



The impact of sales tax on internet and catalog sales: Evidence from a natural experiment[☆]

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ABSTRACT

This paper studies the effect of sales tax changes on internet and catalog sales. We collect sales data from a retailer that sells its products through its internet and catalog channels. We analyze the retailer's sales before and after a major tax cut in one of the largest metropolitan areas in the U.S. This natural experiment allows us to separate the effect of the tax cut from the effect of other confounding factors. The results from our panel data analyses indicate that remote sales have decreased by about 15% in response to a four percentage point decrease in sales tax. Our results are statistically significant and highly robust. Interestingly, we also find that the effect of the tax cut varies across different types of consumers, products, and channels. These findings have important managerial and public policy implications.

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1. Introduction

“Competition from other states and from internet sales, as well as the high and regressive tax burden of the sales tax, continues to be important tax policy issues in New York State. The recently enacted exemption of sales tax on clothing helps to address these concerns.”

[US Fed News Service]

Today, internet retailers enjoy a clear and quite significant pricing advantage over traditional brick-and-mortar retailers: a consumer does not have to pay sales tax when purchasing from internet retailers who do not have a nexus (or physical presence) in her state. Such an advantage was first established by the U.S. Supreme Court's ruling in the famous case of *National Bellas Hess v. Department of Revenue*, which prohibits a state from imposing the duty of collecting sales tax on retailers who do not have a nexus in that state (U.S. Supreme Court 1967). This advantage was further affirmed by the Internet Tax Freedom Act (ITFA), which bars governments at any level from

taxing internet access and from imposing discriminatory taxes on internet commerce.² Consumers are still responsible for paying use tax on out-of-state purchases, but since the enforcement is through self-reporting, purchases made through the internet channel (and catalog channels such as mail and telephone) are virtually tax-free.

The rapid growth of internet commerce has made whether to levy taxes on internet sales a topic of heated debate (see, for example, *Baron and Wiseman, 2000* for more details on this debate).³ On one side of the debate stand online consumers, internet retailers, and technology companies. These parties argue that imposing taxes on internet commerce will slow its growth, as well as the growth of the internet. On the other side of the debate stand brick-and-mortar retailers, who argue that the tax advantage available to internet retailers leads to unfair competition, and state and local governments, who worry that their tax bases could be shrinking. Recently, this debate has also been happening in courtrooms. Amazon and Overstock – two of the largest online retailers in the U.S. – filed a lawsuit against New York State, claiming a new state law, which forces online retailers with affiliates in New York State to collect sales tax on shipments to New York State, unconstitutional (*Gomestyn, 2010; Hansell, 2009*). These ongoing lawsuits only highlight the importance of the topic of internet taxation.

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² The Internet Tax Freedom Act (ITFA) was passed by the U.S. Congress in 1998 and extended until November 1, 2014.

³ According to Forrester Research, the internet retail sales will grow to \$249 billion by 2014, up from \$155 billion in 2009.

At the heart of this current debate on internet taxation lies a key statistic—the size of the impact that taxing internet sales can have on consumers' propensity to make online purchases. Is internet commerce really fueled by the sales tax advantage it enjoys over offline commerce? How big a proportion of internet sales would be affected if they were to be taxed just like regular sales do? Despite the importance of this key statistic, practitioners and academic researchers have yet to obtain an accurate and reliable estimate of it. To make matters worse, such existing estimates may differ by a factor of seven. For instance, [Goolsbee \(2000\)](#) uses consumer survey data to estimate that levying sales tax online would lead to a 24% drop in the number of online consumers, while [Alm and Melnik \(2005\)](#) find that taxing internet sales would reduce online purchases by only 3.6% after analyzing survey data provided by the U.S. Census Bureau.⁴ All the parties that are involved in the internet taxation debate are left wondering what is the true impact of taxing internet sales on internet purchases.

To provide a more accurate and reliable estimate of this key statistic, we take a drastically different approach than the existing literature does. To date, virtually all the research on consumers' sensitivity to sales tax utilizes the variation of local sales taxes across different regions and studies how such a variation in sales tax is correlated with consumers' tendency to purchase from the internet. To the best of our knowledge, there has been no academic research on this topic that uses the setting of a natural experiment. Such an experimental setting used by our paper provides several significant advantages (see [Meyer, 1995](#) for a detailed discussion of the advantages of using natural experiments in economic papers). First, a natural experiment clearly reveals the causal effect of a change in sales tax on internet sales. Second, it overcomes many confounding factors that could be correlated with both variations in sales tax and in internet sales. Finally, it enables researchers to do an event study, revealing how the effect of sales tax evolves over time.

Furthermore, our paper analyzes real consumer-level transaction data, instead of the consumer survey data that has been used by previous studies such as [Goolsbee \(2000\)](#) and [Alm and Melnik \(2005\)](#). Aside from the potential bias coming from self-reporting, survey data relies on survey participants' memory, which can be notoriously unreliable. In addition, survey data used by the existing research on internet taxation often only records whether a survey participant has bought from the internet, instead of the actual quantities she has purchased. The real consumer-level transaction data used in this paper does not suffer from any of the problems or limitations mentioned above.

