

E-Commerce Symposium

E-Commerce and Local Finance: Estimates of Direct and Indirect Sales Tax Losses

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The attention that commentators and analysts have paid to the fiscal, economic, and productivity effects associated with the World Wide Web and the Internet is unparalleled, though many different perceptions have surfaced. Historical ownership of sales tax revenues at the state and local government level (with Congress having a major role in defining collection responsibilities for the tax) and different economic incentives across businesses have caused sales taxation of Internet-related activity to become a hot-button issue, with widely different perspectives both across and within government and the business community. Some have asserted that the economic gains are so great that the technology should remain unfettered by regulatory control and taxation. Others have argued that, although the economic gains are important, the fiscal aspects are too significant to be ignored and that the economic gains would be enhanced through appropriate taxation.

There are a number of key tax issues that must be addressed in

determining whether sales taxes should be imposed on Internet-based transactions, including (1) whether failure to impose taxes on Internet-related activity hurts or helps economic growth and (2) the effects of the failure on perceptions of sales tax equity. This article focuses on just one aspect of the tax issue: how local government finance will be affected by expected growth in Internet-based transactions. The conclusion is that, though local sales taxation is much less important to local finance than property taxation, the revenue consequences of growth in Internet-related transactions can be significant for some local governments. Local governments stand to lose not only revenues they collect directly through local sales taxes but also those they receive indirectly through state government sales tax collections.

This article begins with a discussion of the importance of the sales tax to local finance and of sales tax base trends. It continues with an analysis of the extent to which local government sales tax revenues will be reduced by the inability to collect taxes due on Internet-based transactions. Finally, it provides estimates of how state government transfers will be affected by the states' inability to collect sales taxes.

CONTRIBUTION OF THE SALES TAX TO LOCAL FINANCE

The property tax is the primary source of local government revenue, constituting 73.7 percent of local tax revenue and 45.5 percent of local own-source revenue in 1996. Sales taxes, though the second largest local tax source, pale by comparison. The sales tax provided only 11 percent of local tax revenue in 1996 (though this is up from 8.8 percent in 1979) and 6.8 percent of own-source revenue. Of course, there is considerable variation across states in the sales tax's contribution. Thirty-two states allow local governments the authority to levy local option sales taxes (see Table 1).¹ Local governments in 10 states raise more than 20 percent of their revenues from the local sales tax, and of course, local governments in many states do not collect any sales tax revenues.

Two factors have been key to the growing role that the sales tax plays in local finance. First, local sales taxes are being collected in new states. Five states—Iowa, North Dakota, Pennsylvania, South Carolina, and Wisconsin—reported local sales tax revenues in 1996, but did not in 1979. Second, there has been a strong propensity for the average effective sales tax rate to rise.² All taxing states except Nevada had a higher effective sales tax rate in 1996 than in 1979 (see Table 2). The median effective tax

1. The Census of Governments provides data on sales tax revenues received in 32 states.

2. Effective tax rates are calculated on state sales tax bases, which vary across states.

TABLE 1. Local Option Sales Tax Availability in Sales-Taxing States

<i>State</i>	<i>Local Option?</i>	<i>State</i>	<i>Local Option?</i>
AL	YES	NC	YES
AR	YES	ND	YES
AZ	YES	NE	YES
CA	YES	NJ	NO
CO	YES	NM	YES
CT	NO	NV	YES
FL	YES	NY	YES
GA	YES	OH	YES
HI	NO	OK	YES
IA	YES	PA	YES
ID	YES	RI	NO
IL	YES	SC	YES
IN	NO	SD	YES
KS	YES	TN	YES
KY	NO	TX	YES
LA	YES	UT	YES
MA	NO	VA	YES
MD	NO	VT	YES
ME	NO	WA	YES
MI	NO	WI	YES
MN	YES	WV	NO
MO	YES	WY	YES
MS	NO		

Source: Commerce Clearing House, *State Tax Guide*, March 1997, as reported in Mackey (1998).

rate for states in Table 2 was 1.12 percent in 1996, up from 0.57 percent in 1979.

SALES TAX BASE TRENDS

Sales tax bases have been declining relative to state personal income for many years. For the average sales-taxing state, the tax base equaled 51.4 percent of the state's personal income in 1979, but had fallen to 42.8 percent in 1998 (see Figure 1).³ The breadth of sales tax bases varied

3. Figure 1 also includes a forecast of future trends in sales tax bases. See Bruce and Fox (2000) for the methodology for calculating the ratios, which are weighted averages for sales-taxing states.

TABLE 2. Effective Local Sales Tax Rates, 1979 and 1996

<i>State</i>	<i>1979</i>	<i>1996</i>
AL	1.49	2.83
AR	0.01	0.98
AZ	0.97	1.64
CA	1.04	1.36
CO	1.64	2.92
FL	0.00	0.19
GA	0.54	1.60
IA	0.00	0.21
IL	0.69	1.12
KS	0.16	1.01
LA	1.62	3.50
MN	0.03	0.05
MO	0.78	1.74
NC	0.83	1.20
ND	0.00	0.45
NE	0.38	0.88
NM	0.17	1.10
NV	0.57	0.34
NY	2.88	3.41
OH	0.40	0.93
OK	0.86	1.90
PA	0.00	0.11
SC	0.00	0.14
SD	0.48	1.22
TN	1.21	1.88
TX	0.63	1.13
UT	0.90	1.03
VA	0.83	0.84
WA	0.61	1.54
WI	0.00	0.27
WY	0.49	1.01

Source: Authors' calculations.

