Washington Center for Equitable Growth

The benefits and drawbacks of using dynamic scoring in the federal budget

By Robert G. Lynch February 12, 2015

Overview

One of the first actions taken by the U.S. House of Representatives this year was the approval of a rule change requiring so called dynamic scoring for some proposed legislation. Under the new rule, when the non-partisan U.S. Congressional Budget Office and Joint Committee on Taxation calculate the official budgetary cost of a special category of proposed legislation they will now have to include an estimate of the effects of the legislation on economic growth and the feedback effects of that growth on the budget. The new rule goes into effect this year.

This issue brief explains what dynamic scoring is, what legislation it must be applied to under the new House rule, and what its advantages and disadvantages are in general and then more specifically under the new rule. As explained in detail below, dynamic scoring has theoretical advantages but practical problems that undercut its usefulness. The use of dynamic scoring is likely to lead to greater budgetary uncertainty and, oftentimes, less accurate budget forecasts.

Most critically, from an economic perspective, the selective application of dynamic scoring to budgetary analysis as specified in the new House rule may bias careful evaluation of tax and spending proposals and lead to public policy distortions that will slow down long-run economic growth, weaken job creation, and undermine economic well–being. Understanding the problems with dynamic scoring and the macroeconomic models it relies on to predict future economic growth will be important in particular as Congress and the Obama Administration begin to build a new budget for the fiscal year beginning in October 2015.

What is dynamic scoring?

The U.S. Congressional Budget Office, a nonpartisan federal agency that provides economic and budget information to Congress, and the Joint Committee on Taxation, a

nonpartisan committee of Congress that analyzes tax legislation, evaluate the budgetary consequences of proposed legislation. Under the law that will be superseded by the new House rule, CBO and JCT would "score" legislation by estimating how much revenue would be lost or gained by a tax change proposal and how much money would be spent or saved by spending proposals such as investments in roads or reductions in federal spending on space exploration.

Sometimes proposed legislation, such as the Patient Protection and Affordable Care Act, or Obamacare, involved both tax and spending changes. In those cases, the CBO and JCT calculated the net impact of both the spending and tax changes on the budget. In the case of Obamacare, for example, CBO and JCT calculated that the various tax and spending provisions of the proposed law would raise $486 billion in federal government revenue and increase federal spending by $356 billion over the ten-year period between 2010 and 2019. In giving their final score, they concluded that the "spending and revenue effects of enacting the Patient Protection and Affordable Care Act would yield a net reduction in federal deficits of $130 billion over the 2010-2019 period."[1]

It is important to note that when scoring, or calculating, the budgetary consequences of proposed legislation, CBO and JCT assumed that the legislation would have no effect on economic growth, although they did take into account many individual behavioral changes or microeconomic effects.[2] The House of Representative's proposed "dynamic" scoring method, therefore, is different from the old scoring method because, in estimating the fiscal consequence of some proposed legislation, it will require CBO and JCT to estimate the effects of that legislation on economic growth and then factor in the estimated growth effects on the budget.[3]

In practical terms, this means that for the special class of legislation that will be subjected to dynamic scoring under the new House rule, the budgetary impact will be estimated to be less onerous than under the conventional scoring method when that legislation is deemed to increase economic growth. By the same logic, the dynamic score will be more onerous than the conventional score when that legislation is judged to reduce growth. But under the new House rule, what legislation must be dynamically scored?

Legislation subject to dynamic scoring under the new House rule

Under the new rule, CBO and JCT are required to incorporate an estimate of the growth or macroeconomic effects of "major legislation" into their official budget cost estimates. "Major legislation" is defined as tax bills or mandatory spending bills that cause an increase or decrease in revenues, outlays, or deficits of more than 0.25 percent of GDP (approximately $45 billion in 2015) in any given year. In addition, the chair of the House Budget Committee and, for revenue legislation only, the chair or vice chair

of the Joint Committee on Taxation can designate other bills as "major legislation" even when they do not meet the 0.25 percent-of-GDP threshold.

At first glance, the new rule may seem evenhanded in its treatment of proposed tax and spending legislation. But it is not. Instead, it will apply almost exclusively to tax bills and rarely, if ever, to spending bills. The rule does not apply to spending bills that are "discretionary" as opposed to "mandatory" even if discretionary spending proposals exceed the 0.25 percent-of-GDP threshold. Thus, it does not apply to all the regular appropriations bills that include almost all spending or investment in infrastructure, education, health, research, science, national defense, and hundreds of other programs. In addition, although dynamic scoring does apply to "mandatory" spending, the largest categories of which include Social Security and Medicare spending, it does so only if the budgetary effect of a *change* in annual spending in those programs due to proposed legislation exceeds 0.25 percent of GDP. It is unlikely that any proposed legislation will change annual spending in mandatory programs by $45 billion or more in any given year.

