Analysis of Ohio's Business Income Tax Incentives

Prepared for the Ohio Chamber of Commerce Research Foundation

April 2021

Contents

Executive summary

EY was commissioned by the Ohio Chamber of Commerce Research Foundation to empirically examine the economic effects of the Business Income Deduction and reduced rate on business income (referred to in this report as the "BID"). The deduction is an Ohio tax provision which allows taxpayers with business income to deduct the first $250,000 (or $125,000 depending on filing status) of Ohio business income. Additionally, business income is taxed at an incentivized rate of 3% compared to the nearly 4.8% top marginal individual income tax rate. The deduction is limited based on the total business income reported by an individual taxpayer, meaning owners of multiple businesses would not be able to take the $250,000 deduction separately for each business entity.[1]

This analysis examines the economic effects of the BID in terms of total statewide employment, small business employment, establishment exit rates and Gross State Product (GSP).[2] The econometric analysis finds that the $250,000 deduction and other business income tax incentives increase the overall level of economic activity in Ohio and other states where such incentives exist. Specifically, the analysis examines four types of economic effects and finds the following impacts from Ohio's BID:

- **Gross State Product:** A gain of $5.9 billion in 2018 compared to the Ohio economy absent of the BID.
- **Total employment:** A gain of 59,700 employees in 2018 compared to the Ohio economy absent of the BID.[3]
- **Small business employment:** Small business employment growth (defined as businesses with less than 50 employees) of 14,300 employees in 2018 compared to the Ohio economy absent of the BID.
- **Establishment exit rate:** 1,200 fewer business failures in 2018 (the establishment exit rate) absent of the BID.[4]

Table 1. Estimated economic effects of the Ohio BID, 2018[5]

Economic performance measures	Implied effect for Ohio
Gross state product growth	+$5.9 billion value of GSP
Total employment growth	+59,700 more employees
Small business employment growth	+14,300 more employees
Establishment exit rate	1,200 fewer business closures

Source: EY analysis

While many industrial states, such as Ohio, have seen only moderate growth on various economic measures over the past decade, the BID has contributed to increased overall economic activity in the state. The econometric analysis presented in this study shows the growth of GSP, total employment, small business employment and improvement in the establishment exit rate resulting from the BID.

[1] Please see Ohio IT BUS schedule: https://tax.ohio.gov/static/forms/ohio_individual/individual/2019/schedule_itbus_fi.pdf

[2] Data from 2003 to 2018 from all 50-states were used to develop an econometric model, which estimated these economic outcomes.

[3] These effects do not compound over time. For example, the effect of repealing the BID in 2018 would be a reduction of 59,700 jobs. This does not imply another reduction of 59,700 jobs the following year. The same holds for the other three economic outcome variables of interest: GSP, small business employment and the establishment exit rate.

[4] Business failures are measured by establishments that had employees in the previous year that no longer have employees and does not necessarily imply business bankruptcy or closure.

[5] These values are not the coefficients associated with the econometric models. These values are point estimates for Ohio derived from the econometric coefficients given the Ohio BID and preferential rate on business income.

1. Overview of the Ohio BID and other business income tax incentives

1.1. Ohio's BID

The Ohio BID is a tax provision effective since tax year 2015 (fully phased in the following year) allowing Ohio taxpayers to deduct business income.[6,7] Specifically, the BID provides a deduction for income derived from sole proprietorships, pass-through entities (S-corporations, partnerships, and limited liability companies) and farmers (Schedule-F earners) of up to $250,000 of business income on the Ohio individual income tax return. Additionally, a reduced tax rate of 3% is applied to the business income over $125,000 or $250,000. Introduced to extend and increase the small business deduction to individual Ohio business owners, the Ohio BID had the following stipulations in 2015 which changed for 2016 and thereafter:[8]

- **2015:** Business owners may deduct 75% of their first $250,000 of business income (up to $187,500) and apply a graduated tax rate capped at 3% over the deduction amount. In comparison, the non-business income tax rate is capped at 4.997% in 2015. For taxpayers filing as "single" or "married filing separately," the business income deduction is reduced from $187,500 to $93,750.
- **2016 – current:** Business owners may deduct 100% of the first $250,000 of business income and apply a tax rate of 3% to income over the deduction amount. For taxpayers filing "married filing separately," the business income deduction is reduced from $250,000 to $125,000.

