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What *Really* Is the Evidence on Taxes and Growth?

A Reply to the Tax Foundation

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A 2012 Tax Foundation report asserted that "nearly every empirical study of taxes and economic growth published in a peer-reviewed academic journal finds that tax increases harm economic growth."[2] The report cited 26 studies (19 on the impact of federal or national taxes on national growth and seven on the effects of state taxes on state growth), claiming that 23 of them find that taxes have a "negative" effect on economic growth, while the other three find a "neutral" effect. A previous CBPP analysis found that the Tax Foundation misrepresented the findings of three of the seven state-level studies it cited.[3] This analysis looks in detail at the 19 national-level studies and finds:

- The Tax Foundation mischaracterized, exaggerated, or selectively described the findings of six of those 19. When one adds to these six studies the three state-level studies that the Tax Foundation misrepresented and the three studies that the Tax Foundation correctly identified as showing a "neutral" effect of taxes on growth, *12 of the 26 studies that the Tax Foundation cites do not support its flat assertion that tax increases harm growth.*

- The Tax Foundation's review omitted dozens of relevant studies published in major journals or edited compilations since 2000, many of which conclude that levels of taxation have little if any impact on economic growth or that adverse impacts are limited to particular taxes or time periods.

- The Tax Foundation's assertion of a growing "consensus among experts" that taxes harm growth is false. In fact, studies that the Tax Foundation cited, as well as others that it omitted, explicitly note the *lack* of academic consensus.

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[1] Krista Ruffini and Brandon DeBot provided research assistance.

[2] William McBride, "What Is the Evidence on Taxes and Growth?" Tax Foundation Special Report No. 207, December 18, 2012.

[3] Michael Mazerov, "Academic Research Lacks Consensus on the Impact of State Tax Cuts on Economic Growth," Center on Budget and Policy Priorities, June 17, 2013, http://www.cbpp.org/cms/index.cfm?fa=view&id=3975. This analysis applies the same methodologies of the earlier paper, but instead focuses on federal taxes and national-level growth.

The reason for this lack of consensus may be — as even some of the studies cited by the Tax Foundation find — that the effect of tax increases on growth depends on many different factors, such as the type of tax, the country, the state of the economy, monetary policy, the time frame studied, and what the revenue is used for. For example, two studies cited by the Tax Foundation find that tax increases are associated with *better* economic performance when the resulting revenues finance priorities such as deficit reduction and education. As University of Michigan tax economist Professor Joel Slemrod has noted:[4]

> "Clearly, taxes affect behavior; they affect some behaviors more than others. What has not been established is that the level of taxes has a clear and important impact on economic growth. And one reason is that this is not a well-posed question. How government activity affects prosperity depends not only on the level of taxes, but also on what the money is used for."

Thus, the proper answer to a question as broad as whether tax increases are "positive" or "negative" for growth is: "It depends."

As the previous CBPP analysis explained, the Tax Foundation not only misrepresented the findings of three of the seven state-level studies it cited but also included in its review a study that was contradicted by a later paper by the same author (which the Tax Foundation did not include). The Tax Foundation omitted from its review at least 20 relevant studies about state-level taxes and growth that have been published in major journals or edited compilations since the beginning of 2000, 18 of which conclude that state and local tax levels have little if any effect on economic performance or that adverse impacts are limited to particular taxes or time periods. Taking all of these studies into account, there is simply no consensus that, as a general proposition, cutting taxes is a good strategy to boost economic growth.

Half of National Studies Cited Do Not Fully Support Tax Foundation Claim

The Tax Foundation claimed that 16 of the 19 national-level papers it examined found a "negative effect" of tax increases on economic growth, while three articles found a "neutral" effect. But the Tax Foundation gave a misleading, exaggerated, or incomplete description of six of those 16 papers. Those six papers, along with brief summaries and relevant excerpts, are:

Stephen Miller and Frank Russek, "Fiscal structures and economic growth: international evidence," *Economic Inquiry*, 1997

The Tax Foundation said that this paper concludes that "tax-financed spending reduces growth in developed countries." This description ignores Miller and Russek's finding that the impact of tax increases on growth depends crucially on how the revenues raised are spent. In particular, Miller and Russek find that education spending and deficit reduction financed through tax increases can *improve* growth.

