

THE TRACK OF THE CAT—FORECASTING OHIO’S NEW GROSS RECEIPTS TAX

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INTRODUCTION

STATES AND SUBSTATE GOVERNMENTS ARE increasingly exploring alternatives to corporate taxes based on income. Examples of such alternative-base taxes that have been enacted into law – although not necessarily implemented already – are Ohio’s Commercial Activity Tax (CAT), Michigan’s modified gross receipts tax, and Texas’s margin tax. Other states, such as Nevada and Illinois, have had highly publicized proposals for alternative-base taxes, specifically gross receipts taxes. Since there is little recent state experience with such taxes, estimating revenues from these alternative-base taxes is a challenge. This challenge is further complicated by the fact that these alternative-base taxes are often structured in such a way that tax return data from existing taxes is not particularly helpful in estimating the revenue from the new tax.

This paper reviews the Ohio experience with forecasting its new CAT. Unlike the new Michigan or Texas taxes, the CAT actually has some collection history with which to compare the initial forecasts, allowing us to evaluate the forecast methodology and to suggest improvements. We hope that Ohio’s experience in forecasting the CAT provides useful lessons to other states investigating and attempting to estimate one particular type of alternative-base tax, a gross receipts tax.

The existing literature on state gross receipts taxes is generally restricted to analysis of the policy issues surrounding these taxes (such as the pyramiding issue), and very little literature exists on the forecasting of these taxes. Where such literature exists, as in the case of New Mexico’s long-standing gross receipts tax, it was of little guidance for forecasting Ohio’s new CAT, since the structure of the CAT is different in crucial respects from the gross receipts taxes that have come before it. For example, the CAT does not have elements that are common to gross receipts taxes that are more like sales taxes, so it has no sale for resale deduction, as New Mexico’s tax does. On the other hand, while the CAT is imposed on a very broad defini-

tion of the gross receipts of business, it exempts gross receipts from sales of goods or services whose ultimate delivery or benefit is received by out-of-state purchasers, unlike the taxes levied by Delaware or Washington.

OHIO’S TAX REFORM AND THE STRUCTURE OF THE CAT

Ohio’s sagging economic fortunes provided the impetus for a major business tax reform initiative that was eventually enacted in 2005 (Am. Sub. House Bill 66, 126th General Assembly). The CAT was a vital element of the enacted tax reform legislation. Much of this tax reform initiative was built on the foundation of previous tax reform studies, particularly the efforts of a tax study committee that deliberated in 2002-2003. The 2003 tax study committee issued a report that emphasized the need for reducing (even ideally eliminating) the tangible personal property tax, restoring the corporate franchise tax base, and reducing corporate income and personal income tax rates.¹

The reform that was ultimately adopted followed the study committee recommendations to eliminate the tangible personal property tax and to reduce personal income tax rates. The reform followed a different path with respect to the corporate franchise tax – it eliminated the tax, except for financial institutions and their affiliates. The reform package adopted the new CAT to replace both the tangible personal property tax and the corporate franchise tax, although the CAT is expected to generate only about half of the total revenues that would have been raised by the two taxes it replaces by the time it is fully phased in for fiscal year 2010.² Ohio’s Office of Budget and Management (OBM) forecasts CAT revenues for FY 2011 at \$1.57 billion, slightly less than half the \$3.29 billion lost through the elimination of the tangible personal property tax and the corporate franchise tax.

The CAT is imposed on the privilege of doing business in Ohio. The base of the CAT is gross

receipts but the tax is not transactional in nature, like a sales tax. “Gross receipts” are defined as the total amount realized, without deduction for the cost of goods sold or other expenses incurred, from activities that contribute to the production of gross income. The tax is imposed on gross receipts that are situated to Ohio, where situs is based on the ultimate destination of a good or the location where the benefit of a service is received. So, exports out of Ohio are excluded from the CAT, but imports into Ohio are included.

Many entities are defined as “excluded persons” (i.e., are not CAT taxpayers). These include government agencies and instrumentalities, nonprofits, banks and insurance companies, bank and insurance company affiliates, certain public utilities that still pay the public utility excise tax, and certain brokers and financial intermediaries that are known in Ohio as “dealers in intangibles.”

On the other hand, companies without physical presence in Ohio who are still making substantial use of the Ohio market – those with at least \$500,000 in taxable gross receipts from Ohio activities – are considered to be CAT taxpayers. This economic nexus standard has yet to be challenged in court, although the CAT has been in existence for over two years now.³

Entities with less than \$150,000 in annual taxable gross receipts are not required to register for the CAT, or to file returns, or to pay any tax. Entities whose annual taxable gross receipts equal or exceed \$150,000, but do not exceed \$1 million, pay only a \$150 flat annual tax. Entities whose annual taxable gross receipts exceed \$1 million pay the \$150 minimum tax on the first \$1 million in gross receipts and a tax of 0.26 percent on gross receipts in excess of \$1 million (rates are lower than 0.26 percent in fiscal years 2006-2009 as the CAT is phased in, so the 0.26 percent tax rate applies in fiscal year 2010 and subsequent years).

Although the CAT from its inception was conceived to be a tax on business activity in a very broad sense, most portfolio income – capital gains, dividends, and interest (except for installment sales) – is exempt from the CAT. However, income from intangibles such as royalty and trademark income is generally not exempt.

The CAT in its final enacted form had a somewhat narrower tax base than the administration originally conceived, but this was primarily due to

exemptions and credits that the legislature added for particular industry segments or to address particular circumstances. The basic structure of the CAT was unchanged from the executive budget version to the enacted version that exists today.