FIGURE 1. Sales Tax Base as a Percentage of Personal Income, 1979–2003

widely by state, from 27.6 percent of personal income in Rhode Island to 109.2 percent in Hawaii.⁴ The base does not narrow every year, despite the overall trend. Immediately after a recession and in very strong consumption years like much of the latter part of the 1990s, the base rises as a share of income, but this cyclical pattern must be distinguished from the downward trend.

The narrowing of sales tax bases is attributable to three major factors. The first is remote sales, including electronic commerce (e-commerce), catalog sales, and cross-state shopping, all of which have been rapidly expanding in recent years. Every state with a sales tax imposes a corresponding use tax on remote purchases, effectively intended to convert the overall tax structure to a destination basis.⁵ Thus, to the extent that the base is shrinking because of remote purchases, tax evasion rather than avoidance or redefinition is generally the cause. Administration and compliance costs could be limited through collection of the use tax from

4. The combination of Hawaii's broad taxation of consumer purchases and taxation of certain business inputs results in a base that exceeds personal income.

5. Tax base definitions for the sales and use taxes are very similar. *See* Due and Mikesell, 1994.

vendors rather than buyers.⁶ In *Quill v. North Dakota*, 112 U.S. 298 (1992), however, the U.S. Supreme Court ruled that states could only require firms with physical presence in the state to collect use tax on their behalf. As a result, the states frequently rely on voluntary use tax compliance, which is very limited for individuals except for a small set of commodities that must be registered, such as automobiles and boats. Use tax compliance is somewhat greater for businesses, but still falls far short of the legislated burdens. The Court's limitation of collection responsibility to firms with physical presence was based on the Commerce Clause. This means that Congress has the authority to override the decision through legislation.

The second and perhaps foremost factor in the erosion of sales tax bases is the shift in consumption patterns toward greater consumption of services and less consumption of goods. Services are much less broadly taxed than goods. This means that the base shrinks relative to the economy as services become more prominent. As evidence of this shift in spending, services were 47.4 percent of consumption in 1979, but rose to 58.8 percent in 1998. The implications for base decline would be even larger except that much of the decline in goods consumption has been from a decline in the consumption of food at home, which is exempt in most states.

Third, the continuing process of legislated exemptions has narrowed the base in essentially every state. To be sure, some of the recently legislated exemptions, such as that for industrial equipment,⁷ are consistent with good tax policy, but they still have the effect of lowering the taxable base. Other exemptions are intended to improve equity, such as the exemption for food for consumption at home and prescription drugs. These equity-enhancing exemptions may come at a high price in terms of targeting and of administration and compliance, and improved equity may be better achieved in most states through direct taxes. Still other exemptions are given mostly for political reasons. These exemptions are often for business inputs, which might not belong in a consumption-based tax, but they are given in a haphazard fashion that may not be efficiency enhancing. For example, the exemptions are often firm specific or are very narrowly construed, and can lead to differential taxation within industries.

6. Multistate vendors would probably experience higher compliance costs associated with collecting and remitting sales and use taxes than single-state vendors. If the choice is between collecting use taxes from multistate vendors or from individual consumers, higher costs would be expected for the sum of state governments and all individual consumers than for the sum of state governments and the multistate vendors.

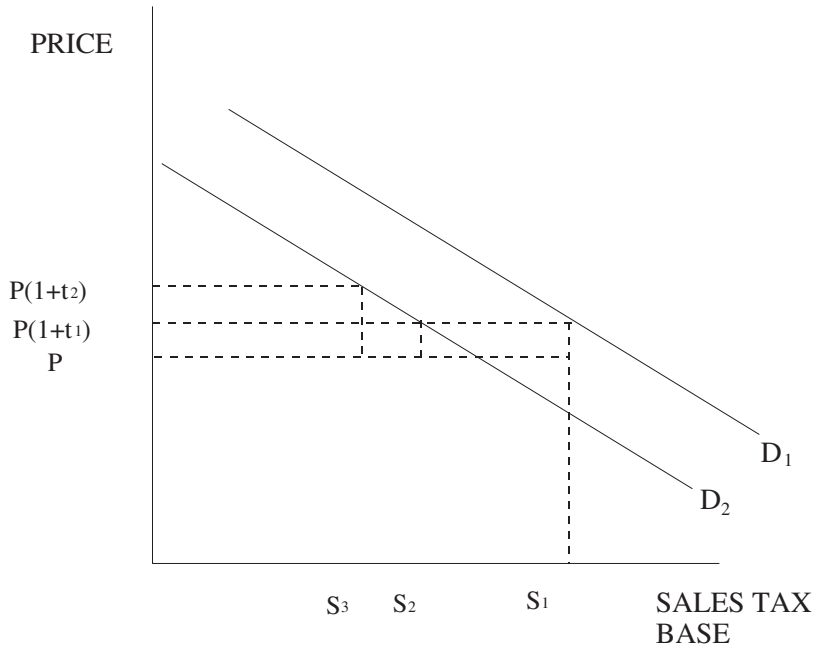
7. Today, most states exempt industrial equipment, but machinery is fully taxed in some states, partially taxed in others, and taxed at a lower rate in others.

One response to this base erosion would be to expand the set of sales-taxable commodities. Local governments in most states, however, are at the mercy of state legislatures regarding the definition of the sales tax base; only a few states allow local governments any independence in defining the tax base. Therefore, as noted above, local governments have responded to the narrowing tax bases by raising tax rates, though the extent of a causal relationship has not been carefully studied. Interestingly, revenues did not rise nearly as fast as would have been anticipated by the rate increases. States have also raised their rates. The median state sales tax rate increased from 3.25 percent in 1970 to 4 percent in 1980 and to 5 percent in 1990. Fifteen states now have rates at or above 6 percent. The rate increases have allowed states to increase revenues slightly as a percentage of GSP since 1986.