> "Debt-financed increases in expenditure retard growth; tax-financed increases in government expenditure lead to either higher or lower economic growth depending on the expenditure

[4] "The Truth About Taxes and Economic Growth," Interview in *Challenge*, vol. 46, no. 1, January/February 2003, pp. 5–14. http://www.challengemagazine.com/Challenge%20interview%20pdfs/Slemrod.pdf.

category. *Education expenditure is the only category that possesses evidence of a positive effect on economic growth. Finally, increasing the government surplus generally raises growth, especially if the deficit is reduced by raising taxes*." [Emphasis added.]

Stefan Fölster and Magnus Henrekson, "Growth effects of government expenditure and taxation in rich countries," *European Economic Review*, 2001

The conclusions of this paper are mixed, but the Tax Foundation reports only some. The paper looks for relationships between government expenditures and growth and between taxes and growth in OECD (Organisation for Economic Co-operation and Development) countries. It finds a statistically robust relationship for government expenditures but not for taxes[5] — and therefore mentions only the spending relationship in its conclusion. The paper finds a relationship between taxes and growth only when six additional medium- and high-income jurisdictions are added to the sample: Hong Kong, Singapore, Israel, Mauritius, Korea, and Taiwan. The Tax Foundation reported only the second result. Fölster and Henrekson write:

> "The results [for the OECD countries] point to a robust negative relationship between government expenditure and growth in rich countries. The size of the estimated coefficients imply that an increase of the expenditure ratio by 10 percentage points is associated with a decrease in the growth rate on the order of 0.7–0.8 percentage points. When the rich country sample is extended to non-OECD countries both government expenditure and taxation are found to be negatively associated with economic growth. These findings are robust even according to the stringent extreme bounds criterion."

As noted below, the Tax Foundation omitted from its report a paper published in the same journal that argues that the results for *both* groups of countries are unreliable.

Michael Bleaney, Norman Gemmell, and Richard Kneller, "Testing the Endogenous Growth Model: Public Expenditure, Taxation, and Growth over the Long Run," *Canadian Journal of Economics*, 2001

Like Miller and Russek's paper, this paper emphasizes the importance of evaluating the effects of taxes and spending together. When viewed in isolation, taxes can weaken economic growth, but using taxes to fund productive government spending can offset this negative impact.

> "As public expenditure ratios rise in OECD countries, financed by rising tax ratios (especially for distorting taxes such as income tax), our evidence suggests that these ratios can be expected to exert similar, but opposite, effects on GDP growth."

Richard Kneller, Michael F. Blearney, and Norman Gemmell, "Fiscal Policy and Growth: Evidence from OECD Countries," *Journal of Public Economics*, 1999

Again, the authors conclude that economic activity is affected by not only the level of public spending but also its *type*. Productive government spending, even when financed with higher taxes, can increase growth, they conclude:

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[5] As the authors write: "the coefficient for taxes is negative, but [statistically] insignificant," p 7.

> "When financed by some combination of non-distortionary taxation and non-productive expenditure, an increase in productive expenditures significantly enhances growth, and an increase in distortionary taxation significantly reduces growth."

Norman Gemmell, Richard Kneller, and Ismael Sanz, "The Timing and Persistence of Fiscal Policy Impacts on Growth: Evidence from OECD Countries," *The Economic Journal*, 2011

This paper builds on the 1997 and 2001 analyses by two of the same authors, once again showing that the growth effects from government spending can offset the negative impacts from taxation and emphasizing that the effect of a tax change cannot be disentangled from the type of tax being considered and what is happening at the same time to spending and the budget deficit. In addition, the paper stresses that any growth effects from taxes usually do not persist because fiscal policy changes frequently:

> "In practice, frequent fiscal policy changes in OECD countries mean that persistent increases or decreases in growth are rarely observed. Further, by including both (relevant categories of) public expenditure and taxes, we find that positive growth effects associated with 'productive' public spending changes have often been approximately counteracted by tax changes with negative effects. … Observed effects of fiscal policy on long-run output levels generally turn out to be small both because fiscal policy is itself volatile, and because growth-enhancing and growth-retarding fiscal changes often occur simultaneously.

and

> "[Our] results largely confirm Dalgaard and Kreiner's (2003; p. 83) a priori conjecture that: 'it may well be the case that a higher tax rate has a significant negative effect on the growth rate, but that this is roughly offset by a significant positive growth effect of the productive government expenditure that is financed by the higher tax rate, thus resulting in a small overall net effect'."

Jens Arnold *et al.,* "Tax Policy for Economic Recovery and Growth," *The Economic Journal*, 2011

The Tax Foundation's claim that this paper finds that "progressivity of PIT [personal income tax] hurts growth" is highly selective and outright misleading, given that one of the paper's findings is that cutting personal income taxes for *low-income* households is the best tax cut to make during a recession or economic recovery.

The paper does find that cutting personal income taxes while simultaneously *raising* other taxes may be good for long-run growth, though it notes that "establishing the magnitude of these effects requires additional work." Further, the Tax Foundation ignores the paper's other key findings. The paper's conclusion section in full is:

> "This article has presented empirical results that support theoretical beliefs that economic growth can be increased by gradually moving the tax base towards consumption and immovable property (especially residential property). It has also argued that growth can also

be enhanced by improving the design of individual taxes. In some cases, such as the reduction of corporate taxes and the top rate of personal income tax, it is unlikely that these growth-enhancing changes will help the recovery from the current crisis. At the same time, there are tax changes that appear to be bad for growth, such as reductions in sales taxes (particularly if they take the form of exemptions and reductions) and property taxes that would do little to speed recovery. The tax change that shows the most promise in terms of both increased growth and economic recovery is the reduction of income taxes (including social security contributions) of those on low incomes. This would stimulate demand, increase work incentives and reduce income inequality. Finally, the article has argued that any necessary increases in revenue after recovery would be least harmful to growth if they were based on increasing recurrent taxes on immovable property and consumption taxes (especially if this took the form of reducing exemptions and rate reductions)."

The Tax Foundation accurately describes three studies as finding that taxes have "neutral effects," on growth. They are:

Claudio J. Katz, Vincent A. Mahler, and Michael G. Franz, "The impact of taxes on growth and distribution in developed capitalist countries: a cross-national study," *American Political Science Review,* 1983

> "These findings run counter to the conventional assertion that an automatic trade-off exists between an active public sector and a dynamic, expanding economy. Despite a modest negative relationship between personal income taxes and savings rates, the absence of any apparent effect of tax mechanisms on rates of increase in investment or growth as a whole in OECD countries should give pause to those who posit a straightforward negative relationship between growth in the public sector and growth in the private sector."

William Easterly and Sergio Rebelo, "Fiscal Policy and Economic Growth: An Empirical Investigation," *Journal of Monetary Economics*, 1993

> "The evidence that tax rates matter for growth is disturbingly fragile. This empirical fragility contrasts sharply with the robustness of the theoretical predictions: most growth models predict that income and investment taxes are detrimental to growth. Our results on the dependence of both growth and tax policy on initial income help explain why it is difficult to isolate the effects of tax policy on growth."

Enrique Mendoza, Gian Maria Milesi-Ferretti, and Patrick Asea, "On the Ineffectiveness of Tax Policy in Altering Long-Run Growth: Harberger's Superneutrality Conjecture," *Journal of Public Economics*, 1997

> "Cross-country panel regressions, estimated using a new method for measuring effective tax rates, produce significant investment effects from taxes that are *consistent with negligible growth effects*.
>
> "We side with Harberger in concluding that changes around current tax structures *would need to be very large to result in noticeable effects on economic growth*." [Emphasis added.]