SUMMARY OF ESTIMATION APPROACH

The Ohio Department of Taxation (ODT) began its forecasting process with the hope of using sales factor numerator data from corporate franchise tax returns to perform a microsimulation of the new CAT. Ultimately ODT abandoned this approach. This decision was based primarily on two factors: (1) the new CAT would be imposed on businesses regardless of their form of organization, and thus using only data from corporate tax returns would bias the results; and (2) the data from the corporate returns, even when using the more detailed data from the special sample of the largest returns prepared by the ODT research division,⁴ was simply not rich enough to be the basis for a reliable forecast of the new gross receipts tax.

Once ODT abandoned the microsimulation approach, it was left with the task of estimating the CAT base from economic data. ODT pursued two methods of forecasting using economic data. The first method was to use state gross domestic product⁵ data by broad industry sector, coupled with estimates of the degree of “pyramiding” of the tax. Estimates of pyramiding could be obtained from the 2002 studies of Washington State’s business and occupations (B&O) tax. This was an indirect method of forecasting. The CAT is imposed on gross receipts, not value added, but state GDP is a value-added measure. So this method essentially involved taking Ohio estimates of value added by industry, and then multiplying by estimates of the ratio of gross receipts to value added by industry (the pyramiding estimates) to derive a gross receipts tax base to which to apply the proposed Ohio tax rates. But there were inherent limitations to this approach. One fundamental problem was the fact that the CAT has some very different features from the B&O tax, the most important of which is the CAT exemption for exports (including not just international exports but anything delivered out of Ohio). The significant disparity

between the structure of the CAT and the B&O tax caused ODT to eventually develop another approach.

ODT ultimately generated its forecasts by using detailed Economic Census Data, both for the nation and for Ohio, at the revenue line-code level, to get an estimate of Ohio production by industry sector (U.S. Census Bureau, 2001). These Ohio production estimates were then adjusted with export and import coefficients from Regional Economic Models Incorporated (REMI) to get estimates of the CAT base by industry sector. These estimates of the tax base were then further adjusted by making estimates about compliance by sector. A number of other adjustments had to be made to the model of the tax base for features of the CAT that will be discussed later.

In general, the estimates of the tax base for each sector took the form:

$$TGR_i = P_i - X_i + M_i - NC_i - IGR_p$$

where *i* designates the industry sector, *TGR* is taxable gross receipts, *P* is in-state production, *X* is out-of-state exports, *M* is imports into Ohio, *NC* is gross receipts (generally imports) legally taxable but assumed to be unreported due to noncompliance, and *IGR* is that class of receipts that are not taxable due to the legal exemption for intra-group transactions.

Two years after the CAT's implementation, ex-post comparison of CAT revenues with the forecasts reveals several key findings:

1. Both the preliminary Ernst & Young (E&Y) model produced for the Ohio Business Roundtable, and the ODT model of the CAT base under-forecasted the base and thus also under-forecasted the revenues, although the "unofficial" ODT forecasts were somewhat closer to the mark;
2. ODT hypothesizes that its estimates under-predicted actual compliance with the tax in several industry sectors. This is only conjecture at this point, based on factors such as the total number of registered entities and audit experience that suggests that companies that initially were nonfilers have been more responsive to registering, filing, and paying (rather than litigating) than ex-

pected, once contacted by ODT compliance personnel;

3. The CAT base is very different than the Ohio sales tax base, and for most industry sectors, the sales tax base is of very little use as a tool for forecasting the gross receipts tax base;
4. The CAT has several features that make it very different from the Washington B&O tax, which makes the ratios of the tax base to value added by industry sector quite different. In general, the ratio of the CAT base to value added is lower than the ratio of the B&O tax to value added. We believe that this result shows that the CAT has less pyramiding than the B&O tax. Our working hypothesis is that this result is due to the export exclusion in the CAT.

The subsequent sections of the paper do the following: discuss the limitations of micro-simulation modeling and value-added modeling of gross receipts taxes; describe in greater detail the Ohio model developed from economic Census data; and evaluate the Ohio forecasts and suggest improvements for anyone wishing to use a similar method to forecast a state or substate gross receipts tax in the future.

THE EVENTUAL FORECASTING METHOD – OHIO PRODUCTION ESTIMATES FROM ECONOMIC CENSUS DATA, WITH A SERIES OF ADJUSTMENTS

After several false starts in forecasting the CAT, ODT found that it had to derive a credible set of official administration CAT estimates within a short time frame. Ernst & Young had already produced a set of estimates for the Ohio Business Roundtable (OBR), after it also had a couple of false starts. E&Y finally settled on a model that used IMPLAN data and the sector flows embedded in the IMPLAN input-output model. For a variety of reasons, ODT analysts judged that the economic Census data would provide a better starting point for CAT estimates than the IMPLAN data would, and so ODT ended up creating a 6-step estimating procedure. The material that follows discusses the five basic steps in creating

the base-year model. The sixth step, projecting the estimated tax base forward from 2002 to succeeding years, is not discussed in detail. In brief, that step involved using forecasts of Ohio GDP by 19 sectors to project the CAT for those sectors.

Estimating Ohio Production

Although it was not analytically challenging, by far the most time-consuming part of the forecasting procedure was the estimation of Ohio production through the use of national and Ohio economic Census data on gross revenues, by revenue line item. Certain types of revenues exempt from the CAT were excluded (capital gains, dividends, most interest).