E-COMMERCE AND LOCAL GOVERNMENT REVENUE LOSSES

E-commerce can lower local government revenues through three direct and indirect means. The obvious direct effect is the revenue loss as local taxes are not effectively collected on many remote purchases. Second, in some states, a portion of state sales tax collections is earmarked for direct distribution to local governments. Tennessee, for example, provides 4.295 percent of sales tax collections to local governments. Thus, some local governments will receive less revenue because states are unable to collect use taxes due on remote sales. Finally, local financing will be reduced to the extent that lower state revenues result in fewer discretionary transfers to local governments, above and beyond the explicit sharing of state sales tax collections. The latter two indirect effects are not additive with state government losses, but are drawn from state sales tax revenues. Most of this article focuses on estimating the direct revenue effects from lower local option sales taxes, but suggestive estimates are also provided for the two indirect effects on local revenues.

The direct effect on local revenues is estimated in the context of the declining sales tax base described above. The combined effects of the trend decline in demand for sales-taxable commodities and e-commerce are summarized in Figure 2. D_1 is the demand for sales-taxable commodities, which in this simple example can be thought of as in-state purchases of goods. Changes in tastes for services that are not taxed and development (through e-commerce) of a substitute commodity that is not taxed reduce demand for sales-taxable commodities, as evidenced by movement of the

FIGURE 2. Effect of Sales Tax Base Changes on Tax Revenues

demand curve to D_2 . State and local governments lose tax revenue equal to $t_1*(S_1 - S_2)$, at the initial tax rate t_1 . Based on past patterns, state and local governments raise their tax rates to offset the lost revenues, and this will further reduce the tax base (evidenced by S_2 to S_3), depending on the price elasticity for sales-taxed commodities. States could increase their tax rate to t_2 , where the additional revenue from the higher tax rate ($(t_2 - t_1)*S_3$) equals the lost tax revenue from fewer taxable purchases ($t_1*(S_1 - S_3)$).

ESTIMATES OF DIRECT REVENUE LOSSES

This section presents estimates of direct sales tax losses from e-commerce in the context of the broader decrease in sales tax bases. To accomplish this objective, we first estimate the trend reduction in sales tax bases that is occurring independent of e-commerce, and then estimate the loss from e-commerce. The focus in this article is on an estimate of revenue losses for 2003, because the nascent state of e-commerce makes a current-year estimate of limited value for policy purposes.

Estimating Trend Decreases in State Sales Tax Bases

The first part of our analysis involves calculating state-level estimates of the trend decrease in sales tax bases as a percentage of personal income. The process involves estimates of state sales tax bases, panel regressions of the relationship between the tax base and personal income, state-by-state estimates of personal income growth, and tax base forecasts as a function of the personal income forecasts.

The estimation of the dollar value of state sales tax bases⁸ was accomplished by dividing each state's sales tax revenues by its sales tax rate.⁹ A sales tax base equation was then fit for all 45 sales-taxing states, plus the District of Columbia, using panel data for 1979 to 1996. The equation was estimated through 1996 in an attempt to find the underlying relationships before any effect from e-commerce. Control variables in this equation include state personal income and state fixed effects to account for differences across states in the underlying sales tax base and other state-specific impacts. The growth in real gross domestic product (GDP) was used instead of fixed effects for time, under the presumption that differences across time are heavily dependent on the point in the business cycle. The key variable of interest in the equation is personal income, and the estimated elasticity on personal income of 0.85 is consistent with previous findings.¹⁰ The finding of an elasticity below 1.0 results in the forecast of a trend decrease in the base as a share of the economy, consistent with the pattern generally observed since 1979.¹¹

The base equation is used to forecast the state-specific sales tax base for each year through 2003, using a forecast of personal income for each state. Personal income forecasts were developed through 2003 using a

8. The estimates developed here are based on the state sales tax base, but the state and local sales tax bases differ in some states. For example, Colorado allows local governments some capacity to define their own tax base, and Tennessee imposes a ceiling on the local option sales tax that can be paid on any single item, but there is no cap on the state tax.

9. In some cases the Census of Governments' sales tax data include revenues from sources other than the general sales tax and exclude revenues from special levies normally included in the sales tax. For example, the Washington business occupations tax is included and the Maryland tax on motor vehicles and boats is excluded. *See* Due and Mikesell, 1994. In addition, some states use multiple tax rates. For example, the District of Columbia has a 5.75-percent general tax rate, a 13-percent tax on hotel rooms, a 12-percent tax on parking, a 10-percent tax on food and drink for immediate consumption, and an 8-percent tax on beer, liquor, and wine for off-premises consumption. John Mikesell used painstaking means to develop a more accurate data series on sales tax bases for 1995 to 1998, and has graciously provided the data for this study. *See* Mikesell, 2000. Census-derived sales tax bases were adjusted from 1979 to 1996 to match the difference between Mikesell's 1996 data and the 1996 data drawn directly from the Census of Governments. It should be noted that this correction affects only the intercept terms for states and not the slope coefficients. No data are available to measure the time trend effects.

10. *See*, e.g., Fox and Campbell, 1984 (finding the income elasticity varies from 0.15 to 1.0, depending on the category of goods); Mikesell 1991 (finding the elasticity varies from 0.76 to 1.22, depending on the state).

11. The personal income elasticity is significantly different from 1.0 at the 0.99 level of confidence.

time series equation for each state, relating state personal income to WEFA's November 1999 forecast of national personal income and the growth rate in real GDP.¹² The latter was intended to account for any state-specific differences in the response to national business cycles.¹³

In Table 3, the tax base, as a share of personal income, is given for each state for 1996, and an estimate is provided for 2003.¹⁴ All states are forecast to experience a reduction in the tax base during this period. It should be noted that Table 3 does not include effects from the development of e-commerce. It is these effects to which we now turn.