Data published by the Ohio Department of Taxation demonstrates that the BID lowers the effective tax rate across all Adjusted Gross Income (AGI) categories (among taxpayers with business income) but has the most considerable effect in terms of tax rate reduction on persons making under $200,000 in AGI. Due to the capped exemption amount of $250,000, the BID only reduces the effective tax rate from the statutory rate of 3% to an effective rate of 2.82% for the highest AGI category. For those with AGI of less than $125,000, all business income is deductible, and these taxpayers are left with an effective rate of 0%. The complete list of effective rates for business income by AGI category is provided in Table 2.

Table 2. Ohio taxable business income, business income tax, and effective rate on business income by AGI category, 2018

Dollars In billions

AGI Category	Business Income Reported on Returns***	Amount of business income deduction**	Taxable Business Income*	Effective Rate (Taxable business x 3%) / business income)
$0 under $125,000	$8.8	$8.5	$0.0	0.00%
$125,000 under $200,000	$4.7	$4.6	$0.0	0.01%
$200,000 under $300,000	$4.7	$4.5	$0.1	0.04%
$300,000 under $400,000	$3.6	$3.0	$0.5	0.39%
$400,000 under $500,000	$2.8	$1.9	$0.8	0.81%
$500,000 under $750,000	$5.3	$2.8	$2.3	1.31%
$750,000 under $1,000,000	$3.8	$1.5	$2.2	1.74%
Over $1,000,000	$58.6	$3.8	$55.0	2.82%
Total	**$91.5**	**$30.8**	**$60.8**	**2.15%***

Source: Ohio Department of Taxation

*The total effective rate does not include income from people under $1 of business income.

**Due to suppressed values in certain AGI brackets, the sum of the business income deduction across AGI categories will not add up to the total.

***Business income is less than the amount of business income deduction between $0 and $125,000 due to taxpayers with negative business income.

[6] Please see: "https://tax.ohio.gov/wps/portal/gov/tax/help-center/faqs/income-business-income-and-the-business-income-deduction/income-business-income-and-the-business-income-deduction"

[7] Ohio initially adopted a "small business deduction" in 2013. It allowed the deduction of 50% of Ohio-apportioned business income below the $125,000/$250,000 thresholds in 2013, and 75% of Ohio-apportioned business income below those thresholds in 2014. There was no tax rate reduction in 2013 and 2014. Additionally, the business income incentives were not available against the Ohio trust income tax.

[8] Please see: "https://www.thetaxadviser.com/issues/2016/aug/maximizing-ohio-small-business-deduction.html"

For Ohio tax purposes, business and non-business income is defined as by Ohio Revised Code 5747.01(B) & (C):

> (B) "Business income" means income, including gain or loss, arising from transactions, activities, and sources in the regular course of a trade or business and includes income, gain, or loss from real property, tangible property, and intangible property if the acquisition, rental, management, and disposition of the property constitute integral parts of the regular course of a trade or business operation. "Business income" includes income, including gain or loss, from a partial or complete liquidation of a business, including, but not limited to, gain or loss from the sale or other disposition of goodwill.
>
> (C) "Non-business income" means all income other than business income and may include, but is not limited to, compensation, rents and royalties from real or tangible personal property, capital gains, interest, dividends and distributions, patent or copyright royalties, or lottery winnings, prizes, and awards.

As mentioned above, the Ohio BID effectively provides a 0% tax rate for business income for married small business owners with income under the $250,000 level and no other sources of income. The BID provides a capped, aggregate deduction for all business income associated with a tax return. Each individual business owner's tax return can only claim a total deduction of up to $250,000 for the BID. Therefore, a taxpayer that owns multiple businesses or pass through entities such as LLCs would not be able to claim up to $250,000 for each business owned by that individual.[9] Table 3 shows the total amount of the BID deduction and the percentage of tax savings from the BID by AGI group.

Table 3. Distribution of the Ohio BID by AGI category in 2018

Dollars In millions

AGI category	Amount of business income deduction	Percentage of total deduction claimed, by AGI level
$0 under $125,000	$8.5	27%
$125,000 under $200,000	$4.6	15%
$200,000 under $300,000	$4.5	14%
$300,000 under $400,000	$3.0	10%
$400,000 under $500,000	$1.9	6%
$500,000 under $750,000	$2.8	9%
$750,000 under $1,000,000	$1.5	5%
Over $1,000,000	$3.8	12%
Total	**$30.8***	**100%***

Source: Ohio Department of Taxation

*Due to suppressed values in certain AGI brackets, the sum of the business income deduction across AGI categories will not equal the total.