Wherever possible, ODT used the relevant 2002 economic Census data for Ohio. However, in many cases, 2002 data was available only at the national level, and 2002 data had to be estimated for Ohio on the basis of factors such as Ohio/national ratios for 1997.⁶

The most detailed Ohio data was generally from the 1997 Geographic Area Series data sets that were shipped to ODT on CDs, as much of the data was not available online. ODT estimated Ohio production for 19 different industrial sectors, using Census revenue line-code data. Starting with very detailed data down to the revenue line-code level allowed ODT to be more precise in its definition of the taxable base. For example, the CAT was envisioned from the beginning as applying to the gross receipts of those utilities that were for the most part already taxed as “general businesses” in Ohio, but not to those utilities taxed under the public utility excise tax (PUET). That is, utilities subject to the utility-specific tax regime (the PUET) would not switch to the CAT. Natural gas distribution companies are among those utilities subject to the PUET that would not convert to the CAT. So, the revenue line code data allowed ODT to exclude line-code 9010 receipts, “sales of natural gas,” from the estimated CAT base with a little more precision than if only aggregate revenues by NAICS category had been available.

Including Imports and Excluding Exports

Once estimates of Ohio production had been derived from the economic Census data at the

revenue line code level, the next step was to adjust the tax base for imports and exports. This step was crucially important and highlights one of the CAT’s most important features – imports are included in the tax base (even from companies without physical presence in Ohio) but exports are excluded.

ODT estimated exports and imports for each of the 19 industrial sectors using both IMPLAN and REMI estimates. The REMI estimates were created by applying REMI-supplied coefficients to the ODT estimates of Ohio production. The IMPLAN estimates of imports and exports were produced by E&Y in their early modeling efforts.

Of the 19 industry sectors estimated, manufacturing and wholesale trade are by far the largest in terms of import and export volumes, with manufacturing being more than three times wholesale trade. REMI actually supplied import and export estimates for 22 separate manufacturing subsectors and 44 other industrial categories. Since ODT had developed its own estimates of Ohio production based on the economic Census data, it aggregated the REMI figures as needed to fit the 19 ODT sectors, and then – for each sector – converted the REMI dollar estimates of imports and exports into a percentage of Ohio production. Next, ODT applied those percentages to its own total production estimates to produce ODT estimates of imports and exports. This general method was used to derive estimates of imports and exports for 18 of the 19 industry sectors being estimated.⁷

The results of this exercise generally accorded with the intuition of ODT analysts: the estimates showed Ohio to be a significant net exporter of manufactured goods but a net importer of certain services such as information services and professional and technical services. In the aggregate, the estimates of Ohio exports slightly exceeded the estimates of Ohio imports.

Adjusting Tax Base Estimates by Sector for the \$1 Million Exclusion

The CAT provides an annual \$1 million gross receipts exclusion – really a “quasi-exclusion.” Companies with annual gross receipts of \$1 million and below pay only the \$150 annual minimum tax, while companies with annual gross receipts

exceeding \$1 million pay \$150 on their first \$1 million in gross receipts. This required ODT to stratify each sector by the size of the companies' gross receipts. Specifically, ODT had to estimate the number of companies in each sector with annual taxable gross receipts below \$1 million and above \$1 million. And for the companies below \$1 million, ODT had to estimate the average amount of annual gross receipts, in order to make the appropriate subtraction from the tax base that would be subject to the 0.26 percent tax rate.

At the time that ODT was preparing its CAT forecasts, in late 2004 and early 2005, the best data source available for this exercise was of relatively old vintage: the Census of Enterprise Statistics, last produced in 1992 (U.S. Census Bureau, 1992).⁸ ODT used this as its base data source for 18 of the 19 industry sectors it was estimating. For agriculture size statistics, ODT used data from the Census of Agriculture (U.S. Department of Agriculture, 1997).

The estimation involved two steps. The first step was to estimate a number of Ohio companies by industry sector. The task here was to translate the number of establishments from the economic Census data into company counts, using the Enterprise Statistics data. The second step was to allocate the estimated number of Ohio companies by industry sector into various annual revenue classes, again using the Enterprise Statistics data, which includes figures for gross receipts by company revenue size.

Subtraction of Gross Receipts from Intra-Group Transactions

The CAT has a somewhat complex set of rules for taxing groups of companies under common ownership. Without going into excess detail, we may describe the treatment as follows: when an entity or individual owns 50 percent or more of each of a group of companies, those companies are under common ownership and thus must file as a "combined taxpayer" or a "consolidated taxpayer."

Unless a commonly owned group of companies elects to be treated as a consolidated taxpayer, it must file as a combined taxpayer. A combined taxpayer need only include and pay tax on entities with nexus in Ohio, but gross receipts from payments between the group members are subject to the CAT.

If a commonly owned group of companies elects to file as a consolidated taxpayer, then it must include all commonly owned entities whether or not they have nexus in Ohio ("the stick") but gross receipts from payments between group members are excluded from the CAT base ("the carrot").⁹

Because of the gross receipts exclusion for transactions between members of a consolidated group, the CAT provides a tax benefit for vertically integrated taxpayers that is not available for non-integrated taxpayers. Putting aside policy questions of fairness and neutrality, this created a very difficult estimating problem for ODT. Ultimately ODT had to use available data on intercompany eliminations from the corporate franchise tax supersample described earlier in this paper in order to estimate the percentage of otherwise taxable gross receipts that would be excluded by consolidated taxpayers. Based on the admittedly rough and not very robust data, ODT pegged the average industry subtraction from the CAT base at about 10 percent. ODT assumed that this subtraction might actually be more than 10 percent for manufacturing industries, where there is generally more vertical integration between companies that supply parts and companies that assemble finished products, at least relative to service industries. However, after some rough simulations using different percentage exclusions for different sectors, ODT concluded that the use of differing percentage exclusions by sector was mostly guesswork and added little to the precision of the estimates.¹⁰