E-Commerce Revenue Loss Estimation Procedure

The revenue losses from e-commerce generally arise because e-commerce significantly expands the potential for remote sales, causing a shift from collecting sales taxes at the point of sale to collecting use taxes for goods used, consumed, or stored in the state. Compliance rates are much better for sales taxes than for use taxes. In addition, use tax compliance, which even before e-commerce was less effective than sales tax compliance, is expected to fall because of e-commerce. There appears to be a feeling, at least among some taxpayers, that e-commerce transactions are free from sales and use taxes. The limited moratorium enacted through the Internet Tax Freedom Act may be one explanation for this misunderstanding. Further, taxpayers who generally comply with use tax laws may be less willing to pay use tax on e-commerce transactions because of the perception that others are reducing their compliance. The revenue losses described here are generally the result of tax evasion, not tax avoidance, since the use tax is due even if the sales tax cannot be collected.

12. Correcting these equations for auto-correlation yielded forecasts for state personal income that differed from prior expectations in some cases. Consequently, we used uncorrected results. The coefficient estimates, which are still unbiased and consistent, yielded very similar overall conclusions.

13. All estimates were corrected for jump-off error in 1996, under the presumption that the model fails to account adequately for shifts in the tax base during the last two years. Had this correction not been made, the main effect on the empirical estimates provided here would be to more than double the trend decline in base shrinkage without e-commerce. Nonetheless, the primary conclusions regarding the losses from e-commerce are essentially unchanged as a result of making this correction.

14. Analysts have not separated the sources of sales tax base shrinkage—legislated changes, the shift to services, and increased remote sales—for all of the states. The forecast of continued shrinkage provided here implicitly assumes that the combination of all three factors would remain important. There are practical limits on the extent to which these factors, and particularly legislated changes, can occur, but there is no reason to presume that the aggregate of states is nearing the limits. States have continued to legislate or consider legislating base narrowing. Additional states have recently exempted food from the base (e.g., Georgia) and other states have given it serious consideration (e.g., Tennessee). A number of states are granting sales tax holidays for clothing, and the list of new exemptions continues to grow.

TABLE 3. Sales Tax Base as a Percentage of Personal Income, 1996 and 2003

<i>State</i>	<i>1996</i>	<i>2003</i>	<i>State</i>	<i>1996</i>	<i>2003</i>
AL	39.9	37.8	MS	55.5	52.9
AR	64.9	61.7	NC	45.8	43.3
AZ	47.8	45.3	ND	51.9	50.0
CA	39.6	37.3	NE	43.1	41.1
CO	45.1	43.0	NJ	29.1	27.5
CT	36.7	34.6	NM	86.2	81.8
DC	44.0	41.6	NV	58.4	55.4
FL	55.4	52.2	NY	34.4	32.5
GA	56.7	53.6	OH	38.8	36.9
HI	109.2	102.3	OK	67.2	64.3
IA	46.4	44.5	PA	32.2	30.5
ID	51.3	48.8	RI	27.6	26.0
IL	32.2	30.7	SC	52.6	49.7
IN	44.3	42.1	SD	65.9	62.8
KS	48.7	46.4	TN	51.0	48.3
KY	46.5	44.2	TX	48.7	46.3
LA	64.7	61.9	UT	61.8	58.9
MA	29.0	27.4	VA	42.8	40.3
MD	35.8	33.7	VT	41.6	39.3
ME	42.3	39.9	WA	49.9	47.3
MI	47.8	45.5	WI	45.5	43.3
MN	46.6	44.3	WV	48.0	45.8
MO	48.1	45.7	WY	71.5	68.9

Source: Author's calculations.

Key inputs to estimating the tax base loss for e-commerce transactions are forecasts of e-commerce sales, identification of the sales-taxable components of these sales, assumptions about what share of taxable sales could be collected in the absence of e-commerce, and estimates of the share of taxes due that can be collected.

E-commerce sales are drawn from Forrester Research Inc.'s annual forecasts for 1999 to 2003 for 24 categories of business to consumer (B2C) sales and 13 categories of business to business (B2B) sales.¹⁵ Forrester anticipates a rapid compound growth rate of 83.7 percent annually through

15. Forrester's detailed estimates are proprietary.

2003.¹⁶ B2B sales are expected to dominate e-commerce activity, representing 90.3 percent of the 2003 total.

Forrester's forecasts were adjusted to net out purchases by businesses and residents in non-sales-taxing states.¹⁷ The assumption was that the share of e-commerce sales in these states is proportionate to their share of the national population.¹⁸ The remaining transactions are assumed to be made by residents and businesses in sales-taxing states. Sales tax bases differ by state¹⁹ and the categories that Forrester uses are relatively broad, so it was necessary to make assumptions about the percentage of sales for each sales category that would be taxable on average across the United States. For sales that are expected to occur through e-commerce, major exempt B2C transactions are most leisure travel purchases (which include airline tickets purchased through e-commerce), many of the food and beverage purchases (at least 27 states exempt food for consumption at home), some health and beauty purchases (medical expenditures are exempt in most states), and a portion of apparel purchases (a portion of apparel expenditures is exempt in some states). Based on the specific assumptions adopted, 70.2 percent of forecast 2003 e-commerce B2C sales will be taxable. States are assumed to collect about 20.9 percent of the due revenues through either the sales or use tax, based on the assumptions that all liabilities on automobile sales are collected and 10 percent of liabilities on other categories are collected.²⁰

Many categories of B2B e-commerce sales are exempt, but the largest categories of expected sales are computing and electronics and motor vehicles. The vast majority of sales in both categories are taxable. Exam-

16. The Forrester estimates used in this article were made before the rapid creation by large bricks-and-mortar firms of parallel corporations (with very similar names) that operate through e-commerce, and may not have nexus in most states. These developments could result in even faster sales growth. The Boston Consulting Group (1999) has recently estimated e-commerce sales of \$2 trillion in 2003, versus the less than \$1.5 trillion estimated by Forrester, and used in this article. Forrester recently prepared a new forecast and significantly increased its B2B e-commerce forecast.

