Learning Dynamics in Tax Bunching at the Kink: Evidence from Ecuador

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Goal: understand dynamic behavioral responses to tax incentives in a development context

- tax incentives:
 - theory predicts bunching at jumps in marginal tax rate
 - only limited empirical evidence for actual bunching
- development context:
 - very little evidence from developing countries
 - transition from informal to formal economy
 - growing number of taxpayers
- dynamic perspective:
 - do people learn how to bunch over time/experience?
 - how is this knowledge transmitted between people?

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Literature

- tax bunching:
 - ► Saez (2010)
 - evidence from Scandinavia: Chetty et al. (2011); Bastani and Selin (2014)
 - knowledge diffusion and spillovers: Chetty et al. (2013); Chetty and Saez (2013); Paetzold and Winner (2014)
- taxation and development:
 - ▶ Kleven and Waseem (2013); Bachas and Soto (2015); Best et al. (2015)
 - analyze corporate taxation in Ecuador: Carrillo et al. (2012, 2014)
 - transition to PIT: Besley and Persson (2013)

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This Paper

- document bunching behavior in Ecuador
- analyze learning effects in tax-adjustment opportunities
- channels of information transmission:
 - Do new workers adjust to firm-level bunching?
 - Do incumbent workers learn from new co-workers who are bunching?

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Preview of Results

- large spike in taxable income distribution at first kink
- entirely driven by reporting behavior (filing deductions)
- bunching increases over time and with experience
- strong impact of firm-level bunching rates on individual bunching
- evidence for firm-level learning

Outline

Introduction

2 Theoretical and Institutional Background

3 Data and Bunching Estimates

4 Channels of Learning

Tax Bunching

- discontinuous jumps in marginal income tax rates generate kinks in the budget set of individuals
 Labor Supply Model
- the kinks induce individuals to locate at the points of discontinuity
 Bunching Mechanism
- empirically, this effect is less pronounced due to adjustment frictions, lack of knowledge, etc.
- reporting effects or real responses?

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Institutional Background Ecuador

since 2008: policies to increase tax compliance and formalization

- data sharing, receipt lotteries
- large-scale deduction possibilities: health, education, nutrition, housing and clothing
- wage earners: firm reported tax declarations
 - tax declarations directly submitted by employer
 - employees report projected value of deductions to employer
 - employer computes wage retention
 - deductions above reporting threshold: employee submits annex

Institutions in detail

- universe of individual income tax return data from 2006 2015
- firm-reported tax forms
- socio-demographic data on workers and firms
- only look at private sector wage earners

Gross Income Distribution



Figure: Pooled gross income of wage earners in Ecuador 2006-2015

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Taxable Income Distribution



Figure: Pooled taxable income of wage earners in Ecuador 2006-2015

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Tax avoidance over time



Figure: Number of individuals with income above first kink

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Tax avoidance over time



Figure: Number of individuals with income above first kink

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Bunching Estimates - Taxable Income



Figure: Bunching estimate taxable income of wage earners 2006-2015

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Bunching over Time

Table: Bunching estimates over time

	2006	2008	2010	2012	2014	2015
Tax	1.36	2.88	3.34	4.44	5.18	6.03
base	(0.37)	(0.49)	(0.54)	(0.72)	(0.77)	(0.61)
Gross	1.35	1.16	1.05	0.26	-0.62	-0.33
income	(0.38)	(0.59)	(0.75)	(0.94)	(0.99)	(0.79)

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Cohort Analysis

Cohort	2008	2009	2010	2011	2012	2013	2014	2015
2008	3.44**	-0.57	2.90***	2.64***	4.78***	3.08***	4.72***	3.83***
2009	(1.00)	0.26	0.75	2.26**	(0.00) 5.74***	4.34***	(0.01) 5.67***	(0.02) 5.61***
2010		(0.66)	(1.60) 0.62	(1.02) 2.16	(1.02) 3.94***	(1.03) 4.75***	(0.70) 5.45***	(0.79) 5.56***
2011			(0.98)	(1.74) 1.18	(1.21) 3.72*	(1.19) 6.05***	(1.00) 6.15***	(0.82) 7.19***
2012				(0.97)	(2.15) 2.91	(1.61) 4.64*	(1.15) 5.69***	(1.04) 5.49***
2013					(3.23)	(2.57) 5.21	(1.35) 4.08*	(0.96) 6.25***
2014						(3.43)	(2.19) 3.73	(1.38) 7.38***
							(3.07)	(1.78)

Note: Bunching estimates for taxable income by year conditioned on the cohort of entry into the formal economy.

Bunching Estimates - No Experience



Figure: No income above first kink in previous 2 years

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Bunching Estimates - Experienced



Figure: At least one year of income above first kink in previous 2 years

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Controls

	Probit Estimates for Bunching Indicator						
	(1)	(2)					
Income Experience	0.0828***	0.0666***					
	(0.0119)	(0.0136)					
Gross Income		0.0000242***					
		(0.0000223)					
Age		0.00626***					
-		(0.00226)					
Female		0.114***					
		(0.0113)					
Foreign		-0.00962					
C		(0.0173)					
Married		0.0454***					
		(0.00816)					
Secondary Education		` 0.0346* [´]					
2		(0.0197)					
Tertiary Education		0.0600* [*]					
•		(0.0280)					
Observations	1069607	1050694					
Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$							

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Job Switchers

How do job switchers adjust to firm-level bunching?

