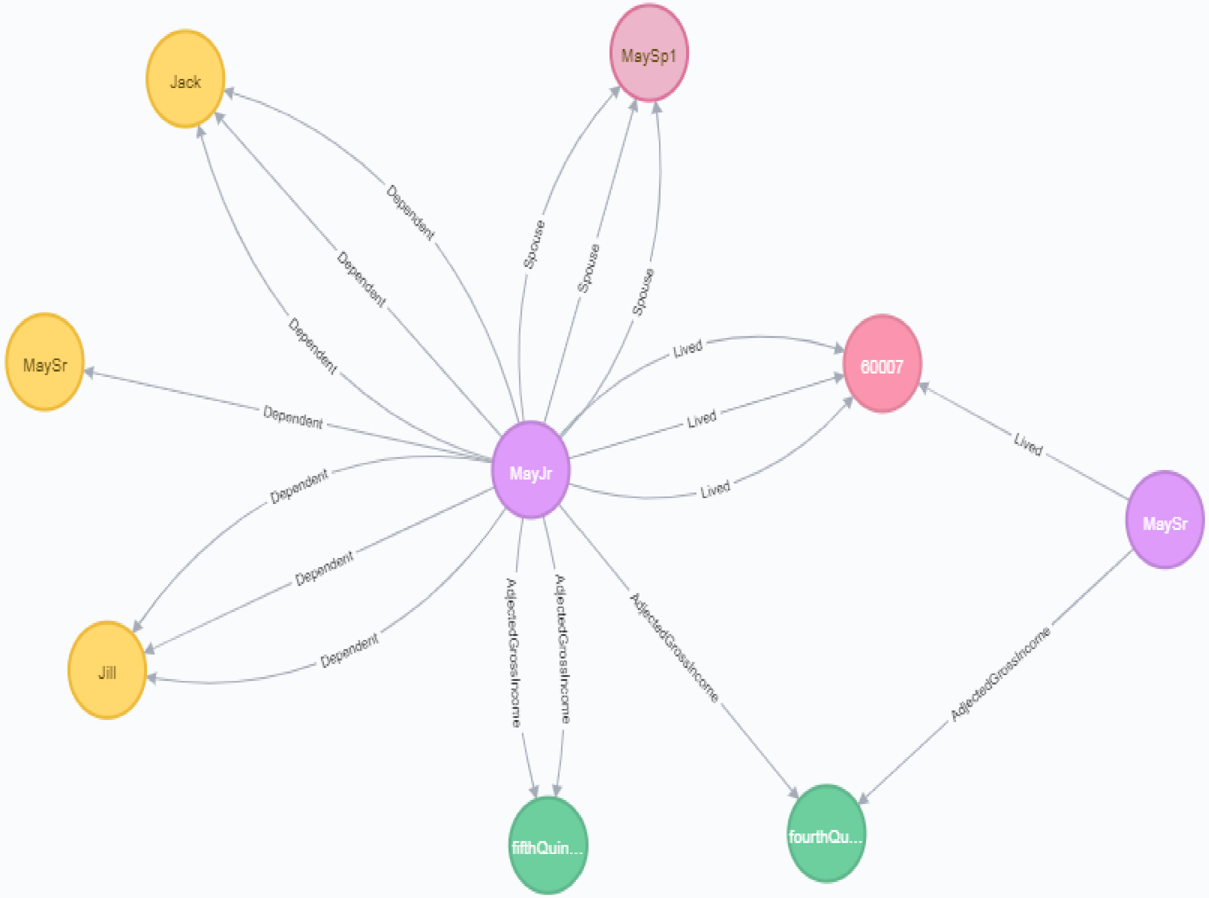
→

2008 – Mr. May Jr claims his father as dependent

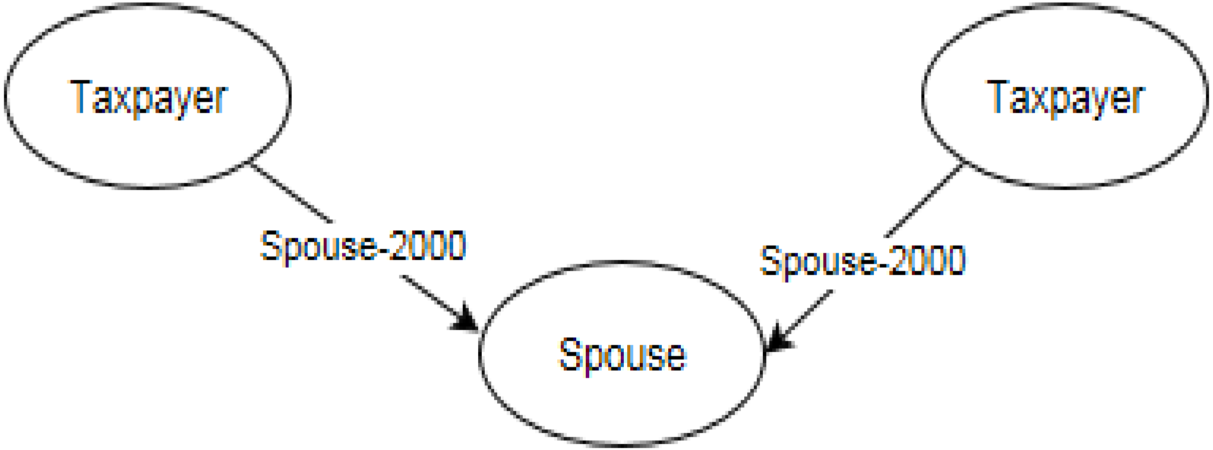
→

2014 – Mr. May Jr drops his father as a dependent


Dependent
Dep-1995
Becomes-Taxpayer-2004
Taxpayer
Taxpayer
Dep-2007
SAME TIN
Dependent


Jack
MaySp1
MaySr
60007
MayJr
MaySr
Jill
fifthQuin...
fourthQu...
Dependent
Dependent
Dependent
Dependent
Dependent
Dependent
Dependent
Spouse
Spouse
Spouse
Lived
Lived
Lived
Lived
AdjectedGrossIncome
AdjectedGrossIncome
AdjectedGrossIncome
AdjectedGrossIncome

Scenario 4: Spouse claimed by two taxpayers



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Discussant Comments: Understanding the Drivers of Taxpayer Behavior

Brian Erard

Key elements in empirical research

- Selection and compilation of data
- Exploratory data analysis
- Hypothesis generation and testing

Ririko and Rahul: graph databases

- **Flat data file example:** TCMP
  - All data fields recorded for all individual income taxpayers
    - Blank or missing value code for irrelevant or missing information
- **Advantages**
    - Conceptually easy to understand
    - Requires relatively little skill/training to use
    - Easy to run tabulations and empirical analysis
- **Disadvantages**
  - Inefficient use of space
  - Most suitable for stand-alone applications

Relational databases

- **Example:** NRP
  - A collection of separate tables for different forms/schedules and for various exam results
  - Tables linked using a key (case id number)
- **Advantages**
  - Relatively easy and fast to do ad hoc queries of various kinds
  - More efficient data storage
    - Scalable
- **Disadvantages**
  - Requires a bit more skill/knowledge to use

Graph databases

- **Advantages**
  - Organized in a more natural way for understanding relationships
  - Only need to touch/load information that is directly related to one's query
    - Simplifies analysis of relationships that would require many "joins" to achieve using a relational database
  - Can perform real-time updates while supporting queries
- **Disadvantages**