1.2. State individual marginal rates on pass-through income

While Ohio is one of two states with a state-level deduction or rate reduction for business income, many states have lower tax rates on non-corporate business income.[10] Table 4 is a 50-state comparison of top marginal tax rates of non-corporate business income. As of 2018, Ohio had the 11th lowest marginal rates, compared to the 16th lowest rate in 2014. In 2018, North Dakota was the only state with a lower marginal rate, while the other 9 states ahead of Ohio did not directly tax passthrough business income.

Ohio also uniquely has a robust municipal tax system which imposes a flat rate on net profits of businesses that operate within a taxable municipality. Over 640 Ohio municipalities impose this tax on business income.[11] The rates imposed by Ohio cities range from 0.5 percent up to 3 percent, with over 78 percent of cities imposing rates over 1 percent.[12] Most other states do not impose such broad local taxes on business income. Michigan and Maryland are among the states with the greatest number of local income taxes, but both have relatively few taxing jurisdictions compared to Ohio. If Table 4 were to account for Ohio municipal tax rates, Ohio's position would fall relative to most other states.

[9] Please see Ohio IT BUS schedule: https://tax.ohio.gov/static/forms/ohio_individual/individual/2019/schedule_itbus_fi.pdf

[10] While Texas and other states do not have a non-corporate business income tax, they do have other business taxes such as a Gross Receipts Tax

[11] Ohio Department of Taxation Annual Report, Fiscal Year 2020, Municipal Income Tax, p. 122

[12] Ibid.

Table 4. Comparing top individual marginal rates on pass-through income, 2014 & 2018

State	2014 top marginal rate on business income	2014 Rank	2018 top marginal rate on business income	2018 Rank
Alaska	0.00%*	1	0.00%*	1
Florida	0.00%*	1	0.00%*	1
Nevada	0.00%*	1	0.00%*	1
New Hampshire	0.00%*	1	0.00%*	1
South Dakota	0.00%*	1	0.00%*	1
Tennessee[13]	0.00%*	1	0.00%*	1
Texas	0.00%*	1	0.00%*	1
Washington	0.00%*	1	0.00%*	1
Wyoming	0.00%*	1	0.00%*	1
North Dakota	3.22%	11	2.90%	10
Ohio	4.80%	16	3.00%	11
Pennsylvania	3.07%	10	3.07%	12
Indiana	3.40%	12	3.23%	13
Michigan	4.25%	13	4.25%	14
Arizona	4.54%	14	4.54%	15
Colorado	4.63%	15	4.63%	16
New Mexico	4.90%	18	4.90%	17
Illinois	5.00%	19	4.95%	18
Utah	5.00%	19	4.95%	18
Alabama	5.00%	19	5.00%	20
Kentucky	6.00%	29	5.00%	20
Mississippi	5.00%	19	5.00%	20
Oklahoma	5.25%	24	5.00%	20
Massachusetts	5.20%	23	5.10%	24
North Carolina	5.80%	27	5.50%	25
Kansas	0.00%**	1	5.70%	26
Maryland	5.75%	25	5.75%	27
Virginia	5.75%	25	5.75%	27
Missouri	6.00%	29	5.90%	29
Rhode Island	5.99%	28	5.99%	30
Georgia	6.00%	29	6.00%	31
Louisiana	6.00%	29	6.00%	31
West Virginia	6.50%	33	6.50%	33
Delaware	6.60%	34	6.60%	34
Nebraska	6.84%	36	6.84%	35
Arkansas	7.00%	38	6.90%	36
Connecticut	6.70%	35	6.90%	36
Montana	6.90%	37	6.90%	36
Idaho	7.40%	40	6.93%	39
South Carolina	7.00%	38	7.00%	40
Maine	7.95%	42	7.15%	41
Wisconsin	7.65%	41	7.65%	42
Vermont	8.95%	44	8.75%	43
New York	8.82%	43	8.82%	44
Iowa	8.98%	46	8.98%	45
Minnesota	9.85%	47	9.85%	46
Oregon	9.90%	48	9.90%	47
New Jersey	8.97%	45	10.75%	48
Hawaii	11.00%	49	11.00%	49
California	12.30%	50	12.30%	50