- compare workers who move into high-bunching vs. low-bunching environment
- consider (first) switch of main employer among all job-to-job transitions in 2010-2014
- only consider switches where we observe at least two consecutive years at both origin and target firm
- assign old and new firms to quintiles based on the share of co-workers who are bunching

Descriptives

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Job Switchers - Event Study





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Jobs Switchers - Identification I

 restrict sample to job switchers starting in mid quintile and moving to quintile ∈ {*low*, *high*}

$$Y_{it} = \beta_0 + \sum_{k=-2}^{k=2} \gamma_k D_{it}^k + \delta post_{it} \times quintile_i + \theta X_{it} + \lambda_t + \alpha_i + \epsilon_{it}$$
(1)

- *Y_{it}*: Indicator for buncher (taxable income 1000\$ below kink)
- quintile_i: Indicator for moving to high or low quintile
- *post_{it}*: Indicator for after job switch
- D_{it}^k : Indicator for year relative to job switch

Job Switchers - Results I

	Mid to	Low	Mid to High			
	(1)	(1) (2) (3)		(4)		
A. Overall Effect						
After event year	-0.00774** (0.00386)	-0.00188 (0.00405)	0.0356*** (0.00485)	0.0314*** (0.00473)		
Controls	No	Yes	No	Yes		

Standard errors in parentheses, clustered at firm level * p < 0.1, ** p < 0.05, *** p < 0.01

Identification II - Anticipatory and post treatment

$$Y_{it} = \beta_0 + \sum_{k=-2}^{k=2} \gamma_k D_{it}^k + \sum_{k=-2}^{k=2} \delta_k D_{it}^k \times quintile_i + \theta X_{it} + \lambda_t + \alpha_i + \epsilon_{it}$$
(2)

• δ_k : identifies anticipatory and post treatment effects

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	Mid to Low Mid to High					
B. Anticipatory Effects						
Event year - 2	0.00350	0.00332	0.00417	0.00333		
	(0.00519)	(0.00519)	(0.00559)	(0.00562)		
Event year - 1	0.00408	0.00525	0.00534	0.00408		
	(0.00546)	(0.00542)	(0.00616)	(0.00612)		
Post Treatment Effects						
Event year	-0.00906	-0.00274	0.0185**	0.0148*		
	(0.00591)	(0.00597)	(0.00779)	(0.00765)		
Event year + 1	-0.00288	0.00349	0.0544***	0.0488***		
	(0.00666)	(0.00690)	(0.00790)	(0.00787)		
Event year + 2	-0.000188	0.00561	0.0494***	0.0435***		
	(0.00838)	(0.00838)	(0.0101)	(0.0100)		
Observations	65224	65186	64504	64473		
Standard errors in parent * $p < 0.1$ ** $p < 0.05$ ***	heses, clustere	ed at firm leve	el			

Job Switchers - Results II

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Job Switchers - Summary

- strong and persistent firm level effects: moving to high quintile increases bunching by 2-5 %
- moving to low quintile does not have significant effect
- $\bullet \rightarrow asymmetric response$
- → learning and memory (confirming Chetty et al. (2013); Paetzold and Winner (2014))

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What determines firm-level bunching?

- Focus on *firm cohorts*
- Group firms into cohorts by year of entry into the formal sector
- Condition on firms always employing potential bunchers after entering formal sector
- Calculate share of firms within cohort with 1 or more bunchers

Firm Cohorts

Cohort	2008	2009	2010	2011	2012	2013	2014	2015	Obs
2008	0.20 (0.40)	0.31 (0.46)	0.38 (0.49)	0.41 (0.49)	0.53 (0.50)	0.61 (0.49)	0.63 (0.48)	0.67 (0.47)	489
2009	~ /	0.23 (0.42)	0.33 (0.47)	0.41 (0.49)	0.47 (0.50)	0.53 (0.50)	0.59 (0.49)	0.61 (0.49)	528
2010		. ,	0.21 (0.41)	0.31 (0.46)	0.43 (0.50)	0.51 (0.50)	0.56 (0.50)	0.54 (0.50)	555
2011			()	0.26	0.38 (0.49)	0.45 (0.50)	0.50 (0.50)	0.55 (0.50)	1100
2012				()	0.31 (0.46)	0.41 (0.49)	0.50 (0.50)	0.49 (0.50)	1657
2013					()	0.37 (0.48)	0.46 (0.50)	0.48 (0.50)	2203
2014						()	0.38	0.44 (0.50)	3280
2015							()	0.36 (0.48)	4847

Note: Share of firms in given cohort with at least 1 buncher. Cohorts conditioned on year of entry into formal sector and having potential bunchers in all subsequent years.

Firm-cohort summary

- Increasing experience at the firm level leads to higher bunching shares
- Cohorts entering later start at higher bunching levels
- Within a given year, firms from older cohorts more likely to bunch

Co-worker Learning

Do workers learn from new co-workers who are bunching?

- compare firms that receive potential bunchers who
 - bunch ("treatment group")
 - do not bunch ("control group")
- consider firms with one incoming event in 2010 2014
- examine average level of bunching in firms before and after the event leaving out the incoming worker

Descriptives

Co-worker Learning - Event Study



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Co-worker Learning - Small Firms



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Co-worker Learning - Summary

- no significant effect of incoming bunchers on coworker bunching level
- even in subsamples where influence seems easier
- ullet ightarrow firms drive decision whether individuals bunch using deductions
- ullet ightarrow however, serious power issues in this analysis

Timing

Conclusion

- clear evidence for tax bunching driven by reporting behavior
- experience with filing taxes increases bunching probability
- strong impact of firm-level bunching on individual bunching
- evidence for asymmetric adjustments: learning and memory
- evidence for firm-level learning
- incumbent workers seem not to learn from new co-workers

THANK YOU

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Learning Dynamics in Ecuador

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Labor Supply Model



Figure: Neoclassical Labor Supply Model

back

Bunching Mechanism

- consider the introduction of a kink at z*
- pre-reform incomes between z* and z* + dz* bunch at z* after reform



Figure: Bunching at the kink



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