17. The five states without sales taxes—Alaska, Delaware, Montana, New Hampshire, and Oregon—comprise 2.48 percent of the U.S. population.

18. The percentage could have been adjusted for the expected differences in the propensity to purchase over the Internet, but the simple population-weighted assumption was chosen as a more conservative option.

19. Local governments in some states, including Colorado, are permitted to determine their own sales tax base, which permits variation in the tax base between local governments. The calculations provided here assume a constant base in each state.

20. As with many of the parameter assumptions used in this study, empirical guidance is either very limited or nonexistent. No studies are available, for example, on use tax collections from individual consumers. The assumption used here is comparable to assuming that consumers randomly purchase from firms that have nexus in states representing 10 percent of the U.S. population. This assumption is of surprisingly little consequence in the calculation of overall revenue losses. For example, doubling the use tax collection assumption from 10 to 20 percent on non-automobile purchases (or increasing it from 20.2 to 29.7 percent on total sales) would only decrease the incremental loss from e-commerce from \$10.8 billion to \$10.5 billion.

ples of exemptions in these categories are for custom software and computers used for research in some states and for computers used directly in the manufacturing process. Paper and office products and pharmaceutical and medical purchases are examples of other categories in which many purchases are taxable. In total, 52.5 percent of expected B2B sales are assumed to be taxable, based on reasonable assumptions about what percentage of each of Forrester's categories is taxable.

In some states, certain sales of tangible personal property are taxable, but sales of a digital counterpart are not. For example, all states tax pre-packaged software, but 16 states do not tax software if it is downloaded (State Taxation Institute, 2000). No explicit adjustment is made to account for changes in form that alter taxability of transactions, except as assumptions are made about the extent to which certain types of sales are assumed to be taxable. At most about 14 percent of e-commerce sales appear to fit reasonably into the category where they might become nontaxable in some states because they are sold in digitized form (e.g., software, music, books).²¹ The resulting estimates are overstated (if states do not alter the tax base to reflect this trend) to the extent that this shift reduces the tax base, but most states could be expected to react quickly to such base erosion and redefine the base to include many digitized sales.

The total revenue loss from e-commerce equals total taxes due on Internet sales minus use taxes collected; however, a new or incremental loss from e-commerce occurs only to the extent that taxes on the transactions would have been collected without e-commerce. These two factors must be combined to obtain the final loss estimate. No precise estimates are available on the extent to which use taxes are being paid on B2B transactions. Discussions with state revenue officials suggest 40- to 50-percent compliance is the current average, except for motor vehicles, where compliance should be much better. The baseline estimates used here assume 50-percent use tax compliance for all items, except for vehicles, where the compliance rate is 100 percent. This results in a weighted average 65.2-percent compliance rate.²² This would appear to be an upper bound on compliance for e-commerce sales. Additionally, the baseline

21. Potentially digitizable B2C categories (software, books, music, videos, and toys and video games) and B2B categories (computing and electronics) make up slightly less than 28 percent of total e-commerce in 2003. Our assumption is that at least half of this represents tangible, nondigitizable goods.

22. Again, very little analysis of use tax compliance for purchases is available. The state of Washington undertook a study of use tax compliance of registered taxpayers in 1991 and found 19.9 percent noncompliance for the use tax, the highest noncompliance rate of any tax. The Washington study, however, can be expected to understate noncompliance for remote sales. Audit rates are generally very low, and normally well below 3 percent, *see* Due and Mikesell, 1994, and the ability to uncover noncompliance through audit is certainly far less than perfect. Many firms, and particularly out-of-state firms, may not register for tax purposes. In addition, use tax compliance in the study is a

assumption used in this analysis is that 50 percent of the B2B revenue loss and 35 percent of the B2C revenue loss would have occurred even without e-commerce transactions (because of failure to collect sales and use tax in a non-e-commerce environment).²³

Based on the assumptions, forecasts of the incremental revenue loss from e-commerce sales are shown in Table 4 for 1999 to 2003. The incremental loss is estimated to be \$10.80 billion in 2003.²⁴ The incremental loss is the amount that would not have occurred without e-commerce, after recognizing the substitution of e-commerce sales for other remote sales.

Although this number may seem large in comparison with other revenue loss estimates (see, e.g., Cline and Neubig (1998), Goolsbee and Zittrain (1999), and the U. S. General Accounting Office (2000)), differences between the various estimates are easily explained. The most important difference is that our estimate includes the losses from B2B e-commerce, which Cline and Neubig (1998) and Goolsbee and Zittrain (1999) do not consider. In terms of B2C losses, our forecast is very similar to these earlier estimates. Finally, the U.S. Government Accounting Office report (2000) considers both B2B and B2C losses and provides something of a confidence interval for the expected combined loss in 2003. Our estimate falls within their expected range.

The dominant role that B2B is expected to play in e-commerce sales means that the ability to collect revenues on B2B transactions is very important to the revenue loss for state and local governments. B2B is responsible for 70.1 percent of the expected incremental revenue loss in 2003, with the other 29.9 percent coming from B2C sales. Economists have argued that exemption of B2B sales is consistent with structuring the sales tax as a consumption tax. This could lead some to conclude that loss

combination of compliance on remote purchases (which is probably not as good) and compliance for items that are purchased with a resale certificate but are taxable. Further, noncompliance may be expected to grow with e-commerce. Tennessee offers a good example of use tax behavior. Use tax collections were 4.4 percent of 1998 sales and use tax collections, but use tax collections on remote sales were less than 2.3 percent of revenues. Based on Ring's (1999) estimates of the consumer share of the sales and use tax, only about 6.1 percent of taxes paid by business come from use tax paid on remote sales. This suggests either that firms buy few inputs from outside the state or that compliance is relatively low.