Application of Compliance Estimates by Sector to Derive Tax Base by Sector

One of the last base model adjustments was an explicit adjustment for noncompliance. The model needed to more closely reflect the expected reality that some firms, especially those located out-of-state and particularly those out-of-state firms without a significant physical presence in Ohio, would pay little or no CAT, at least until ODT audit and compliance efforts could be undertaken. Unfortunately, this was also one of the most subjective adjustments in the CAT estimation process. This exercise had very little hard data to support it. ODT had estimates of B&O tax noncompliance from Washington State,

which showed an overall noncompliance rate of 2.6 percent in calendar year 2000.¹¹ However, this figure only represents unreported tax by registered taxpayers for a tax that had existed over six decades. ODT felt that this could hardly be used as a guide for how much noncompliance Ohio could expect from a new gross receipts-based tax that (1) exempted exports and thus had a greater reliance on imports than the B&O tax, and (2) contained a controversial economic nexus standard to require the payment of tax on imports. ODT expected a large amount of noncompliance by companies that would not register or file returns, in addition to any underreporting that might occur. The 2.6 percent estimate of noncompliance from the Washington study therefore served only as a lower bound for ODT estimates of noncompliance with the CAT.

ODT focused its noncompliance estimation on the estimated imports for each of the 19 sectors. Lacking hard data on which to base its estimates, ODT had to base its noncompliance estimates on information and judgment from E&Y analysts, ODT auditors, and representatives from certain service industries. ODT's estimates of the amount of imports that were legally part of the tax base but that would in practice escape collection were as high as 50 percent in the case of some groups of services. In summary, ODT estimated that noncompliance, at least in the first years of the CAT's operation, would reduce the tax base by 10.6 percent, far above the 2.6 percent noncompliance estimated for Washington's B&O tax.

Projection of Tax Base from 2002 to Succeeding Years

After all the foregoing steps, ODT had finally arrived at an estimate of the CAT base for 2002. (The year 2002 was our operative "baseline" because it represented the year of the most recent economic Census whose results were then being sporadically released.) The imposition of the CAT was to be phased in over five fiscal years, from FY 2006-2010. ODT thus had to project the estimated CAT base forward to those years to finalize its forecasts – or at least to finalize the forecasts for the executive budget, before legislative changes to narrow the tax base were enacted.

Despite the fact that ODT had earlier rejected building a simulation model based on state GDP

data, at this point – once estimates of the tax base for the 19 sectors had been created – ODT used state GDP data to project the estimated 2002 CAT base to fiscal years 2006-2010.

In the aggregate, the estimated CAT base for 2002 that would be subjected to the tax rate – that is, the tax base left after the million dollar exclusion amounts were factored out and the adjustments for intra-group receipts and behavioral changes were subtracted – was about 1.5 times Ohio state GDP for that year, once government GDP was excluded (a necessary exclusion since the gross receipts of government entities were from the beginning excluded from the CAT). As we shall see later, that 1.5 figure somewhat overstated the actual ratio of taxable gross receipts to state GDP.

ODT now faced a decision about whether to project the CAT base forward by sector, using Global Insight's varying forecasts for Ohio GDP by sector, or to use a single Ohio GDP growth rate for all sectors. ODT was concerned that, due to uncertainty about the accuracy of the GDP growth forecasts by sector eight years out, use of the sector forecasts might magnify any errors in the sectoral estimates of the CAT base. ODT therefore decided to apply an estimated aggregate state GDP growth rate to each sector in order to forecast the CAT base for FY 2006-2010. That is, each sector would grow at the same presumed rate, based on the overall state GDP forecasts. In retrospect, the average annual growth rate assumption of 3.0 percent was too cautious.

EX-POST EVALUATION OF THE FORECASTING MODEL

ODT's CAT estimates ended up being lower than actual liability or payments for both of the first two fiscal years of the CAT's implementation, FY 2006-2007. Unfortunately, although FY 2007 is closed, ODT has only just finished compiling FY 2007 return data and there has been no opportunity for analysis of that data. Most of the analysis of the forecasts that follows therefore deals with FY 2006.

CAT Taxpayers – Number and Type

The total number of entities paying the CAT has been roughly what was expected. There are

178,000 registered taxpayers (the tabular data based on tax returns for FY 2006 show a slightly smaller number, 171,000). The total number of taxpaying entities – including those who are part of consolidated or combined groups – is 254,000, slightly higher than the 235,000 ODT estimate. The carrot of intercompany exclusions has received more use than the stick, with about 81,000 entities in 18,000 consolidated groups, while there are only about 20,000 entities in 6,000 combined groups. About 27,000 of these members of combined or consolidated groups are companies located outside Ohio.¹²

CAT Revenues for FY 2006 and FY 2007

The FY 2006 revenues of \$273.4 million exceeded the ODT estimate of \$214.4 million by \$59.0 million, or 27.5 percent. FY 2007 CAT revenues were \$594.9 million, or 34.1 percent above the ODT estimate of the enacted CAT.

Much earlier in this paper there was mention that Ernst & Young (E&Y) had produced estimates that ODT eventually matched by recalibrating its models. The preliminary ODT model estimates were about 13 percent higher than the E&Y estimates, or not quite halfway between the E&Y estimates and the actual CAT revenues that were eventually realized. Although no real harm was done by adjusting ODT's estimates downward – which was accomplished not by changing any of the base estimates but by increasing the estimated subtractions for such things as failure to pay tax on imports and intercompany exclusions – in retrospect it may have been better if ODT had stuck with its original forecasts.