Source: Wolters Kluwer

* States with an (*) do not have an income tax and do not tax earned business income

** States with two (**) do have an income tax but did not tax business income

[13] Tennessee has the Hall-Income tax which only applies to dividends from stock and interest from bonds, for more information see here: https://www.tn.gov/revenue/taxes/hall-income-tax.html

1.3. Other state and federal business income tax incentives

Oregon is the only other state that currently provides state-level business income tax incentives. Effective since the tax year 2015, the Oregon legislature implemented reduced personal income tax rates on non-passive income for S-corporations, partnerships, and limited liability companies (LLCs). These taxpayers receive tiered preferential rates between 7% and 9% rather than the top marginal rate of 9.9% on the first $5 million of qualified business income every year.[14] Similar to the requirements of the Ohio BID, the income earned must be associated with regular business activity and is restricted from benefiting passive investments and rental income. The tax provision was also extended to sole proprietorships effective for tax year 2018.[15]

In addition to state-specific tax provisions regarding business income, the Tax Cuts and Jobs Act of 2017 (TCJA) introduced a measure in which joint tax filers with taxable income below $326,000 ($163,000 for single filers) may deduct 20% of their qualified business income. The 20% deduction is phased out as taxpayers approach the income caps and are not available to all business income types. This federal deduction intends to reduce the disparity between business income taxed at the federal corporate rate of 21% and the income derived by individuals from business activities potentially taxed at a higher individual rate.[16] States that have adopted the federal QBI deduction as of the tax year 2018 include Colorado, North Dakota and Idaho. In addition, Iowa partially conforms to the federal BID as of the tax year 2019, allowing taxpayers to deduct an amount equal to 25% of their federal BID deduction from their taxable income.[17]

The Ohio BID has a somewhat similar purpose of reducing disparity among businesses. In Ohio, business income that is derived by C-corporations is not subject to any individual income taxes, while both C-corporations and all other businesses are subject to the Ohio Commercial Activity Tax. Taxing the business income of pass through entities and sole proprietorships at a lower income tax rate helps to partially, but not completely, offset this disparate treatment of business income.

[14] Please see: "https://www.oregon.gov/DOR/forms/FormsPubs/schedule-or-pte-fy_101-365_2018.pdf"
[15] Ibid.
[16] Please see: "http://scholarworks.csun.edu/bitstream/handle/10211.3/209739/TDJ-11-36-debree.pdf?sequence=1"
[17] Please see: "https://www.legis.iowa.gov/docs/publications/LGE/87/SF2417.pdf"

2. Review of the empirical literature

There has been substantial research into the question of how state and local taxes affect economic growth. Table 5 summarizes notable examples of research focused on this relationship.

- **Goff, Lebedinsky, and Lile (2012)** examined state tax data from 1997 through 2005 and compared states that were statistically the most similar. They found the more similar the states, the more important lower tax burdens were in determining economic growth. The analysis found a 1 percentage point increase in overall tax burden led to a 0.19 reduced growth rate in GSP.[18]
- **Denaux (2012)** performed a county-level assessment of North Carolina and found that a 1 percentage point increase in the corporate tax rate lowered personal income by 2.6%. The author did not find a statistical association between the personal income tax rate and personal income.[19]
- **Gius & Frese (2002)** estimated the effects of state personal and corporate taxes on firm location decisions. They found a statistically significant negative association between personal income taxes and firm locations. They postulated firms might choose to locate in states where employees would face a lower tax burden.[20]
- **Holcombe & Lacombe (2004)** shows that over the 30-year period from 1960 to 1990, states that raised their income tax rates more than their neighbors had slower income growth and, on average, a 3.4% reduction in per capita income.[21]
- **Alm and Rogers (2011)** estimated the effects of selected policies and political characteristics on economic growth from 1947 – 1997. They found a statistically significant relationship between total taxes as a share of personal income and economic growth.[22]
- **Debacker et. al (2017)** modeled the 0% pass-through rate in Kansas and suggest the lower rates encouraged shifts in reporting income through reclassifying wage income to business income – rather than growth in economic activity.[23] It should be noted that the Kansas policy of 0% tax on pass-through income is an outlier compared to the rest of US tax policy. Kansas' 0% rate on business income was a large enough discrepancy between taxes on different types of income to encourage workers to reclassify income from wage and salaries to business income, which is part of the paper's findings.

