Online Shopping and Taxes

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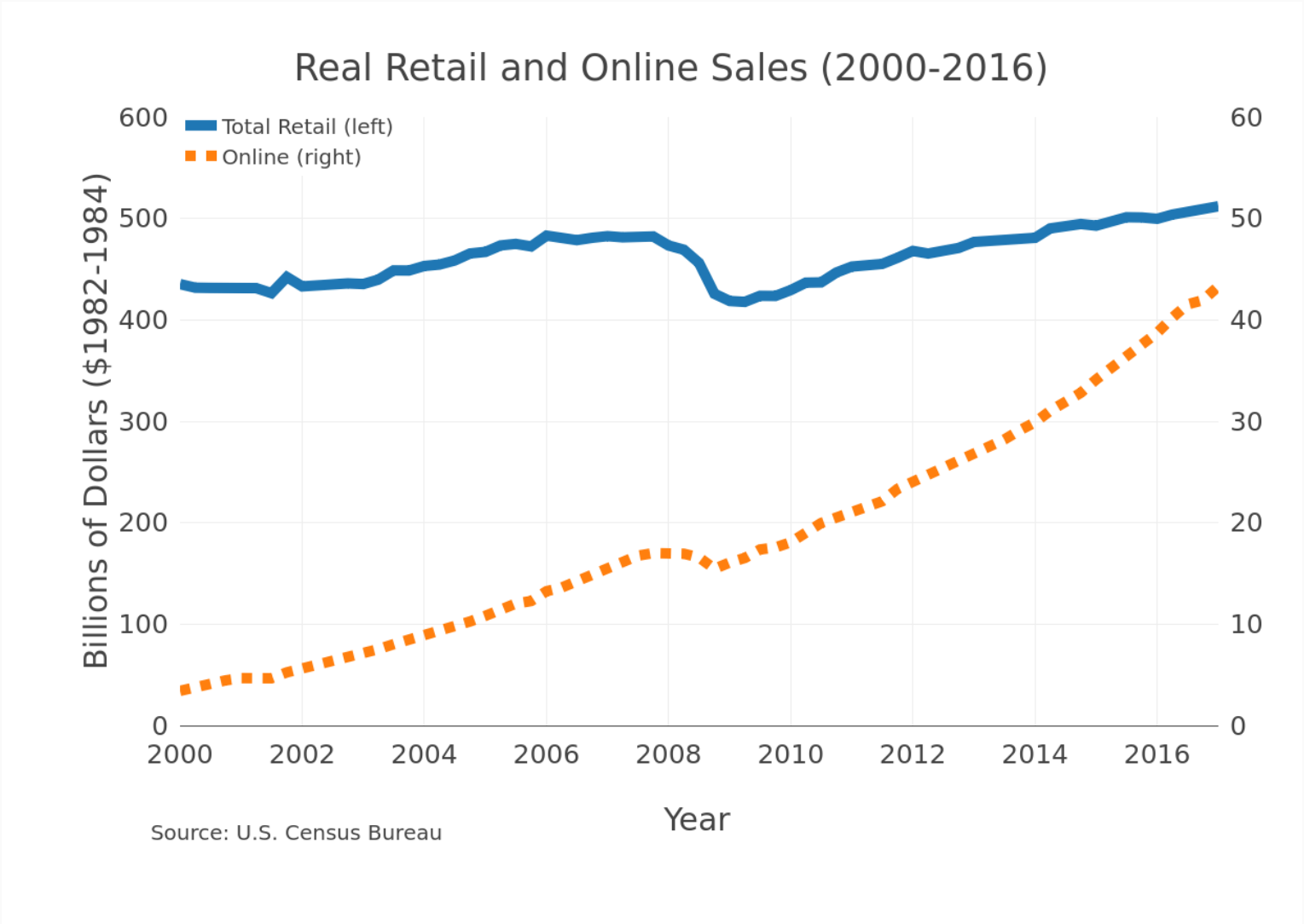
Background

- Online shopping has grown immensely over time (to 8.5% of total retail sales in 2017:Q1), even when retail sales have cratered