Table 1 compares the FY 2006 CAT liability from tax returns (which is somewhat lower than total cash collections in the accounting system: \$260.2 million vs. \$273.4 million, respectively) to the estimates that it made for the enacted CAT in 18 industry sectors (ODT consolidated the education services category with the health care and social assistance category for the *ex-post* analysis). Liability in most sectors exceeded the ODT estimates, with manufacturing and retail trade having the largest dollar overages. The wholesale trade sector showed by far the biggest shortfall relative to the estimates. ODT had some trepidation about the size of the wholesale

trade estimate because it implied a very high degree of pyramiding, larger than for the Washington B&O tax, and it appears that this concern was well-founded. On the other hand, the reporting of CAT liability by NAICS code is also imperfect. Because taxpayers in a combination or consolidation are subsumed under the “primary” reporting entity, the industry data are not wholly accurate; for example, many wholesalers may be reported under their manufacturing parent company.

CAT Base in Comparison to Ohio GDP

State and substate revenue estimators and policy analysts looking at a business tax similar to the CAT (i.e., a tax measured by gross receipts) may find value in examining the relationship between the Ohio CAT base and Ohio GDP. The results shown below may provide them with a *rough* approximation of the potential gross receipts tax base existing in their state. (Even so, these results should be used with caution; they certainly should not be seen as a substitute for a more thoroughgoing state-specific analysis.) Table 2 compares the Ohio CAT base with estimated Ohio private-sector state GDP for FY 2006 (estimates supplied by Global Insight). Because FY 2006 liability was only for three quarters (July 2005 through March 2006) the data below has been adjusted to represent annual tax base figures.

The data shows that, while the CAT is indeed a broad-based tax – demonstrating that its base exceeds state GDP (even if government-sector GDP, which is exempt from the CAT, is included in the GDP total) – the degree of pyramiding is less than that for the Washington B&O tax. We have calculated the degree of pyramiding for the CAT as the ratio of the tax base, both before and after the \$1 million exclusion, to value added, whereas Washington calculated B&O tax pyramiding as the ratio of effective tax rates to nominal tax rates. Although the calculation methods for pyramiding are slightly different, the results are still comparable.

The ratio of taxable gross receipts **before** the exclusion to value added in one sense shows the true value of pyramiding, in that it measures the amount of receipts that theoretically could be subjected to the CAT (even this measure is distorted somewhat by the fact that entities with annual

Table 1
FY 2006 CAT Liability Compared with ODT Estimates for 19 Sectors
Liability is for 3/4 of Year (Three Quarters)

Dollar amounts in millions. Note that liability of \$260.2 million is less than \$273.4 million in collections. Note also that the total minimum tax was \$225 in FY 2006 (\$75 for July-Dec 2006 period and \$150 for CY 2007).

<i>Industrial Classification</i>	<i>NAICS Code Ranges</i>	<i>Number of Taxpayers</i>	<i>Net Taxable Gross Receipts (After Exclusion)</i>	<i>Total Tax Due: 0.06% Tax and Minimum Tax</i>	<i>HB 66 Estimate of Tax Due</i>	<i>Actual minus Estimate</i>
Agriculture, Forestry, and Fishing	111100-115310	5,711	\$2,317.4	\$2.5	\$1.9	\$0.7
Mining	211110-213110	758	\$2,727.2	\$1.8	\$2.0	-\$0.3
Utilities (excluding telecommunications)	221100-221300	126	\$13,762.5	\$8.3	\$4.7	\$3.6
Construction	236110-238900	18,192	\$20,452.5	\$15.8	\$16.0	-\$0.2
Manufacturing	311110-339900	14,651	\$114,466.9	\$71.5	\$58.3	\$13.2
Wholesale Trade	423100-425120	8,853	\$44,104.0	\$28.2	\$45.4	-\$17.2
Retail Trade	441110-454390	23,691	\$73,675.8	\$48.8	\$38.9	\$9.8
Transportation and Warehousing	481000-493100	4,867	\$8,264.7	\$5.9	\$3.6	\$2.3
Information (including telecommunications)	511110-519100	1,708	\$18,607.0	\$11.5	\$8.2	\$3.3
Finance and Insurance	522110-525990	5,478	\$5,955.8	\$4.6	\$2.0	\$2.7
Real Estate, and Rental & Leasing of Property	531110-533110	14,377	\$8,310.7	\$7.8	\$3.0	\$4.8
Professional, Scientific, and Technical Services	541110-541990	15,145	\$17,052.7	\$13.2	\$9.7	\$3.5
Management of Companies (Holding Companies)	551111-551112	917	\$15,283.8	\$9.3	\$0.8	\$8.5
Administrative & Support Services, and Waste Management & Remediation Services	561110-562000	4,382	\$4,822.8	\$3.7	\$5.0	-\$1.3
Education, Health Care, and Social Assistance	611000-624410	12,790	\$9,235.9	\$8.1	\$6.2	\$1.9
Arts, Entertainment, and Recreation	711100-713900	1,692	\$1,148.9	\$1.0	\$0.9	\$0.1
Accommodation and Food Services	721110-722410	8,903	\$5,542.3	\$5.0	\$5.2	-\$0.1
Other Services	811110-812990	8,759	\$2,952.1	\$3.5	\$2.8	\$0.7
Unclassified	n/a	19,660	\$9,991.5	\$9.7	\$0.0	\$9.7
TOTAL		170,660	\$378,674.6	\$260.2	\$214.5	\$45.7

The total tax liability shown in this table does not match actual commercial activity tax revenues in fiscal year 2006. This is largely because the table reflects reported tax liability, not actual payments made. Furthermore, the table reflects information from tax returns on the computer system as of the dates when the February 2006 and May 2006 return data were extracted; any subsequently filed tax returns or subsequent corrections made to the tax returns are not reflected in this table.