23. The combination of 65.2 percent compliance with the B2B use tax and this 50 percent reduction for previous noncompliance can be interpreted as a combined 82.6 percent "compliance" rate. With this alternative interpretation, incremental revenue losses in column 3 rather than total e-commerce losses in column 2 in Tables 3 through 5 are the relevant indicators of loss to the extent that the additional 50 percent subtraction is seen as further compliance.

24. The assumptions on compliance and incremental loss were both increased by 10 percent and decreased by 10 percent. This resulted in a range of estimates from \$9.8 billion on the low side to \$11.8 billion on the high side. In addition, as mentioned above, doubling the B2C compliance on non-automobile purchases (increasing overall B2C compliance to 29.7 percent) would only decrease the loss to \$10.5 billion.

TABLE 4. Estimated Sales Tax Revenue Losses from E-Commerce

(\$ Billions)	1999	2000	2001	2002	2003
Total B2B ¹	106.59	244.87	486.63	821.80	1,297.80
Less Exempt Sales	-47.54	-105.05	-208.76	-369.81	-616.45
Less B2B on which sales or use tax collected	-34.07	-80.96	-164.77	-281.59	-444.24
Equals B2B Base Loss	24.98	58.87	113.09	170.40	237.11
Less substitution for other remote sales	-12.49	-29.43	-56.55	-85.20	-118.55
Equals Incremental B2B Base Loss	12.49	29.43	56.55	85.20	118.55
<i>Approximate Revenue Loss from B2B</i>	0.80	1.88	3.61	5.44	7.57
Total B2C ¹	19.75	37.79	62.59	98.62	140.19
Less Exempt B2C	-8.32	-15.34	-23.53	-32.74	-41.78
Less B2C on which sales or use tax collected	-1.14	-2.60	-5.51	-10.54	-20.57
Equals B2C Base Loss	10.29	19.85	33.55	55.34	77.85
Less substitution for other remote sales	-3.60	-6.95	-11.74	-19.37	-27.25
Equals Incremental B2C Base Loss	6.69	12.90	21.81	35.97	50.60
<i>Approximate Revenue Loss from B2C</i>	0.43	0.82	1.39	2.30	3.23
<i>Approximate Incremental Revenue Loss</i>	1.23	2.70	5.00	7.74	10.80

of revenues on B2B transactions is a good thing; however, exempting B2B transactions acquired through a specific means may not be welfare enhancing (see Bruce, Fox, and Murray, 2000, for additional discussion along these lines). Elimination of the B2B sales from the base should be part of broader policy reform.

State and Local Revenue Loss Estimates by State

State-specific estimates of the revenues lost from e-commerce were prepared based on the 2003 calculations. The distribution between states was approximated based on two factors. First, each state's taxable e-commerce sales were assumed to be proportionate to the state's share of the combined sales tax base for all states. Estimates of each state's sales

tax base were drawn from the calculations described in the section on trend base losses. Second, each state's tax base was weighted for the propensity of residents to shop via e-commerce depending on the state and local sales tax rate. Goolsbee (2000) found that each 1-percent increase in the sales tax rate led to a 0.5 percent increase in the probability of buying something online. Thus, differences across states in the share of the national loss from e-commerce are a function of the breadth of the states' sales tax base (a determinant of the state's existing share of the combined base), the states' income growth (determining the forecasted growth in the general sales tax base), and differences in state sales tax rates (determining the relative propensity to purchase through e-commerce).

Table 5 lists (1) the 2003 state and local government revenue losses from trend narrowing of the tax base (i.e., above and beyond any effects of e-commerce), (2) total e-commerce losses, (3) incremental (new) e-commerce losses, and (4) the combined total revenue losses, which add the trend losses in (1) to the incremental e-commerce losses in (3). The national total of the combined revenue losses shown in column 4 is \$23.86 billion. An estimated 45.2 percent of the revenue loss comes from incremental e-commerce sales. This is a surprisingly large share, given that the trend sales tax base losses over the past several decades appear to have been driven more by shifts to consumption of services than by increases in remote sales. The incremental revenue loss of \$10.8 billion is shown in column 3.

These incremental losses from e-commerce are estimated to range from \$17.1 million in Vermont to \$1.49 billion in California, and are highly correlated with state population (0.98) and the state and local tax rate (0.48).

The loss in column 3 is the additional revenue that state and local governments are estimated to lose as a result of e-commerce. It should not be interpreted as the taxes that states would collect if Congress enacted legislation establishing nexus for firms with economic rather than physical presence. Rather, it is simply the incremental effect of e-commerce beyond any losses already occurring from the inability to collect sales and use taxes. Column 2, the total e-commerce revenue loss of \$20.1 billion, is the estimate of the total revenues from collecting all taxes due on e-commerce transactions.²⁵ This estimate assumes 100-percent compliance with sales and use tax laws.

25. In addition, states would collect a somewhat lower amount if Congress created nexus on the basis of economic presence, but with a *de minimis* rule excluding small firms.