Background

- Sales taxes makes up 33% of state tax revenue
- People try to avoid paying taxes when possible[Citation needed]
- Online transactions have been effectively tax free
- In 2008, New York passed the first "Amazon Law" to require Amazon to collect sales tax instead of relying on consumer self-reporting
  - Amazon circumvented this law, but it began a slow cascade of state initiatives to recapture an important stream of revenue
- As of April 1, 2017, Amazon now collects sales tax in all states

Motivating Questions

- How responsive is consumer spending to sales taxes?
  - I explore a simpler question: Do consumers shift spending away from Amazon when Amazon collects sales tax in their state?
  - Are consumers shifting spending to non-taxed outlets, taxed outlets, or reducing their spending?
  - Are consumers shifting spending to other online outlets, offline outlets, or reducing their spending?
- Is consumer search behavior affected by sales taxes?
  - I explore a simpler question: Do consumers shift time (i.e. search and eyeballs) away from Amazon when Amazon collects sales tax?

Preview of Results

comScore Web Behavior Database

- Consumers are less likely to make an Amazon purchase when Amazon begins collecting sales tax in their state
- Consumers' implied tax-spending elasticity is about -0.5, meaning that for a 1pp increase in the tax rate, Amazon spending decreases by 0.5% conditional on Amazon collecting sales tax
  - This effect is even more pronounced for consumers that live in counties bordering states with no sales tax (i.e. Delaware, Oregon, New Hampshire, Montana)
- Consumers shift their spending to Amazon's taxed competitors, with the implied elasticity of 0.6, meaning that for a 1pp increase in the tax rate, spending on Amazon's taxed competitors increases by 0.6% conditional on Amazon collecting sales tax
- Similar results hold when looking at page views and time spent on Amazon versus Amazon's taxed competitors

Preview of Results

Nielsen Homescan Consumer Panel

- Expenditures at online-only stores is not affected when Amazon begins collecting sales tax
- Cross-border shopping is important
  - For every 1pp difference in sales tax rate between home and adjacent county rate, online-only spending drops by about 3.3% and this is slightly more sensitive in border counties
- Expenditures at stores with an offline presence (may or may not have an online store) are sensitive to taxes
  - A 1pp increase in the sales tax rate is associated with a 0.54% increase in spending at stores with an offline presence
  - Conditional on Amazon collecting sales tax, there is an additional 0.06% boost to spending at stores with an offline presence.

Related Literature

- **Cross-border Shopping**
  - Consumers living close to borders are more tax sensitive than those not close to borders
  - Mikesell (1970); Asplund, Friberg, and Wilander (2007); Davis (2011); Agarwal, Marwell, and McGranahan (2017)
- **Online Shopping**
  - Sales taxes influence individual's decisions of whether to shop online and how much they spend
  - Goolsbee (2000); Alm and Melnik (2005); Scanlan (2007); Ballard and Lee (2007); Einav et al (2014); Baugh, Ben-David, and Park (2017); Houde, Newberry, and Seim (2017)

Estimated Elasticities

Table 1: Cross-Border Shopping Elasticities

Elasticity Type	Paper	Estimate
Cross-border Price-Expenditure	Asplund, Friberg, Wilander (2007) – Foreign price	0.2 to 0.5
	Asplund, Friberg, Wilander (2007) – Domestic price	-0.2 to -1.3
	Agarwal, Marwell, McGranahan (2017)	-2 to -30
	Davis (2011)	-2.2 to -3.6
	Agarwal, Chomsisengphet, Qian, Xu (2017)	-2.3
	Mikesell (1970)	-6.3
Tax-Purchase	Scanlan (2007)	0.0
	Ballard & Lee (2007)	-0.2
	Alm & Melnik (2005)	-0.5
	Einav, Knoepfle, Levin, & Sundaresan (2014)	-1.8
	Goolsbee (2000)	-2.3
Tax-Price	**Hossain (2017) - non-Amazon spending**	**0.6**
	Hossain (2017) - Amazon spending	**-0.5**
	Baugh, Ben-David, & Park (2017)	-1.2 to -1.4
	Houde, Newberry, & Seim (2017)	-1.3