Table 2
Fiscal Year 2006 Commercial Activity Tax Base Compared to State GDP
Dollar amounts are in millions - all figures adjusted to allocate unclassified taxpayers across NAICs codes

<i>Industrial Classification</i>	<i>NAICS Code Ranges</i>	<i>Taxable Gross Receipts, Annualized</i>	<i>Exclusion, Annualized</i>	<i>Net Taxable Gross Receipts, Annualized</i>	<i>Global Insight Estimate of Ohio GDP, FY 2006</i>	<i>Ratio, CAT Base Before Exclusion to GDP</i>	<i>Ratio, CAT Base After Exclusion to GDP</i>
Agriculture, Forestry, and Fishing	111100-115310	\$5,408.6	\$2,235.0	\$3,173.6	\$1,790.5	3.02	1.77
Mining	211110-213110	\$4,186.1	\$451.2	\$3,734.9	\$2,165.1	1.93	1.73
Utilities (excluding telecommunications)	221100-221300	\$18,929.4	\$82.1	\$18,847.3	\$9,955.9	1.90	1.89
Construction	236110-238900	\$37,724.3	\$9,715.2	\$28,009.1	\$17,849.1	2.11	1.57
Manufacturing	311110-339900	\$166,536.7	\$9,778.0	\$156,758.7	\$86,762.5	1.92	1.81
Wholesale Trade	423100-425120	\$66,121.2	\$5,722.2	\$60,399.0	\$27,292.6	2.42	2.21
Retail Trade	441110-454390	\$113,921.7	\$13,025.0	\$100,896.7	\$31,039.7	3.67	3.25
Transportation and Warehousing	481000-493100	\$13,839.6	\$2,521.3	\$11,318.3	\$14,176.1	0.98	0.80
Information (including telecommunications)	511110-519100	\$26,381.8	\$900.1	\$25,481.7	\$12,710.6	2.08	2.00
Finance and Insurance	522110-525990	\$10,410.0	\$2,253.8	\$8,156.2	\$34,060.2	0.31	0.24
Real Estate, and Rental & Leasing of Property	531110-533110	\$17,613.5	\$6,232.2	\$11,381.3	\$48,178.2	0.37	0.24
Professional, Scientific, and Technical Services	541110-541990	\$30,441.2	\$7,088.1	\$23,353.1	\$24,294.3	1.25	0.96
Management of Companies (Holding Companies)	551111-551112	\$21,604.0	\$673.4	\$20,930.7	\$13,314.0	1.62	1.57
Administrative & Support Services, and Waste Management & Remediation Services	561110-562000	\$8,675.9	\$2,071.2	\$6,604.7	\$12,671.2	0.68	0.52
Education, Health Care, and Social Assistance	611000-624410	\$19,938.9	\$7,290.7	\$12,648.2	\$39,711.5	0.50	0.32
Arts, Entertainment, and Recreation	711100-713900	\$2,314.1	\$740.8	\$1,573.3	\$3,281.0	0.71	0.48
Accommodation and Food Services	721110-722410	\$11,861.3	\$4,271.4	\$7,589.9	\$10,054.7	1.18	0.75
Other Services	811110-812990	\$7,748.3	\$3,705.4	\$4,042.8	\$11,381.6	0.68	0.36
Total		\$583,656.6	\$78,757.1	\$504,899.5	\$400,688.6	1.46	1.26

gross receipts below \$150,000 are not subject to the CAT at all). The ratio of taxable receipts **after** the exclusion to value added measures an **effective** rate of pyramiding by sector, since only the receipts after the exclusion are actually subjected to the CAT's marginal tax rate (0.0598 percent in FY 2006). In either case, we chose these comparisons rather than a comparison of the effective tax rate to the nominal tax rate because the presence of the exclusion and the \$150 minimum tax makes the calculation of effective tax rates and their relationship to the nominal tax rate an imprecise measure of how many times transactions are subjected to the CAT.

The ratio of the Ohio tax base to value added is estimated to be 1.46 overall if one measures the tax base before the exclusion, and only 1.26 if one measures the tax base after the exclusion. For purposes of comparison, ODT took the data presented in the Washington state tax structure study and calculated the tax base by sector, working backward from the effective tax rates and value added in that study. Under this measure, the B&O tax has an average degree of pyramiding of 2.3 (slightly lower than the 2.5 figure one gets from dividing effective tax rates by nominal tax rates). Thus, in the aggregate, the Ohio CAT pyramids either slightly more than half as much as the Washington B&O tax, or about two-thirds as much as the B&O tax, depending on whether one measures the CAT base after or before the exclusion.

The Ohio CAT actually appears to have more pyramiding than the B&O tax in certain sectors, most notably retail trade, where the degree of pyramiding of the CAT is double that of the B&O tax (3.25 or 3.67 in Ohio vs. 1.6 in Washington). Whether this is really additional pyramiding under the CAT or whether other factors are at work is unclear.¹³ On the other hand, the Ohio CAT pyramids only 1.8 or 1.9 times on manufacturing, depending on which measure one uses (before or after exclusion), whereas the weighted-average degree of pyramiding of the B&O tax on manufacturing is 4.4 (this number is calculated by ODT from the detailed figures by manufacturing subsector in the Washington study). This is almost certainly due primarily to the export exclusion in the CAT, and to a lesser degree, to the intercompany exclusions for vertically integrated taxpayers. Nor is this an accident: when the CAT was developed,

its advocates explicitly stated that it was a tax that would favor manufacturing, which is relatively footloose, over retailing and other activities that are much less mobile.