Table 5. Overview of select academic literature

Authors	Observed	Key findings
Goff, Lebedinsky, and Lile (2012)	GSP	1 %pt increase in overall tax burden results in a 0.19% reduction in the growth rate of GSP
Denaux (2012)	Personal income	1 %pt increase in corporate tax rate lowered personal income by 2.6% - no statistically significant results for personal income
Gius & Frese (2002)	Firm Location	1 %pt increase in state personal income tax rate resulted in 8% less firms in a given industry
Holcombe & Lacombe (2004)	Per capita income	Increase in personal income tax lowered per capita income by 3.4% (when comparing neighboring states)
Alm and Rogers (2011)	Personal income	Total state taxes had a negative relationship with economic growth (magnitude changed depending on variables in the model)
Debacker et. al (2017)	Employment, investment & other measures	Kansas 0% pass-through rate caused taxpayers to reclassify income and did not substantially impact the level of economic activity

[18] Goff, Brian, Alex Lebedinsky, and Stephen Lile. "A matched pairs analysis of state growth differences." Contemporary Economic Policy 30.2 (2012): 293-305.
[19] Denaux, Zulal S. "Endogenous growth, taxes and government spending: Theory and evidence." *Review of Development Economics* 11.1 (2007): 124-138.
[20] Mark P. Gius & Phillip Frese (2002) The impact of state personal and corporate tax rates on firm location, Applied Economics Letters, 9:1, 47-49, DOI: 10.1080/13504850110046859
[21] Holcombe, Randall G., and Donald J. Lacombe. "The effect of state income taxation on per capita income growth." *Public Finance Review* 32.3 (2004): 292-312.
[22] Alm, James, and Janet Rogers. "Do state fiscal policies affect state economic growth?" Public Finance Review 39.4 (2011): 483-526. Note that variations of the total tax variable (e.g. total tax as a level rather than a share of total income) and the year of the analysis caused the statistical significance and magnitudes to change. This is typically seen as a sign that the results are not robust. Individual taxes were never found to have a statistically significant effect.
[23] DeBacker, Jason Matthew and Heim, Bradley and Ramnath, Shanthi and Ross, Justin M., The Impact of State Taxes on Pass-Through Businesses: Evidence from the 2012 Kansas Income Tax Reform (September 1, 2017). Available at SSRN: https://ssrn.com/abstract=2958353 or http://dx.doi.org/10.2139/ssrn.2958353

3. Results

This section discusses the findings from the econometric analysis, which uses four models to estimate effects on Ohio's (1) GSP, (2) total employment, (3) small-business employment, and the (4) establishment exit rate. Table 6 summarizes the estimates of the various coefficients of interest from each of the four econometric models, the Ohio specific estimates, and the translation of the Ohio specific estimates into economic outcomes for 2018. For details of the full model specifications, see the Technical Appendix.

For context, from 2013 to 2018, Ohio grew at a slower rate than the United States across many of the economic measures. This slower growth can be attributed to the state's economic and demographic characteristics. The econometric models described in this section isolates the individual effects of these characteristics on economic outcomes, while controlling for other characteristics of states. For example, the model suggests a state's educational attainment (as measured by the share of the population with a bachelor's degree) increases economic growth, and Ohio ranks below average (36th out of 50 states) on that measure. Likewise, a greater share of the working-age population increases GSP growth, but Ohio is below the national average (ranked 29th). After controlling for these economic and demographic factors, the models indicate that the BID promoted Ohio's economic growth.

In discussing the results below, the effect of the BID on economic growth is tested by examining the impact of the effective tax rate on business income. The effective tax rate on business income reflects the business income deduction and the reduced tax rate on business income. The econometric models evaluate the impacts on the various economic measures (GSP, employment, etc.) of changing the effective tax rate on business income.

GSP effects. The analysis suggests that for each 1 percentage point decrease in the tax rate on business income, GSP will increase by 0.365 percentage points. After the BID, Ohio's adjusted business income tax rate was 2.2%, a 2.6 percentage point reduction from the 2018 top rate of nearly 4.8%. Therefore, for Ohio, the model estimates a 0.97 percentage point increase in GSP growth due to the BID's existence at 2018 levels. This result implies $5.9 billion greater GSP in 2018 compared to the Ohio economy absent the BID. The calculation steps are shown below:

Step 1: Model Coefficients

Are the results of the econometric models. They imply a 1 percentage point (%pt) decrease in the tax rate results in the coefficient change in the dependent variable.