TABLE 5. Combined State and Local Revenue Losses in 2003 (\$ Millions)

<i>State</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>
AL	177.2	269.7	144.8	322.1
AR	113.9	188.6	101.3	215.1
AZ	218.7	341.4	183.4	402.1
CA	1,964.4	2,780.2	1,493.2	3,457.6
CO	167.5	290.7	156.2	323.6
CT	201.5	288.0	154.7	356.2
DC	38.6	55.1	29.6	68.2
FL	1,006.8	1,403.0	753.6	1,760.4
GA	419.6	620.7	333.4	752.9
HI	127.0	158.6	85.2	212.2
IA	82.4	162.7	87.4	169.8
ID	39.9	67.1	36.0	75.9
IL	497.7	844.8	453.7	951.5
IN	202.1	324.6	174.3	376.5
KS	112.3	189.5	101.8	214.1
KY	145.3	238.6	128.2	273.4
LA	239.2	453.9	243.8	483.0
MA	207.6	303.6	163.1	370.7
MD	215.9	294.1	158.0	373.8
ME	56.7	78.5	42.1	98.9
MI	460.7	757.5	406.8	867.6
MN	254.3	408.6	219.5	473.8
MO	243.8	395.0	212.1	456.0
MS	119.9	206.1	110.7	230.6
NC	300.1	444.9	239.0	539.1
ND	17.7	38.6	20.7	38.4
NE	59.4	105.6	56.7	116.1
NJ	360.0	510.7	274.3	634.2
NM	119.8	191.1	102.6	222.4
NV	122.8	191.1	102.7	225.5
NY	1,073.1	1,581.3	849.3	1,922.4
OH	411.4	671.4	360.6	772.0
OK	155.5	298.3	160.2	315.7
PA	427.6	666.8	358.2	785.7
RI	39.5	55.5	29.8	69.3
SC	158.6	231.4	124.3	282.9
SD	33.8	57.7	31.0	64.8

<i>State</i>	(1)	(2)	(3)	(4)
TN	361.1	545.6	293.0	654.2
TX	1,039.5	1,735.9	932.4	1,971.9
UT	91.9	158.2	85.0	176.9
VA	262.6	363.8	195.4	458.0
VT	22.4	31.8	17.1	39.5
WA	422.0	646.2	347.1	769.1
WI	193.5	320.1	171.9	365.4
WV	57.9	104.7	56.2	114.1
WY	16.9	38.5	20.7	37.6
US	13,060.3	20,109.9	10,801.0	23,861.4

Source: Authors' calculations.

Direct Losses for Local Governments

Local revenue losses from e-commerce sales are measured here by multiplying the estimated lost sales tax base by the state-specific effective local sales tax rate.²⁶ There are assumed to be no increases in local option sales tax rates after 1996. On average, about 16.7 percent of the losses demonstrated in Table 5 (\$1.8 of the \$10.8 billion combined state and local losses in column 3) are direct losses for local governments. The loss to local governments varies widely by state, as shown in Table 6 for the incremental losses (corresponding to column 3 of Table 5). There is no loss in states where local sales taxes are not imposed. On the other hand, local governments in Colorado, Louisiana, and Alabama will suffer more than 40 percent of the direct loss. The local government share of the loss is positively correlated with the local tax rate and is negatively correlated with the state tax rate. This suggests that local governments bear more of the reduction in cases where local governments place high reliance on the sales tax and the state government places low reliance on the sales tax.

The local government dollar losses are also shown in Table 6. More populous states, including New York, California, and Texas, have the greatest dollar losses. The dollar loss is also positively correlated with the local tax rate and is negatively correlated with the size of the tax base.

Overall, the direct losses to local governments are relatively small because the sales tax's contribution to local finance is limited. The incremental loss to local governments is estimated to be about 0.4 percent

26. The estimated weighted average local rate is defined as local sales tax revenues divided by the state sales tax base.

TABLE 6. Direct Local Revenue Loss from E-Commerce

(1) Direct Local Revenue Loss as a Share of Total State and Local Loss

(2) Incremental (New) Direct Local Revenue Loss Due to E-Commerce (\$ Millions)

<i>State</i>	<i>(1)</i>	<i>(2)</i>
AL	41.42	60.0
AR	17.93	18.2
AZ	24.67	45.2
CA	18.53	276.6
CO	49.36	77.1
FL	3.02	22.8
GA	28.59	95.3
IA	3.95	3.5
IL	15.18	68.9
KS	17.11	17.4
LA	46.68	113.8
MN	0.71	1.5
MO	29.16	61.9
MS	0.08	0.1
NC	23.03	55.0
ND	8.23	1.7
NE	15.00	8.5
NM	18.06	18.5
NV	5.01	5.1
NY	46.01	390.7
OH	15.73	56.7
OK	29.66	47.5
PA	1.73	6.2
SC	2.72	3.4
SD	23.34	7.2
TN	23.87	69.9
TX	15.31	142.8
UT	17.45	14.8
VA	19.26	37.6
WA	19.14	66.4
WI	5.04	8.7
WY	20.19	4.2
US	16.73	1,807.4

Source: Authors' calculations.

of total local tax revenues. Even including the trend base decline (corresponding to column 4 of Table 5), the loss in 2003 is only about 1 percent of local tax revenues.

ESTIMATES OF INDIRECT LOSSES FOR LOCAL GOVERNMENTS

Local governments will also experience a reduction in resources as they lose a portion of their state-shared taxes and their other formula-based and discretionary grants from state governments. These indirect losses represent the share of state revenues that would have been distributed to local governments, and are not additional revenue losses to the combined state and local losses provided in Tables 4 and 5. We estimate the two categories of indirect losses separately.

First, each state was called in an attempt to estimate the share of sales taxes earmarked for local government finance. Fifteen states report that they share some of the state portion of sales tax collections with local governments, and 30 do not (see Table 7). The sharing ratios also vary widely among the states, with percentages ranging from 4.3 percent in Tennessee to 31 percent in California.