The Tax Foundation's description of an additional ten studies as finding that lower taxes are associated with economic growth is, broadly speaking, correct.[6] Yet the findings of many of these papers are more nuanced than the Tax Foundation's categorization would indicate:

- The Tax Foundation correctly points out that the studies by Lee and Gordon (2005) and Ferede and Dahlby (2012) find that some taxes don't harm economic growth. But the Tax Foundation includes those studies in its list of 23 studies that it purports find a negative effect of taxes on growth. In fact, the Ferede and Dahlby study presents evidence that sales tax increases can have a *positive* effect on growth.

- While the Romer and Romer (2010) paper finds that policy-motivated tax increases overall are associated with lower growth, they also find evidence that tax increases motivated by reducing deficits are associated with *faster* growth (although these results are not statistically significant).

In total, contrary to the Tax Foundation's claim that 16 of the 19 studies about national taxes showed that taxes have a negative effect on growth, only ten of the studies can be reasonably characterized that way.

[6] Ergete Ferede and Bev Dahlby, "The Impact of Tax Cuts on Economic Growth: Evidence from the Canadian Provinces," National Tax Journal, 2012; Karel Mertens and Morten Ravn, "The dynamic effects of personal and corporate income tax changes in the United States," American Economic Review, 2012; Robert Barro and C.J. Redlick, "Macroeconomic Effects of Government Purchases and Taxes," Quarterly Journal of Economics, 2011; Christina Romer and David Romer, "The macroeconomic effects of tax changes: estimates based on a new measure of fiscal shocks," American Economic Review, 2010; Alberto Alesina and Silvia Ardagna, "Large changes in fiscal policy: taxes versus spending," Tax Policy and the Economy, 2010; International Monetary Fund, "Will it hurt? Macroeconomic effects of fiscal consolidation," World Economic Outlook: Recovery, Risk, and Rebalancing, 2010 (note that while the Tax Foundation described all 26 studies as peer-reviewed, this is not a peer-reviewed article published in an academic journal); Young Lee and Roger Gordon, "Tax Structure and Economic Growth," Journal of Public Economics, 2005; Olivier Blanchard and Robert Perotti, "An Empirical Characterization Of The Dynamic Effects Of Changes in Government Spending And Taxes On Output," Quarterly Journal of Economics, 2002; Fabio Padovano and Emma Galli, "Tax rates and economic growth in the OECD countries (1950-1990)," Economic Inquiry, 2001; Reinhard Koester and Roger Kormendi, "Taxation, Aggregate Activity and Economic Growth: Cross-Country Evidence on Some Supply-Side Hypotheses," *Economic Inquiry*, 1989.

Tax Foundation Methodology Bound to Produce a Meaningless Result

The Tax Foundation report examined a number of academic studies and stated whether each found that taxes had a "positive," "neutral," or "negative" effect on growth. As this paper and the previous CBPP report on the state-level studies the Tax Foundation examined show, the Tax Foundation mischaracterized many studies and ignored many other studies that contradicted its claims.

More fundamentally, to frame the issue as broadly as whether taxes are "positive" or "negative" for growth masks the fact that the answer can depend on the type of tax, initial level of taxation, the particular country (or state), the business cycle and underlying economic structure, what the tax is used to pay for, and how it is designed — as studies even in the Tax Foundation's limited survey found.[a]

For example, raising statutory marginal tax rates on low-income people to reduce short-run deficits during an economic recovery may have a very different impact on the economy than closing tax loopholes for high-income people when the economy is at full capacity.[b] And evidence drawn from a small, open economy about either of those policies may be irrelevant to a large economy like the United States.

In short, any attempt to derive a single, universal conclusion about taxes and growth from academic studies that span vastly different time periods, countries, economic conditions, and types of taxes is bound to prove meaningless.[c]

As also discussed in the Appendix, even when the findings of a study are correctly reported, that does not mean that those findings are reliable. Many academic studies in this area contain methodological flaws.