For example, a 1%pt decrease in the tax rate increases GSP growth by *0.365* %pt.

Step 2: Economic Effects of Pass-through Incentives

To develop an estimate for Ohio, the model coefficient of -0.365 is multiplied by the change in tax rate caused by the BID. For 2018, this was a reduction of *2.6* %pt.

-0.365 x *-2.6* = *0.97 %pt*

Step 3: Implied effect for Ohio

From Step 2, we know the reduction of the tax rate increases GSP growth by 0.97%. We then take Ohio's 2018 GSP and multiply by 0.97. This is the increase due to the business tax preferences.

Ohio GSP (~$600B) * *0.97 %* =

Employment effects. The estimated employment effect (shown in Table 6) suggests that for each 1 percentage point decrease in the tax rate, state employment growth increases by an average of 0.462 percentage points. Based on Ohio's 2.6 percentage point reduction in the effective tax rate on business income due to the incentives, the analysis suggests a 1.22 percentage point increase in employment growth due to the BID at 2018 levels, or 59,700 more employees.

Small-business employment effects. The estimated impact for small business employment (shown in Table 6) suggests that for each 1 percentage point decrease in the tax rate there is a 0.291 percentage point increase in small business employment growth. For Ohio, this results in a 0.77 percentage point increase in small business employment, which implies 14,300 more employees than the Ohio economy absent the BID.

Establishment exit rate effects. The estimated impact for the establishment exit rate (shown in Table 6) suggests that for each 1 percentage point decrease in the tax rate, the establishment exit rate decreases by an average of 0.186 percentage points. For Ohio, this results in a 0.49 percentage point decrease due to the existence of the BID, implying 1,200 fewer annual business failures compared to the Ohio economy absent the BID, at 2018 levels.

Table 6. Estimated model coefficients and Ohio economic effects from pass-through incentives, at 2018 levels

Economic performance measures	Model coefficient on tax rate (+1%pt)	Economic effect of the BID	Implied effect for Ohio
Gross state product growth	-0.365	+0.97%pt	+$5.9 B value of GSP
Total employment growth	-0.462	+1.22%pt	+59,700 more employees
Small business employment growth	-0.291	+0.77%pt	+14,300 more employees
Establishment exit rate	0.186	-0.49%pt	-1,200 less business closures

Source: EY analysis.

4. Limitations of analysis

The reader should be aware of several limitations of the analysis, which include the following:

1. Differences in tax rates and bracket structures across states complicates the construction of comparisons of marginal rates for the same taxpayer. The analysis capture taxpayers' rates in the $100,000 - $300,000 range using the effective tax rate that would apply in this range of income since this is the income range where the majority of the business income deduction is claimed.
2. The definition of business income varies across states, making state comparisons of effective tax rates on business income imperfect. The estimated effects on states with outlier definitions of business income could be over or understated.
3. States with low marginal rates on business income may have other business taxes (i.e., gross receipts taxes). This analysis did not attempt to capture the total business tax burden due to data limitations.
4. The TCJA was enacted in 2017 and was only applicable for one year of data in our analysis. Additional analysis on the effect of Section 199-A should be conducted as more data becomes available.

5. Conclusions

Ohio's BID was enacted in 2015 and was fully phased in by 2016. Ohio is one of two states that have provided rate reductions or income deductions for non-corporate business income. The federal tax code also currently allows for a deduction of qualified business income, and four states have either partially or fully adopted this provision for state tax purposes. Both before and after Ohio's enactment of the BID, Ohio's economic growth has been slower than the rest of the United States. Using an econometric analysis, the models estimate that while Ohio has experienced only moderate growth in recent years (similar to many other states that had large industrial sectors), the enactment of the BID increased Ohio's economic activity on a variety of different measures.