Data

- **comScore Web Behavior Database**
  - Captures computer-level browsing and transaction activity
  - Households report various demographics and ZIP code
  - Includes domain name
  - Data from 2006 to 2016
- **Nielsen Homescan Panel**
  - Nationally representative panel that keeps track of all goods that they buy and consume
  - High-quality data and well-maintained panel
  - Stores are anonymized, but they are categorized
  - Data from 2004-2015
- **Tax Data Systems**
  - Database of state, county, and local sales tax rates at a ZIP code level
  - Data from 2006 to 2014

Research Design

- Before 2008, Amazon only collected sales tax in the 5 states it had a physical presence in
- In 2008, New York passed the first law requiring Amazon to collect sales tax even though it did not have a physical presence in New York
- Over the next 9 years, Amazon quasi-randomly began collecting sales tax in various states, either by entering into agreements with the states or because states passed laws requiring them to collect sales tax
- From a consumer perspective, these changes were largely unexpected and would be plausibly exogeneous shocks

Regression Specification

$$E^j_{hct} = \beta_0 + \beta_1 \log(\mathbb{1}^{Collect}_{ct} * SalesTax_{ct}) + \beta_2 TaxDiff_{ct} + \lambda_h + \lambda_c + \lambda_t + \epsilon_{hct}$$

- The above regression relates log expenditures (on various channels) to
  - Local sales tax rate conditional on Amazon collecting sales tax
  - Difference in tax rates between a consumer's home county and an adjacent county
  - Household income and race
  - Month-year and county fixed effects

Regression Results (Expenditures)

Table 2: Amazon Expenditures

	Dependent variable:								
	Log Expenditures								
	All Counties					Border Counties			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collect	−0.037***					−0.233**			
	(0.011)					(0.105)			
Log(1 + Sales Tax)		0.525					−12.144*		−12.267*
		(1.198)					(6.498)		(6.494)
Log(1 + Sales Tax * Collect)			−0.500**	−0.498**	−0.498**			−3.892**	−3.920**
			(0.233)	(0.233)	(0.233)			(1.729)	(1.728)
Tax Diff				−0.346					
				(1.440)					
Tax Ratio					−0.392				
					(1.510)				
Observations	156,462	99,541	99,541	99,541	99,541	3,443	3,443	3,443	3,443
R^2	0.067	0.064	0.065	0.065	0.065	0.102	0.101	0.102	0.103
Adjusted R^2	0.051	0.040	0.040	0.040	0.040	0.061	0.061	0.061	0.062

Note: *p<0.1; **p<0.05; ***p<0.01
Household race and income as well as month-year, county, and product category fixed effects are included in the above regressions and standard errors are clustered at the year-month and county level.

Regression Results (Expenditures)

Table 3: Taxed Non-Amazon Expenditures

	Dependent variable:								
	Log Expenditures								
	All Counties					Border Counties			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collect	0.002					0.081			
	(0.010)					(0.124)			
Log(1 + Sales Tax)		−1.147					3.427		3.297
		(0.816)					(5.174)		(5.177)
Log(1 + Sales Tax * Collect)			0.583***	0.586***	0.586***			1.681	1.640
			(0.184)	(0.184)	(0.184)			(2.050)	(2.051)
Tax Diff				−0.580					
				(1.013)					
Tax Ratio					−0.601				
					(1.063)				
Observations	227,411	181,217	181,217	181,217	181,217	5,584	5,584	5,584	5,584
R^2	0.044	0.048	0.048	0.048	0.048	0.059	0.059	0.059	0.059
Adjusted R^2	0.032	0.033	0.033	0.033	0.033	0.032	0.032	0.032	0.032
Note:	*p<0.1; **p<0.05; ***p<0.01								
	Household race and income as well as month-year, county, and product category fixed effects are included in the above regressions and standard errors are clustered at the year-month and county level								

Regression Results (Expenditures)

Table 4: Non-Taxed Non-Amazon Expenditures

	Dependent variable:								
	Log Expenditures								
	All Counties					Border Counties			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collect	0.006					−0.182			
	(0.011)					(0.130)			
Log(1 + Sales Tax)		−0.265					19.211***		19.446***
		(0.894)					(5.694)		(5.698)
Log(1 + Sales Tax * Collect)			−0.084	−0.083	−0.083			−2.087	−2.352
			(0.216)	(0.216)	(0.216)			(2.104)	(2.103)
Tax Diff				−0.192					
				(1.126)					
Tax Ratio					−0.161				
					(1.182)				
Observations	213,613	167,907	167,907	167,907	167,907	4,914	4,914	4,914	4,914
R^2	0.037	0.043	0.043	0.043	0.043	0.063	0.065	0.063	0.065
Adjusted R^2	0.024	0.027	0.027	0.027	0.027	0.033	0.035	0.032	0.035

Note: *p<0.1; **p<0.05; ***p<0.01
Household race and income as well as month-year, county, and product category fixed effects are included in the above regressions and standard errors are clustered at the year-month and county level.