[a] See, for example, this paper's discussion of Stephen Miller *et al.* 1997 and Romer *et al.* 2010. The Tax Foundation study also fails to distinguish between studies that examine the effect of raising or lowering effective *marginal* tax rates and those that examined lowering or raising *average* taxes, and whether the *level* or *growth* of GDP was at issue.

[b] See, for example, our discussion of Jens Arnold *et al*., 2011.

[c] See, by contrast to the Tax Foundation's simplistic approach, two careful academic reviews of academic literature related to fiscal settings and government growth, one of which pre-dates and another of which post-dates the Tax Foundation study: Joel Slemrod, "What Do Cross-Country Studies Teach About Government Involvement, Prosperity and Economic Growth?" Brookings Papers on Economic Activity, 2, 1995, pp. 373-431, http://goo.gl/nAuDva; and Norman Gemmell and Joey Au, "Do Smaller Governments Raise the Level or Growth of Output? A Review of Recent Evidence," *Review of Economics,* Volume 64, Issue 2, August 12, 2013, pp. 85-116, http://goo.gl/VcxhE6.

Tax Foundation Review Omitted Recent Studies That Contradict Its Claims

In addition to mischaracterizing many of the studies that it cited, the Tax Foundation report — which claimed to review "nearly every empirical study of taxes and economic growth published in a peer-reviewed academic journal" — omitted dozens of recent studies on this topic, many of which were published in the same journals as the articles that the Tax Foundation *did* review.[7]

[7] Numerous *non*-peer-reviewed working papers and discussion papers on the issues addressed here also exist, including those published by reputable sources including the Congressional Research Service and Congressional Budget Office.

Because so many studies on the impact of taxes on economic growth have been published since 2000, we have not provided an exhaustive list of the studies that the Tax Foundation omitted.[8] But to illustrate, a recent academic survey of the literature on government size and growth listed 16 cross-country panel data studies published in peer-reviewed journals between 1999 and 2011.[9] The Tax Foundation study cited just four of those. (And, as our previous paper noted, the Tax Foundation omitted 20 peer-reviewed studies on *state*-level taxes and growth, 18 of which contradicted the Tax Foundation's conclusion.)

Three examples illustrate the Tax Foundation's incomplete selection of studies:

Jonas Agell, Henry Ohlsson, and Peter Skogman Thoursie, "Growth effects of government expenditure and taxation in rich countries: A comment," *European Economic Review*, 2003

> This study, published in the same journal as the Fölster and Henrekson study cited above, attempted to replicate that study's methodology and address its flaws; the Tax Foundation cited the Fölster and Henrekson study but not the Agell *et al.* response, which concluded:
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> "In our view the new results reported by [Fölster and Henrekson] give no guidance on the magnitude of the growth-retarding effects of a large public sector. . . . In effect, it merely suggests that cross-country panel regressions is too imprecise a business to shed light on the important policy issues.
>
> "[Fölster and Henrekson] claim that they solve a number of difficult econometric issues that has been identified by recent surveys of the cross-country growth literature. We do not agree. . . . Moreover, using theoretically valid instruments we find that the estimated partial correlation between [the] size of the public sector and economic growth is statistically insignificant and highly unstable across specifications. A policy-maker who wants to promote growth is well-advised to look for other evidence than cross-country growth regressions."

Konstantinos Angelopoulos, George Economides, and Pantelis Kammas, "Tax-spending policies and economic growth: Theoretical predictions and evidence from the OECD," *European Journal of Political Economy,* 2007

As noted above, the Tax Foundation cited Lee and Gordon's 2005 finding that corporate taxes have a negative effect on growth but not that same study's finding that *other* taxes have no discernable effect on growth. It also failed to include in its study a 2007 paper by Angelopoulos *et al.* that used the same dataset as Gordon and Lee and was cited in another study that the Tax Foundation included.[10]

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[8] CBPP's previous analysis of the state-level articles cited by the Tax Foundation found 20 peer-reviewed academic studies published since 1999 that the Tax Foundation did not include. The Tax Foundation omitted considerably more national-level studies; the bibliographies of the studies cited here and in the Tax Foundation's review alone show scores of articles on this topic.