Ohio's business tax changes lowered the rate on business income to 3% from the individual income rate of nearly 4.8% and allowed the first $125,000 to $250,000 (depending on filing status) of business income to be fully deductible. The BID lowers the effective and marginal rates on business income. The 50-state econometric analysis shows a statistically significant relationship between state level tax rates on business income and GSP, total employment, small business employment, and establishment exit rates. This analysis suggests Ohio's BID supports $5.9 billion in Ohio GSP, 59,700 jobs, 14,300 small-business jobs and 1,200 fewer establishment failures at 2018 levels compared to an Ohio economy absent the BID.

6. Appendix: Technical description of data and limitations

Data used in the analysis

Construction of the 'Tax Rate on Business Income' variable of interest:

The analysis used an econometric model to estimate the effect of the Ohio BID. The variable used to capture the BID's effect was the year-to-year change in the marginal tax rate on business income. This marginal rate was adjusted downwards for states with a business income deduction or an explicit reduced individual income tax rate for business income businesses. In general, the model used the top marginal tax rate each year for each state. In states such as New York, New Jersey, and California, which have top marginal rates that apply at $1 million or more, the model used the second highest marginal rate rather than the top rate (as the top rate in these states does not apply to many taxpayers). The marginal tax rate selected for all states would typically apply to AGI earners between $100,000 to $300,000.

BID and business income tax rate adjustments:

The marginal effective tax rate was adjusted downwards in states that had business income deductions or rate reductions.[24,25] Kansas' marginal rate was set to 0% in years in which the state did not tax business income. Oregon's marginal tax rate was 7.2% which was the second-highest rate under the alternative rate schedule for business income. Since Ohio taxpayers in the $100,000 to- $300,000 AGI range either faced a marginal rate of 0% (if they were below the BID threshold) or the 3% preferential rate, an effective tax rate on business income was calculated. This effective rate could be considered a close approximation to the marginal effective rate on business income. The effective tax rate is calculated by dividing total tax (taxable business income multiplied by 3%) by total taxable income. For the tax year 2018, Ohio's effective rate was 2.15, which is the number used for the tax rate on business income variable in the model. The effective tax rate calculation by AGI category and overall is shown in Table 2. For tax years 2013 through 2017, the Ohio tax rate was also adjusted downward to reflect the existence of the small business income deduction and the business income tax incentives.

For states that conformed to the TCJA qualified business income deduction, a similar effective tax adjustment using IRS Statistics of Income (SOI) data was used. Unlike the BID, the QBI deduction is phased-out for married filing jointly $150,000 - $300,000 to limit the QBI deduction for high income earners. The analysis assumes all Schedule C, E and F income as qualified business income and did not adjust for business income that doesn't receive the QBI deduction. The marginal effective rate for Iowa (that only allows a 25% deduction of the federal amount) was adjusted down by 25% of the amount of full conformity states.

The additional data used as control variables in the econometric analysis combines information from several different federal data sources such as the US Census Bureau, the US Energy Information Administration and the Department of the Treasury. The data was gathered at the state-level for the period 2003 to 2018.

Econometric methodology

The econometric model used in the analysis is a fixed effects model. Fixed effects models control for time invariant characteristics across the 50 states in the analysis. The models also controlled for additional economic and demographic characteristics of states. Controlling these additional factors was done to isolate the effect of the change in the tax rate on the business income variable on the dependent variables of interest.

These additional controls included state level personal consumption expenditures, percent of workers in a union, percent of workers employed in the manufacturing sector, average energy prices, a variable indicating whether the economy was in a recession, and the population density of the state. The US Treasury Bond 3-month rate was also included to

[24] Oregon and Kansas are the two other states that provide or have provided business income tax incentive provisions. Oregon provides a rate reduction for business income, and Kansas (though the provision has since been repealed), did not tax pass-through business income. In Oregon, taxpayers receive tiered preferential rates between 7% and 9% rather than the top marginal rate of 9.9% on the first $5 million of qualified business income every year since tax year 2015.

[25] In addition, several states have adopted the Federal Qualified Business Income (QBI) deduction as of the tax year 2018 which allows joint tax filers with taxable income below $326,000 ($163,000 for single filers) to deduct 20% of their qualified business income. States that have adopted the federal QBI deduction as of the tax year 2018 include Colorado, North Dakota and Idaho. In addition, Iowa partially conforms to the federal BID as of the tax year 2019.

capture trends in the macro economy, this variable did not fluctuate by state like the other independent variables. The four variables estimated are the Gross State Product (GSP), totally employment, small business employment and the establishment exit rate.