  - Users already familiar with SQL need training to learn new database programming language
  - Requires investment to transform relational database into graph database
  - There are some applications/queries that are better suited for a relational database

Examples where graph database is/is not more convenient

- **No clear advantage**
  - Comparing future reporting behavior of individual taxpayers who were and were not audited in a given tax year.
  - Identifying individual income taxpayers who received an understatement penalty in one year and related information on whether they also received an understatement penalty in subsequent years.
- **Advantage**
  - Investigating whether an audit of a taxpayer has spillover effects on other individuals in the same “network” or on other types of tax reports by the same taxpayer.
  - Identifying shell corporations that have similar or identical addresses or contact numbers, share one or more directors, and have been created or administered from the same set of IP addresses.

Reaction

- Graph databases are certainly better suited for some types of analysis that a tax administration may want to undertake
  - IRS and some other tax administrations have experience using graph databases for certain specific initiatives
- At the same time, developing a graph database version of the IRS Databank and training users requires an investment of resources and time
- It would be helpful to identify some likely use cases to help evaluate whether such an investment makes sense

Janet's presentation on underpayment

- Withholding is hard to get right
  - Deductions that depend on factors such as family size, medical expense, family income, home ownership
  - Graduated rate structure
  - Refundable credits and other offsets
- Tax reform created new complications

Asymmetric treatment

- No interest from government when over-withheld
- But may owe penalty if under-withheld
- Rationally, one should avoid being over-withheld
    - However, many taxpayers seem to like getting a refund – they seem to frame this as a gain rather than a loss