[9] Norman Gemmell and Joey Au, "Do Smaller Governments Raise the Level or Growth of Output? A Review of Recent Evidence," *Review of Economics,* Volume 64, Issue 2, August 12, 2013, pp. 85-116, http://goo.gl/VcxhE6.

[10] Norman Gemmell, Richard Kneller, and Ismael Sanz, "The Timing and Persistence of Fiscal Policy Impacts on Growth: Evidence from OECD Countries," *The Economic Journal*, 2011.

Angelopoulos *et al.* analyzed 23 OECD countries, which have economies more comparable to the United States than the larger group of 70 countries that Lee and Gordon analyzed. Angelopoulos *et al.* found that although taxes on labor have a negative effect on growth, the level of corporate income taxes is either *positively* related to growth or has no statistically significant effect.

> "Thus, the relation between growth and fiscal policy is not expected to be monotonic. The empirical evidence has so far been mixed.
>
> "[T]he significant negative effect of the statutory corporate tax rate, obtained in Lee and Gordon (2005) from a 70-country world sample, does not seem to apply to OECD countries. Therefore, the tax structure matters to growth, with different tax rates having different effects.
>
> "Our results suggest that OECD countries could improve their growth performance by reallocating public spending towards productive activities. With respect to the effects of tax rates, labor income tax rates are negatively related to growth, whereas capital income and corporate income tax rates are usually positively related."

Leonel Muinelo-Gallo and Oriol Roca-Sagalés, "Economic Growth and Inequality: The Role of Fiscal Policies," Australian Economic Papers, 2011

This study uses data from several dozen middle/high income countries over 1972–2006 and a methodology that draws on a number of the studies cited by the Tax Foundation. Like other articles mentioned above, it emphasizes that the impact of tax increases on growth depends on how the revenues are used. It also considers the impact of fiscal policy changes on inequality:

> "According to our estimates, increasing the size of the public sector (through current expenditures and direct taxes) improves the distribution of income at the expense of economic growth. The effects of indirect taxes on both output and inequality are found to be statistically insignificant. Moreover, the novelty of these results is that they indicate that under certain circumstances the classic trade-off between efficiency and equity when implementing specific public policies could be avoided. *In particular, increasing public investment reduces inequality without harming output, no matter if it is financed through direct or indirect taxes.*" [Emphasis added.]

Further, while the Tax Foundation cherry-picks results for particular tax types from some studies, it cites *none* of what three leading tax economists recently termed the "large and growing" empirical literature about the effects of changing marginal income tax rates for high-income households.[11] As they concluded in a comprehensive evaluation of those studies, "there is no compelling evidence to date of *real* responses of upper income taxpayers to changes in tax rates." The literature suggests that if the alternative to raising taxes is larger deficits, then modest tax increases on high-income

[11] Emmanuel Saez, Joel Slemrod, Seth H. Giertz, "The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review," *Journal of Economic Literature, Vol. 50, No. 1, March, 2012, at* page 40, http://elsa.berkeley.edu/~saez/saez-slemrod-giertzJEL12.pdf.

households would likely be more beneficial for the economy over the long run — and that cutting taxes for high-income U.S. households would not turbocharge growth.[12]

Conclusion

Thirteen of the 26 studies cited by the Tax Foundation do not support its assertion that tax increases harm economic growth. Furthermore, its report omits many comparable peer-reviewed studies, a number of which rebut studies in the Tax Foundation report. The Tax Foundation's claim of a "growing consensus" that tax increases harm growth is simply false.

The lack of consensus partially reflects the fact that the many different studies examine different measures and types of taxes,[13] across different political units, economic conditions, time periods, fiscal and monetary policies — all of which affect how taxes influence growth. Differences among studies' methodologies also have an important impact on their findings. In particular, some studies, including those in the Tax Foundation's own survey, emphasize that when drawing lessons for policy, what taxes are *used for* is crucial in understanding how taxes affect growth. Some tax increases to finance investments such as deficit reduction and education are associated with increased economic growth. Thus, the proper answer to a question as broad as whether tax increases are "positive" or "negative" for growth is: "It depends."