Regression Results (Search)

Table 5: Amazon Search Duration

	Dependent variable:								
	Log Expenditures								
	All Counties						Border Counties		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collect	−0.030***					−0.290***			
	(0.010)					(0.100)			
Log(1 + Sales Tax)		−1.782					−20.383***		−20.537***
		(1.096)					(6.214)		(6.207)
Log(1 + Sales Tax * Collect)			−0.401*	−0.401*	−0.401*			−4.857***	−4.902***
			(0.213)	(0.214)	(0.213)			(1.654)	(1.652)
Tax Diff				0.037					
				(1.318)					
Tax Ratio					0.063				
					(1.382)				
Observations	156,462	99,541	99,541	99,541	99,541	3,443	3,443	3,443	3,443
R^2	0.076	0.082	0.082	0.082	0.082	0.118	0.118	0.118	0.121
Adjusted R^2	0.060	0.057	0.057	0.057	0.057	0.078	0.079	0.078	0.081

Note: *p<0.1; **p<0.05; ***p<0.01
Household race and income as well as month-year, county, and product category fixed effects are included in the above regressions and standard errors are clustered at the year-month and county level.

Regression Results (Search)

Table 6: Taxed Non-Amazon Search Duration

	Dependent variable:								
	Log Expenditures								
	All Counties						Border Counties		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collect	0.011					−0.029			
	(0.009)					(0.106)			
Log(1 + Sales Tax)		0.270					16.928***		16.964***
		(0.706)					(4.405)		(4.407)
Log(1 + Sales Tax * Collect)			0.094	0.091	0.091			−0.236	−0.447
			(0.159)	(0.159)	(0.159)			(1.747)	(1.746)
Tax Diff				0.580					
				(0.877)					
Tax Ratio					0.692				
					(0.921)				
Observations	227,411	181,217	181,217	181,217	181,217	5,584	5,584	5,584	5,584
R^2	0.046	0.052	0.052	0.052	0.052	0.059	0.061	0.059	0.061
Adjusted R^2	0.034	0.037	0.037	0.037	0.037	0.032	0.035	0.032	0.035

Note: *p<0.1; **p<0.05; ***p<0.01

Household race and income as well as month-year, county, and product category fixed effects are included in the above regressions and standard errors are clustered at the year-month and county level.

Regression Results (Search)

Table 7: Non-Taxed Non-Amazon Search Duration

	Dependent variable:								
	Log Expenditures								
	All Counties					Border Counties			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collect	0.018					0.112			
	(0.013)					(0.155)			
Log(1 + Sales Tax)		2.690***					−1.413		−1.629
		(1.029)					(6.811)		(6.815)
Log(1 + Sales Tax * Collect)			0.592**	0.588**	0.588**			2.139	2.161
			(0.248)	(0.248)	(0.248)			(2.514)	(2.516)
Tax Diff				1.480					
				(1.295)					
Tax Ratio					1.517				
					(1.360)				
Observations	213,613	167,907	167,907	167,907	167,907	4,914	4,914	4,914	4,914
R^2	0.075	0.075	0.075	0.075	0.075	0.090	0.090	0.091	0.091
Adjusted R^2	0.062	0.060	0.060	0.060	0.060	0.061	0.061	0.061	0.061

Note: *p<0.1; **p<0.05; ***p<0.01

Household race and income as well as month-year, county, and product category fixed effects are included in the above regressions and standard errors are clustered at the year-month and county level.

