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Taxes, Competition, and the Information Economy

Austan Goolsbee*

The growth of the information economy — the Internet, computers, media, and the like — has generated massive amounts of debate in popular and policy circles. More than that, though, it has raised many interesting subjects for economic research. My work in the area has focused on two general topics: the impact of tax and other government policies in the information economy, and the nature of industrial competition on the Internet and in other information-based industries. In general, the findings have tended to suggest that the responsiveness to price, tax, and other types of shocks in these industries is surprisingly high.

Taxes and the Information Economy

The rapid rise of the Internet certainly has made policymakers nervous about how online retail sales may serve to undermine the sales tax base of the states. Internet sales are treated the same way as catalog sales for tax purposes, which is to say that sales tax applies to all transactions, in principle, but cannot be enforced, in practice, because of legal restrictions. States are not allowed to require out-of-state merchants to collect sales tax on their citizens, so Amazon.com in Washington is not required to collect sales tax on sales to customers in Illinois, for example, where it has no employees or physical presence. As almost no private citizens are voluntarily paying the taxes on such transactions, it's as if they were tax-free.

Using a large dataset on the

online purchase behavior of consumers around the country, I examined how much this tax break matters for the probability of buying online.¹ The idea is that living in a place with a sales tax of 5 percent raises the relative price of buying in a store relative to the Internet by 5 percent so should make buying online more likely. The equivalent of charging sales tax online would be moving to a state like Delaware that has no sales tax at all (so the relative prices are unaffected). The data show that customers' online buying is quite sensitive to local sales tax rates. Controlling for individual observables and for MSA effects, people living in higher sales tax places are more likely to buy online and this effect is largest for goods like books and computers (where sales tax definitely would apply) and non-existent for things like mutual funds and stocks (where there is no sales tax). The data suggest enforcing sales taxes online, at the time of the sample, would have reduced the likelihood of buying by almost 25 percent.

In a follow-up piece, I used later data to reexamine the elasticity and to determine if consumers had become less tax sensitive as a greater share of the country went online.² The interesting thing was that in both the older and the newer cross-sections, only Internet veterans, those online for two or more years, were responsive to taxes. New users were not sensitive to tax rates at all. Since the Internet had been growing something like 100 percent per year at that point, it suggested that the tax problem might diminish over time. The problem was, the follow-up data showed that with the passing of time, the formerly new users had become just as sensitive to tax rates as the Internet veterans. People, evidently, learn how to use the Internet to avoid sales taxes the longer they are on line.

In work with Jonathan Guryan, I look at the issue of tax subsidies for Internet adoption in public schools through the e-rate program.³ This subsidy of \$2.25 billion per year amounted to as much as 35-40 percent of the entire computer budget of U.S. public schools combined and is funded through a tax on long-distance telephone service (which is not without controversy in itself for being a tax with a particularly high deadweight loss.⁴) The program subsidizes Internet access and communications technology up to 90 percent (poorer schools get higher subsidies) but following a formula with several discrete jumps. We use the step-function nature of the subsidy to identify the impact of the subsidy on Internet investment while controlling for the characteristics of the schools. The evidence suggests that schools are quite responsive to the subsidy rate in their decisions about investing in Internet technology and that the program increased connections by more than 60 percent. When we use the increased connection to the Internet to examine the impact of the technology on student outcomes, the results are not so encouraging. We could find no evidence that the increased Internet connections in classrooms improved measured educational outcomes like test scores, graduation rates, or the share of people choosing to take more advanced classes in any way.

I also have looked at the role of taxes on executive compensation in high-tech and information-based industries.⁵ I find that the extensive use of stock options in those industries, and the ease with which executives can use stock options to change the timing of their compensation for tax purposes, implies that the short-run sensitivity of reported income to marginal tax rates is extremely high there, even larger than for executives overall.⁶ Also,

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predicting the revenue effects of tax changes is difficult because of the blurring of the distinction between capital and labor income on tax returns for people in such industries. Because changing capital gains tax rates can lead executives to exercise options (which are typically treated as ordinary income on a tax return), for example, the tax rate on capital gains can lead to large unanticipated fluctuations in labor income in the tax data.

Competition and the Industrial Organization of the Information Economy

Competition between firms in information-based industries also has become a topic of academic interest in the last few years. Motivated by the work on sales taxes that seemed to imply significant competition between online and offline sellers, I have examined the competition between Internet and retail merchants directly.

One paper uses individual-level purchase data on personal computers to examine the competition between online sellers like Dell with traditional retail brands like HP.⁷ Using a hedonic regression for computer prices with city dummies, I compute a cross-city retail price index for computers. I then look at the likelihood of buying online as a function of the retail price of computers in the individual's city. People living in places where retail store prices are higher are more likely to buy their computers online. Conditional on buying a computer, the elasticity of buying a computer remotely with respect to local retail prices is around 1.5.