[12] Emmanuel Saez, Joel Slemrod, Seth H. Giertz, "The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review," *Journal of Economic Literature, Vol. 50, No. 1, March, 2012*, http://elsa.berkeley.edu/~saez/saez-slemrod-giertzJEL12.pdf.

[13] For example, while previous studies had relied on observed average tax rates, Padovano and Galli (2001) attempted to model effective marginal tax rates in order to use a more theoretically appropriate measure for investigating the effect of tax changes on growth.

Appendix

Attempts to Evaluate Relationship Between Taxes and Growth Face Significant Methodological Problems

As this report details, the Tax Foundation inaccurately or incompletely summarized the conclusions of many studies on taxes and growth. Even when it accurately reports a study's conclusion, it does not consider the study's quality, which may be poor. Empirical papers on taxes and growth have to grapple with many daunting methodological challenges. These challenges — and the varied (and sometimes unsound) approaches that studies take to meet them — are likely an important reason why the literature is so varied.

The challenges include small sample sizes for tax changes and errors in measuring tax levels or changes, particularly when using statistics from different countries and time periods.[14]

Two other challenges are even more fundamental. First, in pursuit of whatever goal a given tax change is designed to achieve — such as to reduce budget deficits, offset changes in government spending, stimulate a weak economy, or for ideological reasons — policymakers often enact *other* policy changes as well, which can also affect economic activity. Second, while tax changes may affect growth, changes in growth might prompt policymakers to change tax levels or the structure of the tax system; in other words, the causal arrows may point in both directions.

If a study does not overcome both of these problems, it will simply show that taxes are *correlated* with economic growth, not that they *cause* changes in economic growth. Studies try to overcome these difficult problems with varying degrees of success:

- One common approach is to try to identify an "instrumental variable" that affects the tax measure and affects economic growth *only* through the tax measure. For example, Lee and Gordon (2005) use the weighted average personal and corporate tax rates in nearby countries as an instrument for a country's tax rate. The intuition is that neighboring countries' tax rates will influence a given country's tax rates but won't affect that country's economic growth rates in any other way. If that hypothesis is correct, then if a country's growth rates go up when taxes in nearby countries go down, the likely reason is that the country's own tax cuts are *causing* its economic growth rates to increase.

- Using this method, Lee and Gordon concluded (as discussed above) that corporate taxes harm economic growth. However, the study's assumption that neighboring countries' tax rates affect economic growth in a given country *only* by influencing its tax rates is highly questionable as it ignores channels such as bilateral trade, and consumer demand.

- To try to overcome the problem that economic growth affects taxes (as well as the other way around), some studies use lagged variables — that is, they look at how taxes in one year affect growth rates in subsequent years. The idea is that if there is a correlation between taxes in one

[14] See Gemmell and Au.

year and growth in subsequent years, it can't be because growth affected taxes, since growth rates cannot determine tax-rate changes made in a previous year.

However, policymakers might change tax policy in anticipation of future growth rates, such as by cutting taxes to try to stave off worsening economic conditions. Further, there can be a close relationship between previous, current, and future growth rates. This method therefore does not perfectly isolate a causal link between taxes and economic growth.

- Increasingly, empirical work on the relationship between taxes and growth has used a "narrative approach," most recently developed by economists Christina and David Romer. Their 2010 study attempts to overcome the problems listed above by considering legislated tax policy changes that occurred for ideological or long-term reasons but not in response to economic forecasts. While the Romers' approach represents an important contribution to the literature, it is important to note that their study only looks at a specific type of tax change, namely those that the authors identify as *not* responding to economic conditions. As the authors note, further work is necessary to identify how the specific characteristics of tax changes (such as their perceived permanence and their effect on marginal tax rates) relate to economic activity.

These significant challenges, and the various strategies that researchers are developing to deal with them, are yet another reason to be cautious about sweeping, overly broad conclusions from the literature in this area.