Regression Results (Nielsen)

Table 8: Online Expenditures

	Dependent variable:									
	Log Expenditures									
	All Counties						Border Counties			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Collect	0.010						−0.235***			
	(0.006)						(0.055)			
Log(1 + Sales Tax)		−0.392		−0.356				−4.088		−4.010
		(0.590)		(0.592)				(3.860)		(3.857)
Log(1 + Sales Tax * Collect)			−0.095	−0.090	−0.055	−0.056			−4.022***	−4.018***
			(0.112)	(0.113)	(0.113)	(0.113)			(0.910)	(0.910)
Tax Diff					−3.339***					
					(0.693)					
Tax Ratio						−3.534***				
						(0.728)				
Observations	618,386	444,606	444,606	444,606	444,606	444,606	12,131	12,131	12,131	12,131
R^2	0.064	0.072	0.072	0.072	0.072	0.072	0.099	0.097	0.099	0.099
Adjusted R^2	0.059	0.067	0.067	0.067	0.067	0.067	0.086	0.085	0.087	0.087

Note: *p<0.1; **p<0.05; ***p<0.01
Household race and income as well as month-year, county, and product category fixed effects are included in the above regressions and standard errors are clustered at the year-month and county level.

Regression Results (Nielsen)

Table 9: Offline Expenditures

	Dependent variable:									
	Log Expenditures									
	All Counties						Border Counties			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Collect	0.008***						−0.002			
	(0.001)						(0.014)			
Log(1 + Sales Tax)		0.545***		0.530***				−1.672**		−1.675**
		(0.119)		(0.119)				(0.800)		(0.800)
Log(1 + Sales Tax * Collect)			0.064**	0.057**	0.062**	0.062**			0.031	0.042
			(0.026)	(0.026)	(0.026)	(0.026)			(0.227)	(0.227)
Tax Diff					0.174					
					(0.144)					
Tax Ratio						0.182				
						(0.152)				
Observations	6,001,547	4,209,893	4,209,893	4,209,893	4,209,893	4,209,893	107,630	107,630	107,630	107,630
R^2	0.088	0.091	0.091	0.091	0.091	0.091	0.094	0.094	0.094	0.094
Adjusted R^2	0.088	0.090	0.090	0.090	0.090	0.090	0.093	0.093	0.093	0.093

Note: *p<0.1; **p<0.05; ***p<0.01

Household race and income as well as month-year, county, and product category fixed effects are included in the above regressions and standard errors are clustered at the year-month and county level.

Regression Results (Nielsen)

Table 10: Total Expenditures

	Dependent variable:									
	Log Expenditures									
	All Counties						Border Counties			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Collect	0.010***						0.004			
	(0.001)						(0.014)			
Log(1 + Sales Tax)		0.616***		0.597***				−1.814**		−1.823**
		(0.118)		(0.118)				(0.798)		(0.798)
Log(1 + Sales Tax * Collect)			0.085***	0.078***	0.084***	0.084***			0.108	0.120
			(0.026)	(0.026)	(0.026)	(0.026)			(0.227)	(0.227)
Tax Diff					0.112					
					(0.144)					
Tax Ratio						0.115				
						(0.151)				
Observations	6,006,028	4,213,437	4,213,437	4,213,437	4,213,437	4,213,437	107,711	107,711	107,711	107,711
R^2	0.089	0.091	0.091	0.091	0.091	0.091	0.095	0.095	0.095	0.095
Adjusted R^2	0.088	0.091	0.091	0.091	0.091	0.091	0.093	0.093	0.093	0.093

Note: *p<0.1; **p<0.05; ***p<0.01

Household race and income as well as month-year, county, and product category fixed effects are included in the above regressions and standard errors are clustered at the year-month and county level.

Future Research

- Connect these results with either a fully rational agent story or a salience story
- Explore the browsing (comScore) and shopping trips (Nielsen) data to estimate search costs
- Explore the labor and public finance impact of these shifts (is a hot topic in the press)
  - Big question: Is ecommerce making traditional retailing disappear and what are the impacts of it?
    - Almost 16 million people are employed in "Retail Trade". If you remove Food and Beverage, Gasoline, and Motor Vehicles, you still have 9 million people.
    - Manufacturing only employs 12 million people
  - The Economist (May 13, 2017): Sorry, we're closed: The decline of established American retailing threatens jobs
  - The Atlantic (May 23, 2017): The Viscious Cycle of Retail's Decline

Questions?

Thanks!