In a second paper, Jeffrey R. Brown and I look at the impact of the Internet as a source of information on offline prices that may reduce search costs.⁸ In the case of term life insurance, we show that insurance prices, even for policies with identical policy characteristics, have fallen substantially since Internet comparison sites began listing multiple price quotes, and the price declines have been correlated directly with the states and the years in which Internet usage grew most. We show that this cannot be explained by

falling mortality or other standard explanations. Further, we show that the relationship between price changes and Internet growth does not hold for whole-life policies, which have not been covered by most of the web search engines. The relationship did not start to hold until the search engines actually began (that is, internet growth before there were insurance sites was not correlated with price declines). Overall, the rise of the Internet may have reduced term life prices by as much as 10-15 percent.

In joint work, Judy Chevalier and I examine the competition between online booksellers Amazon.com and Barnes and Noble (BN.com).⁹ We use the stated sales ranks for books on each site to derive a measure of quantities sold (after first showing that sales can be approximated well by a Pareto distribution). Using information over time and across sites, we show that both sites have significant own- and cross-price elasticities but that demand differs substantially across the two sellers. The own- and cross-price terms at Barnes and Noble indicate that the customers there are extremely price sensitive. Amazon customers are dramatically less so.

In another paper, Amil Petrin and I examine the competition between Direct Broadcast Satellites (DBS) and cable television.¹⁰ With micro data on the television choices of thousands of individuals, we are able to estimate a discrete choice model of demand but we do so in a way that allows for correlation of unobserved tastes across products; this means that people who, after controlling for observable characteristics, like Satellite also may be the kind of people who like premium cable. This correlation ends up being quite important. The results show that the demand for satellite and premium cable are more closely tied than satellite is to expanded basic or antenna-only reception, despite the small market share of premium cable. A more standard logit model yields very different results. We find that demand for premium and for DBS are fairly elastic while demand for expanded basic is relatively less so. We also address the issue of how cable companies responded to the rise of DBS in their

pricing and quality decisions, showing that if there were no satellite competition, prices would be about 15 percent higher than they are and the quality of cable would be lower. The total consumer welfare gain (combining the gains to the DBS adopters and the price and quality improvements to cable for the DBS non-adopters) likely exceeds \$5 billion per year.

Peter J. Klenow and I have examined the spread of home PCs and the role of spillovers and network externalities, looking at how the adoption decision of people in nearby geographic areas influences the future adoption of novice users.¹¹ We find that people are more likely to buy their first home computer in areas where a high fraction of households already own computers, or when a large share of their friends and family own computers. Further results suggest that these patterns are unlikely to be explained by city-specific unobserved traits. When we look at the spillovers in detail, they appear to derive only from the proximity to a small group of experienced and intensive computer users. The spillovers are not associated with the use of any particular type of software, but do seem to be highly tied to the use of e-mail and the Internet, consistent with computers being part of a local information and communications network.

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² A. Goolsbee, "Tax Sensitivity, Internet Commerce, and the Generation Gap," in *Tax Policy and the Economy*, Vol. 14 (2000), James M. Poterba, ed., Cambridge, MA: MIT Press, pp. 45-66.

³ A. Goolsbee and J. Guryan, "The Impact of Internet Subsidies for Public Schools," NBER Working Paper No. 9090, August 2002.

⁴ J. Hausman, "Taxation By Telecommunications Regulation," NBER Working Paper No. 6260, November 1997.

⁵ A. Goolsbee, "Taxes, High-Income Executives, and the Perils of Revenue Estimation in the New Economy," NBER Working Paper No. 7626, March 2000,

and *American Economic Review (Papers and Proceedings)*, Vol. 90 (2) (May 2000), pp. 271-5.

⁶ A. Goolsbee, "What Happens When You Tax the Rich? Evidence from Executive Compensation," *Journal of Political Economy*, Vol. 108, No. 2 (April 2000), pp. 352-78.

⁷ A. Goolsbee, "Competition in the Computer Industry: Online Versus Retail," NBER Working Paper No. 8351, July 2001, and *Journal of Industrial Economics*, 49 (4), December 2001, pp. 487-99.

⁸ J. R. Brown and A. Goolsbee, "Does the Internet Make Markets More Competitive? Evidence from the Life Insurance Industry," NBER Working Paper No. 7996, November 2000, and *Journal of Political Economy*, 110 (3) (June 2002), pp. 481-507.

⁹ J. Chevalier and A. Goolsbee, "Price Competition Online: Amazon Versus Barnes And Noble," NBER Working Paper No. 9085, July 2002, forthcoming in *Quantitative Marketing and Economics*.

¹⁰ A. Goolsbee and A. Petrin, "The

Consumer Gains from Direct Broadcast Satellites and the Competition with Cable Television," NBER Working Paper No. 8317, June 2001, forthcoming in *Econometrica*.

¹¹ A. Goolsbee and P. J. Klenow, "Evidence on Learning and Network Externalities in the Diffusion of Home Computers," NBER Working Paper No. 7329, September 1999, and *Journal of Law and Economics*, Vol XLV (2) (PT. 1) (October 2002), pp. 317-44.

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