The sharing percentages in Table 7 were applied to the estimated sales tax revenue loss for the corresponding state to determine the amount of revenue that local governments stand to lose in each state.²⁷ In total, local governments lose an additional \$775.2 million indirectly through reduced revenue sharing, of which about half is in California alone. This represents approximately 8.6 percent of the new state loss from e-commerce.

As noted above, the indirect losses to local governments also include reduced formula-based and discretionary grants from state general revenues. We estimated a fixed-effects panel regression to calculate the elasticity of state grants to local governments with respect to state sales tax collections; our estimate is 0.125.²⁸ In other words, state grants to local governments would fall by 1.25 percent if state sales tax collections were to fall by 10 percent. Next, we expect state sales tax collections to fall by about \$8.219 billion in 2003 (\$10.801 billion minus \$1.807 billion in direct local losses and \$775.2 million in indirect local losses due to reduced revenue sharing). If it is assumed that state sales tax collections will be the same share of total state taxes in 2003 as they were in 1996 (34 percent for sales-taxing states), this represents a loss of about 4.1 percent in state

27. To arrive at the state losses in column 1 of Table 7, we subtract the direct losses in column 2 of Table 6 from the state and local losses in column 3 of Table 5.

28. This regression, which also included a set of year dummies, was estimated for the 45 sales-taxing states for 1988 to 1996. Full results are available from the authors upon request.

TABLE 7. Indirect Local Revenue Losses from E-Commerce

(1) Incremental (New) State Revenue Loss Due to E-Commerce (\$ Millions)
 (2) State Sharing Rate
 (3) Indirect Local Revenue Loss as a Result of Reduced State Sharing (\$ Millions)

<i>State</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>
AL	84.9	0%	0
AR	83.1	0%	0
AZ	138.2	18.139%	25.1
CA	1,216.6	31.000%	377.1
CO	79.1	0%	0
CT	154.7	0%	0
FL	730.8	9.653%	70.5
GA	238.1	0%	0
HI	85.2	0%	0
IA	83.9	0%	0
ID	36.0	13.750%	5.0
IL	384.9	16.000%	61.6
IN	174.3	0%	0
KS	84.4	8.000%	6.8
KY	128.2	0%	0
LA	130.0	0%	0
MA	163.1	0%	0
MD	158.0	0%	0
ME	42.1	5.100%	2.1
MI	406.8	24.200%	98.5
MN	217.9	0%	0
MO	150.3	0%	0
MS	110.6	18.500%	20.5
NC	183.9	0%	0
ND	19.0	8.000%	1.5
NE	48.2	0%	0
NJ	274.3	0%	0
NM	84.1	40.000%	33.6
NV	97.5	0%	0
NY	458.6	0%	0
OH	303.9	4.800%	14.6
OK	112.7	0%	0
PA	352.0	0%	0
RI	29.8	0%	0
SC	120.9	0%	0
SD	23.8	0%	0

<i>State</i>	(1)	(2)	(3)
TN	223.1	4.295%	9.6
TX	789.6	0%	0
UT	70.2	0%	0
VA	157.7	28.090%	44.3
VT	17.1	0%	0
WA	280.7	0%	0
WI	163.3	0%	0
WV	56.2	0%	0
WY	16.5	27.000%	4.5
US	8,964.0	8.648%	775.2

Source: Authors' calculations.

sales tax collections. When our elasticity of 0.125 is applied to this, state grants to local governments stand to fall by 0.51 percent in 2003. Again, if it is assumed that state grants to local governments will be the same share of total state taxes in 2003 as they were in 1996 (57.9 percent for sales-taxing states), this translates to an additional indirect revenue loss to local governments of \$1.742 billion.²⁹

All told, local governments stand to lose about \$4.3 billion as a result of lost local option sales tax revenue (\$1.807 billion), reduced sales tax revenue sharing (\$775.2 million), and reduced state grants to local governments (\$1.742 billion) in 2003. This represents approximately 40 percent of the combined new state and local loss from e-commerce of \$10.8 billion in 2003.

CONCLUSION

The current tax treatment of Internet transactions has not yet resulted in substantial revenue losses for state and local governments. As e-commerce grows dramatically in the very near future, however, those losses will become much more significant. We have considered the effects of e-commerce in the context of other important sales tax base trends, and

29. The combined indirect loss as a share of reduced state tax revenues (\$775.2 million lost revenue sharing plus \$1.742 billion other lost grants divided by \$10.801 billion state and local loss minus \$1.807 direct local loss = 28 percent) is much smaller than the average of grants as a percentage of taxes (57.9 percent).

have accounted for the tremendous importance of B2B transactions. We expect these effects in 2003:

- The inability to tax e-commerce uniformly will result in a new revenue loss to state and local governments of \$10.8 billion.
- Of this \$10.8 billion, approximately \$4.3 billion (or 40 percent) represents direct and indirect losses to local governments. The loss is a little over 1 percent of the likely 2003 total local tax revenues.
- If state and local governments were able to tax e-commerce transactions as if they were local transactions, an additional \$20.1 billion could be collected.
- The combined effect of trend base losses and e-commerce will be a revenue loss to state and local governments of \$23.9 billion.

Despite the fact that local governments rely far more heavily on property taxes than sales taxes, they stand to lose significant revenues in 2003 as a result of the inability to tax e-commerce. Local losses will vary widely, both across and within states, depending on the relative importance of sales taxation.

As with any revenue reduction, local governments will have the option of reducing local expenditures, increasing local sales tax rates or expanding bases (where permissible), or turning toward other sources of revenue (primarily the property tax). The outcome of this decision is likely to vary widely across the country, and perspectives on the desirability of the resulting policies are also likely to vary widely.

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