In this paper, we utilize data from a natural experiment. We collect the sales data of a retailer that sells its products primarily through the company's own catalog and internet channels. We analyze the retailer's sales before and after a major tax cut in one of the largest metropolitan areas in the U.S.—New York City. Using panel data analyses at an individual level, we find that in the five months following a four percentage point cut of local sales tax (from 8.375% to 4.375%), remote sales (i.e., sales via the internet and catalog channels) have decreased by an average of 15.0%, which corresponds to a 3.75% decrease in remote sales for each percentage point of the sales tax cut. This effect is statistically highly significant.

More importantly, this paper provides several new insights that are absent from the existing literature on internet taxation, by exploring how the effect of sales tax varies across different consumers, different products, and different channels. Our results show that the effect of sales tax cuts on remote sales varies dramatically across different consumers depending on their loyalty to the focal retailer: remote sales to consumers who are new to the focal retailer's products decrease more, while remote sales to consumers who tend to be loyal are affected less. In addition, the effect varies across different products: sales of cheap products drop more than sales of expensive products do. Finally,

the effect of sales tax is more significant on the internet channel than on the catalog channel, consistent with the literature that has found that the internet channel is a more competitive channel and internet consumers tend to be more price sensitive.

It is worth noting that all of the new insights mentioned above enrich our current understanding of the impact of sales tax, while supplying further evidence toward the robustness of our results. These insights also provide actionable suggestions to managers and public policy makers by pinpointing the areas – i.e., the set of consumer segments, products and channels – that are likely to be most influenced by changes in sales tax. Therefore, the results in this paper have important managerial and public policy implications.

The rest of this paper is organized as follows. In [Section 2](#), we review the related literature. [Section 3](#) provides the details of the exogenous change in sales tax that we use as a natural experiment, our consumer-level transaction data, and our empirical models. [Section 4](#) presents the results of our analyses, along with a variety of robustness tests. [Section 5](#) concludes with discussions.

2. Literature

Theoretical research on internet commerce has studied the potential competition between internet commerce and traditional brick-and-mortar commerce and the unique properties of internet commerce. First, [Balasubramanian \(1998\)](#) builds a game-theoretic model that has a direct retailer and multiple brick-and-mortar stores and finds that the direct retailer competes with brick-and-mortar stores. Because internet commerce and traditional commerce are interrelated, any changes in price (or tax), product selection, or service (i.e., the number and location of stores) in one channel could lead to changes in demand in other channels. This thinking has spurred a number of papers to empirically measure such cross-channel effects. Second, researchers have examined the difference between internet commerce and traditional commerce. For instance, [Hitt and Frei \(2002\)](#) argue that internet consumers differ from offline consumers in demographic and behavioral characteristics as well as their access to information and online tools. [Brynjolfsson et al. \(2006\)](#) mention that search tools, recommendation tools, and customer reviews can drive internet purchases. As a result of using these tools, internet consumers may make more purchases and purchase a different set of products, when compared with offline consumers ([De et al., 2010](#)).

Empirical research on internet commerce has examined consumers' sensitivity to price and sales tax. The internet channel is a more competitive market than the offline channel (e.g., [Clemons et al., 2002](#)). As a result, internet consumers can have high levels of price sensitivity. For instance, [Brynjolfsson et al. \(2010\)](#) provide empirical evidence that the price elasticity for online markets is higher than that for offline markets. [Ellison and Ellison \(2009a\)](#) show that internet consumers who use search engines to find retailers can be extremely sensitive to prices, with price elasticity estimates of -20 or more. [Baye et al. \(2009\)](#) find that the elasticity of consumers' clicks with respect to prices ranges from -3.6 to -6.6 , and is larger in size when there are more sellers in the market.

Researchers have also empirically examined how the number of local stores affects internet commerce. For instance, [Brynjolfsson et al. \(2009\)](#) show that internet commerce, particularly internet commerce of popular products, drops as the number of local stores increases.

Our research is closely related to a number of papers that have measured consumers' sensitivity to sales tax. Almost all of these papers rely on the variation of local sales tax across different regions and study how such a variation is correlated with consumers' propensity to purchase from the internet. Because internet purchases are virtually tax-free, consumers whose local sales tax rates are relatively high should be more likely to purchase through the internet channel. In an early paper that studies the impact of sales tax on internet sales, [Goolsbee \(2000\)](#) shows that consumers living in high sales tax locations have a higher tendency to purchase online and that consumers' sensitivity to sales tax is at a very high level. In contrast, [Alm and Melnik \(2005\)](#) find

⁴ We note that [Alm and Melnik \(2005\)](#) estimate a tax elasticity of -0.52 for internet commerce. Using 6.85% as the average sales tax rate, they would have estimated that taxing internet sales leads to a 3.6% decrease of internet sales.

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