In most cases, the degree of pyramiding of the CAT is not radically different depending on whether it is measured before or after the exclusion. In the utilities sector, where almost all the enterprises are large, the parameters are virtually identical. The most notable exception to this rule is in the Agriculture sector, where the majority of businesses are small, and thus the exclusion takes the degree of pyramiding from 3.02 down to 1.77.¹⁴

CAT Base Compared to Sales Tax Base

Finally, although it may seem intuitively obvious to some that the structure of the CAT is different enough from that of a standard state sales and use tax so as to make the sales and use tax of little help in forecasting a tax like the CAT, Table 3 makes the lack of connection explicit.

There are only two sectors, retail trade and accommodations and food services, where the sales tax base is within 10 percent of the gross receipts tax base (before exclusion). In all other sectors the vastly different structural features of the two taxes make the bases very different. The important differences include the following:

1. The exclusion of many business inputs from the sales tax base under the various "direct use" exemptions, such as the direct use in manufacturing, direct use in agriculture, and direct use in providing a utility service exemptions;
2. The "sales for resale" exemption from the sales tax base;
3. The exclusion from the sales tax base of sales to government entities and to nonprofits, as opposed to the CAT exclusions for gross receipts received by government entities and nonprofits.

Since retailing is a significant part of the CAT base, and of any broad gross receipts tax, the gross receipts forecaster would be advised to check the estimated gross receipts tax base against the state

Table 3
Sales and Use Tax Base vs. CAT Taxable Gross Receipts for FY 2006, by Industrial Classification
 Amounts in millions of \$

<i>Industrial Classification</i>	<i>NAICS Code Ranges</i>	<i>Sales Tax Base</i>	<i>Taxable Gross Receipts Before Exclusion, Annualized</i>	<i>Ratio of Sales Tax Base to Taxable Gross Receipts Before Exclusion</i>
Agriculture, Forestry, and Fishing	111100-115310	\$34.8	\$5,138.4	0.68%
Mining	211110-213110	\$41.4	\$4,049.9	1.02%
Utilities (excluding telecommunications)	221100-221300	\$843.7	\$18,425.3	4.58%
Construction	236110-238900	\$391.0	\$36,174.6	1.08%
Manufacturing	311110-339900	\$2,729.6	\$161,584.6	1.69%
Wholesale Trade	423100-425120	\$2,329.8	\$64,050.0	3.64%
Retail Trade	441110-454390	\$100,016.6	\$110,172.6	90.78%
Transportation and Warehousing	481000-493100	\$173.7	\$13,330.6	1.30%
Information (including telecommunications)	511110-519100	\$8,825.5	\$25,634.4	34.43%
Finance and Insurance	522110-525990	\$694.1	\$10,006.8	6.94%
Real Estate, and Rental & Leasing of Property	531110-533110	\$3,384.8	\$16,793.1	20.16%
Professional, Scientific, and Technical Services	541110-541990	\$863.5	\$29,233.5	2.95%
Management of Companies (Holding Companies)	551111-551112	\$31.9	\$20,995.6	0.15%
Administrative & Support Services, and Waste Management & Remediation Services	561110-562000	\$4,693.1	\$8,328.8	56.35%
Education, Health Care, and Social Assistance	611000-624410	\$136.0	\$18,996.8	0.72%
Arts, Entertainment, and Recreation	711100-713900	\$469.2	\$2,210.8	21.22%
Accommodation and Food Services	721110-722410	\$10,438.0	\$11,304.7	92.33%
Other Services	811110-812990	\$3,085.5	\$7,332.4	42.08%
Unclassified	n/a	\$1,702.5	\$19,893.8	8.56%
TOTAL		\$140,884.7	\$563,762.8	24.99%

sales tax base to check on whether they are in the same ballpark; but beyond that reality check, the sales tax base is unlikely to be of much help for the gross receipts tax forecast.

ODT has also compared the CAT base with the sales tax base for subsectors of retail trade, not shown in Table 3. This more detailed analysis reveals that the CAT base and the sales tax base for FY 2006 were within 8 percent of each other for three specific subsectors of retail trade: general merchandise stores, clothing and accessory stores, and furniture and home furnishing stores. Again, in those subsectors, it may be worthwhile for the gross receipts tax forecaster to check his or her gross receipts tax base forecasts against the sales tax base.

CONCLUSION

Forecasting the CAT has revealed, or perhaps merely confirmed, several lessons about revenue estimation.

Any effort to estimate a new business tax, especially one with few comparable models, requires creativity and flexibility, and it is a process that probably entails as much art as science. ODT discovered that not only was core economic data (economic Census data and data supplied by IMPLAN and REMI) vital in the estimation effort, there were certain aspects of the CAT estimation process that simply required reasoned judgment and an intuitive “feel.” Examples of the latter include the adjustment made for compliance, and the decision to use REMI (rather than IMPLAN) as the primary basis of the import and export adjustments. Input from ODT’s auditors and from business representatives, although either based on small samples or anecdotal, had to somehow be factored into the analysis.

The decisions about how to spend one’s time and resources are crucial. ODT had a limited amount of resources, especially time, to produce a CAT model. If there had been a luxury of time and expense, perhaps other approaches would have been explored. For example, further testing of microsimulation methods may have been conducted. And ODT could have spent more time to address admittedly weak parts of the model, such as the subtractions of intercompany transactions. In the case of the CAT, ODT judged that the lion’s

share of the estimation effort should be devoted to developing a thorough model of Ohio’s “produced” gross revenues, layering import and export adjustments on top of them.