Model specification

The analysis used a fixed-effects model to estimate the tax rate variable's effect on four dependent variables of interest. The dependent variables were GSP, total employment, small business employment and establishment exit rate. All the dependent variables were estimated using the same specification. The model specification and definition of the variables can be seen below:

$$Yi\ (DepVar1-4) = B_1(TaxRate) + B_2(TBOND) + B_3(EDUC) + B_4(SHARE16-65) + B_5(MANU) + B_6(ENERGY) + B_7(POPDENSITY) + B_n(STATE) + B_n(YEAR) + e_i$$

$\boldsymbol{Y_i}$: Represents the predicted value of the dependent variable for a given state each year.

$\boldsymbol{B_{1-8}}$: Represents the beta values are the coefficients associated with each variable (seen in Appendix Table 1).

$\boldsymbol{B_n}$: Represents the fixed effects binary variables.

$\boldsymbol{e_i}$: Represents the error term associated with the predicted value for a given observation.

DepVar1 – 4: The dependent variables are GSP, total employment, small business employment or the establishment exit rate. The same model specification is used for the four dependent variables. State GSP was gathered from the Bureau of Economic Analysis. Employment data was gathered through the .US Census Bureau's County Business Pattern data and the establishment exit rate was gathered through US Census' Business Dynamics Statistics.

Tax rate: The tax rate variable represents the marginal tax on business income for earners in the $100,000 - $300,00 AGI range for each state over time. This marginal rate is adjusted downwards for states with business income deductions, preferential rates, or with conformity to Section 199-A of the federal tax code. The variable is the change from the previous year's value of the tax rate variable. Income tax rates were collected from Wolters Kluwer.

TBOND: The treasury bond rate was collected through the Department of the Treasury and reflects the 3-month annual US treasury bond rate.

EDUC: The educational attainment bachelors and above variable was collected through the US Census Bureau and reflects the percent of the population with the educational attainment of bachelors or higher over the total population ages 25 and over.

SHARE16-65: The share of the population aged 15 to 64 was collected through the US Census Bureau and reflects the percent of the working population (ages 15 to 64) over the total population.

MANU: The percent manufacturing variable was collected through U.S. Census' County Business Patterns (CBP) data and reflects the percent of manufacturing employment over total employment.

ENERGY: The average energy price variable was gathered through the US Energy Information Administration and represents average total energy price estimates across primary energy (coal, natural gas, fuel oils and HGL), electric power and electricity retail sales

POPDENSITY: The population density was collected through the US Census Bureau and reflects the number of people in a state by total land area.

STATE: Represents fixed effects controlling for all 50 states.

YEAR: Represents fixed effects controlling for each year (2003-2018).

Technical detailed presentation of econometric analysis output

Appendix Table 1 shows the coefficients for each of the four dependent variable specifications shown above.

Appendix Table 1. Econometric results across model specifications

VARIABLES	%pt change in GSP	%pt change in total employment	%pt change in small business employment	%pt change in establishment exit rate
Tax rate change	-0.365*	-0.462***	-0.291**	0.186***
	(0.187)	(0.167)	(0.118)	(0.0577)
Percentage manufacturing	0.143	0.351**	0.192*	-0.0580
	(0.165)	(0.147)	(0.104)	(0.0508)
Educational attainment BA and above	0.326***	0.539***	0.333***	-0.246***
	(0.104)	(0.0929)	(0.0656)	(0.0321)
Share population age 15 to 64	0.240	0.151	-0.0654	0.320***
	(0.191)	(0.170)	(0.120)	(0.0589)
Average energy price	-0.102***	0.135***	0.0213	0.00920
	(0.0368)	(0.0328)	(0.0232)	(0.0113)
Population Density	0.00180	0.0220	0.0135	-0.0107**
	(0.0161)	(0.0143)	(0.0101)	(0.00495)
T-bond rate	0.333***	0.579***	0.486***	0.0393*
	(0.0756)	(0.0674)	(0.0476)	(0.0233)
Constant	-23.84	-35.72***	-10.10	-2.693
	(15.28)	(13.63)	(9.618)	(4.710)
Observations	750	750	750	750
R-squared	0.086	0.186	0.223	0.473

Notes:
1. Each column represents model specification
2. Standard errors are reported in parenthesis
*3. *** p<0.01, ** p<0.05, * p<0.1*