Challenges for non-withheld

- Self-employed and other non-withheld taxpayers
  - Required to make quarterly estimated tax payments
    - Curiously, the "quarters" are in April, June, Sept., and Jan.
  - It can be difficult to predict earnings for coming year
  - Income flows tend to vary from one quarter to next
  - Some solace from being able to prepay 100%/110% of last year's tax liability over coming year
- Special rules for farmers and fisherman
    - Should explore if this is good or bad policy

Reasons for receiving penalty

- Unintentional mistake
  - Poor understanding of requirements
  - Poor record-keeping, lack of attention
- Unexpected financial shortfall
- Estimated tax penalty may not be very salient to higher income taxpayers
- May be a consequence of decision not to file
- Rational borrowing behavior
  - “IRS as loan shark”: 6% seems like a great loan rate for many taxpayers

Possible consequences of being under-withheld

- May postpone fiiling (with or without an extension)
- May be more inclined to understate tax liability when one does file
- May have difficulty paying full balance at filing time
- Since first estimated tax payment for current tax year is due on same date that balance is due for prior tax year (April 15), this may perpetuate cycle of under-withholding

Ongoing and future research directions

- Collection notice redesigns have shown some promise, so reminder letters pilot seems sensible
- Other research questions
  - Can the withholding system better facilitate compliance among households with both withheld and non- withheld income sources?
  - Are quarterly payments the best frequency?
  - Is the current penalty rate optimal?

Ethan’s presentation on audits

- Focus is on specific deterrence
  - Impact of a tax audit on future reporting behavior
- Proposes that the impact of an audit is different for compliant and noncompliant taxpayers
- Hypothesizes that the size of the audit impact increases with the level of audit burden
- Explores whether a simple apology to compliant taxpayers can neutralize the counter-deterrent effect of an audit

Existing evidence on audit impact by compliance status

- Cheaters seem to become more compliant following an audit, while compliers tend to become cheaters (Gemmell and Ratto, 2012; Beer et al., 2019)

Rational actor explanation of specific-deterrent effect of an audit

- An audit is a learning experience that may lead to:
  - Change in perceived probability (p) or penalty rate (θ)
  - Resolution of uncertainty about:
    - True tax liability
    - Tax agency's capacity to uncover and punish evasion
- When audits go back several years, increased cheating following an audit might be a rational response

Theoretical insights from psychology and behavioral economics

- Changes in perceived risk of audit and penalty
  - Greater salience of audit costs (availability-heuristic effect)
  - Gambler’s fallacy
- Loss-repair (motivation to recoup financial loss)
- Change in tax morale
  - Audit of a compliant taxpayer may “crowd-out” tax morale
  - Fair and respectful behavior during audit may enhance tax morale

Experiment focuses on impact of audit burden on future compliance

- Compares behavior of those receiving high-burden audit to those receiving no-burden audit
- Relative to a low-burden audit, a high burden audit is found to:
  - Drive cheaters to become more compliant
  - Drive compliers to become less compliant
- An apology to audited compliers
  - Mitigates cheating effect a little for high-burden audits
    - Underreport by 1,212 in next period instead of 1,608
  - Exacerbates cheating effect substantially for no-burden audits
    - Underreport by 2,245 in next period instead of 625

Observations

- Study shows audit burden may be related to audit impact
- Puzzling that apology seems to have “backfired” for compliant taxpayers with a no-burden audit; also, it only slightly improved compliance in the case of high-burden audits
- It would be useful to isolate the absolute impact of an audit on reporting behavior, not just differential impact of no-burden and high-burden audits
- It would have been helpful to extend the experiment for a few more rounds to see if specific deterrent effects taper off over time
- Some questions about external validity

Session 4. Understanding the Drivers of Taxpayer Behavior

Moderator:	***Melissa Vigil*** *IRS, RAAS*
Underpayment of Estimated Tax: Understanding the Penalized Taxpayer Population	***Janet Li*** *IRS, RAAS*
The Effect of Audit Burden on Subsequent Tax Evasion	***Ethan LaMothe*** *University of South Carolina*
Using a Graph Database to Analyze the IRS Databank	***Rahul Tikekar*** *IRS, RAAS*
Discussant:	***Brian Erard*** *Brian Erard & Associates*

IRS Research, Applied Analytics, and Statistics

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Wrap-Up

Eric Toder

Codirector, Urban-Brookings Tax Policy Center

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