The loss function that ODT faced in forecasting the CAT was not even close to symmetrical. Forecasts that were lower than actual revenues might create some consternation on the part of lawmakers and the administration, but the CAT rate could always be reduced in response to surpluses (in fact, the CAT law contains formula rate adjustments that would lower or raise the rate if actual revenues strayed by more than 10 percent from preset targets). On the other hand, if the forecasts were higher than actual revenues, the CAT would not have produced enough revenue to reimburse school districts and local governments for their lost tangible personal property tax revenues due to tax reform, and the administration and the legislators would have had to figure out how to make up the shortfall at a time when the general fund has no slack in it because of the reduction in revenues caused by the tax reform package. Given the very different risks to being high or low in the CAT forecasts, it is no surprise that the CAT forecasts were below actual revenues, despite the best efforts of the estimators to construct unbiased estimates.

Acknowledging the challenges inherent in forecasting the CAT and the significant risk associated with overestimating, there are still a number of ways that the CAT forecasting process could have been improved. In retrospect, after developing initial sector-specific tax base estimates, ODT probably should have made its adjustments to the initial estimates more sector-specific, rather than making gross, across-the-board adjustments. It may also be that more effort should have been spent exploring any differences between economic Census data and Ohio-specific data, where available (such as wage data by sector) and adjusting the economic Census data where necessary.

Finally, the reasons for the differences between the forecasts and the actual revenues are not yet fully known, because the CAT returns are very simple and thus have a paucity of data that the researcher can use to answer basic questions about the CAT. For example, how much of the variance of the estimate from the actual revenue in the

manufacturing sector is the result of the initial estimate of the CAT base being too low, as opposed to the subtraction for intercompany receipts being too high, or from the compliance estimate being too low? The return data are simply not detailed enough to supply a direct answer to that question. In the longer run, audit data or survey data may help provide answers to those questions. The research program for forecasting the CAT is far from finished.

Notes

- ¹ Ohio Committee to Study State and Local Taxes, 2003.
- ² Although it was not part of the 2002-2003 tax study committee recommendations, the idea of replacing the tangible personal property tax and the corporate franchise tax with a broad-based, low-rate business tax had been proposed before by Professor Edward Hill of Cleveland State University (Hill, 2001).
- ³ This nexus standard, which embodies a number of additional details not described here, is essentially the Multistate Tax Commission (MTC) "factor nexus" proposal.
- ⁴ For most Ohio corporate franchise tax returns, detailed apportionment factor data is not electronically captured. This data is regularly captured for only a substrata of the taxpayer population, consisting of the approximately 1,500 returns with Ohio franchise tax liability exceeding \$100,000. Random samples of the remaining taxpayer population have also been occasionally drawn for research purposes.
- ⁵ Formerly known as "gross state product."
- ⁶ For a discussion of imprecision in economic Census data on gross receipts and techniques for using wage and salary data to try to improve the accuracy of those estimates, see Larson (2007).
- ⁷ ODT ended up using IMPLAN estimates of imports and exports for agriculture, since trying to use REMI coefficients with the ODT production estimates in this area led to anomalies.
- ⁸ Since the time that ODT created its initial CAT forecasts, the 2002 Economic Census Data on 14 of the 18 nonagricultural industry sectors in ODT's CAT estimate have been issued under a series of tables labeled as "Revenue Size of Firms for the United States: 2002" (U.S. Census Bureau, 2002). Because the firm size data are now available at the industry level and are considerably more current, they are much more precise than those with which ODT had to work. Analysts estimating gross receipts tax revenues in other states presumably would have a considerable advantage due to the availability of this data.
- ⁹ Taxpayers electing consolidated status may choose to include or exclude all non-U.S. entities in the group.
- ¹⁰ Another significant adjustment to the estimated CAT base was for behavioral changes in response to the imposition of the CAT. A number of businesspeople, when discussing the impending CAT, stated that they would change their business practices in response to the CAT. Specifically, they stated that they would change their practices so that there would be fewer changes of possession in the production or construction process, and therefore fewer transactions that would give rise to gross receipts. As a simple example, consider a general building contractor purchasing building supplies (bricks, steel rods, concrete, etc.) from a number of vendors and then incorporating those supplies into the structure, which would then be sold to the ultimate consumer. Contractors told ODT that they would, to the extent possible, structure the transactions so that the consumer of the structure paid for the materials separately, and then paid the contractor for his services, so that the total price paid by the consumer was the same, but the intermediate purchases by the contractor of materials would be reduced or eliminated. ODT heard similar claims from manufacturers, wholesalers, and certain service providers. ODT gave enough credence to these claims to decide that the CAT base should be reduced. The ad hoc adjustments that ODT made to the CAT base for these behavioral changes ended up reducing the CAT base by about 5 percent.
- ¹¹ Gutmann and Wilson (2004).
- ¹² These companies have non-Ohio addresses. In some cases they are clearly companies whose operations are wholly or primarily outside Ohio. There may also be cases where even though the company has a non-Ohio address, it has significant Ohio operations.
- ¹³ There may be other explanations, such as the CAT's economic nexus standard being more effective at taxing retail sector gross receipts received from out-of-state companies.
- ¹⁴ The degree of pyramiding in the finance and insurance sector is understated because much of the activity in this sector is exempt from the CAT and instead subjected to other taxes, such as the net worth tax on financial institutions and the gross premium tax on insurance companies.

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