The upshot: Annual appropriations or investments of hundreds of billions of dollars in highway reconstruction, early childhood education, health care, and hundreds of other programs would not be subject to dynamic scoring, but a $45 billion tax proposal would be. For all practical purposes, therefore, the new rule will apply almost exclusively to tax legislation. Indeed, the House Committee on the Budget has noted that the rule would have applied to only 3 bills in the last Congress, all of which were primarily tax bills.[4]

What's more, as explained in the section below describing the problems with dynamic scoring, the selective nature of the new House rule undermines theoretical arguments in favor of dynamic scoring—arguments that might lead to the adoption and application of the method to budgetary analysis should the many obvious practical hurdles to accurate dynamic scoring be overcome some day. But before describing the problems of dynamic scoring, lets first look at its theoretical advantages.

Advantages of dynamic scoring in theory

Many government tax or spending policies are likely to influence economic growth. Economic research shows that during a recession some investments in infrastructure, education, and health care spur faster growth while cutbacks in these areas can slow growth. Likewise research shows that during an economic downturn some tax cuts stimulate growth while tax increases reduce growth.[5] Measuring these effects is very difficult to do with extreme precision, but two ways would be to

- Improve the accuracy of budget scoring
- Remove the bias against pro-growth policies in budget scoring

Let's look briefly at each of these theoretical advantages.

Improving accuracy of budget scores

When policy affects economic growth, it will have a feedback effect on the budget because the policy will affect the size of the economy and influence the level of public revenues and expenditures. A larger economy generates more tax revenue and reduces expenditures on many programs such as unemployment insurance. Similarly, a smaller economy produces less tax revenue and tends to increase spending on many programs such as nutrition assistance. Under perfect dynamic scoring, then, policies that promote growth will have a smaller budgetary cost and those that slow growth will have a larger budgetary cost than conventional CBO scoring predicts.

Ignoring these growth feedback effects causes conventional CBO scores to be less accurate than they otherwise could be. In an ideal world, every tax and spending proposal would be subjected to rigorous dynamic scoring so that we could get a true picture of the revenue and expenditure impacts of all legislation. The bottom line is that dynamic scoring, at least in theory, could provide policymakers and the public with more accurate budgetary information.

Remove bias against pro-growth policies

A second theoretical advantage of accurate dynamic scoring is that it is not biased against pro-growth policies compared to the current conventional scoring method. By ignoring macroeconomic effects, the conventional method overstates the true budgetary cost of pro-growth policies, such as infrastructure investments, and understates the cost of anti-growth policies.

Consider the conventional scoring of two policies with opposite impacts on economic growth. Policymakers weighing these two alternative proposals could be misled into rejecting the policy that has a positive impact on economic growth because it would be erroneously estimated to be more costly than it truly is, while they may be pushed into selecting the anti-growth policy because it would be falsely scored as less costly than it actually is.

Disadvantages of dynamic scoring in practice

The theoretical advantages of dynamic scoring, however, run into an array of serious practical hurdles. These practical considerations overwhelm the two theoretical reasons for considering dynamic scoring, namely:

- Economists do not know how to accurately measure the growth effects of most policies
- Dynamic scoring relies on less-than-accurate, theory-based macro models
- The macro models undergirding dynamic scoring have numerous controversial and unproven built-in assumptions
- The assumptions embedded in the macro models are not always carefully empirically based
- Macro models exclude theoretically and empirically supported evidence of supply-side effects of public investment
- Macro models exclude evidence-based effects of economic inequality
- Macro models exclude evidence-based effects of numerous policies
- Macro models provide different estimates of growth impacts of policy depending on guesses of how the policy may be financed

Let's examine each of these disadvantages in turn.

Economists do not know how to accurately measure the growth effects of most policies

The first problem is that we do not know how to accurately measure the growth effects of most policies, a problem not faced by CBO and JCT under conventional scoring, which does not require estimates of the future growth effects of policy.

Future macroeconomic outcomes, such as growth, unemployment, and inflation are a function of a vast multitude of factors that include economic policies but also many other policy-unrelated events such as technological innovation, an outbreak of war, or a catastrophic weather phenomenon, to give just a few examples. Empirically identifying, isolating, and measuring the macroeconomic consequences of one specific policy is very time consuming, often involving many years of research, and is fraught with difficulty and large errors.

Dynamic scoring relies on less than accurate, theory based macro models

In practice, instead of basing budgetary estimates on empirically verified evidence, as is often done in conventional scoring, the CBO and JCT's dynamic scoring relies on macroeconomic forecasting models that are theory based.[6] There are a host of such macroeconomic models that attempt to measure growth effects and the subsequent feedback effects on the budget. They all come to different conclusions, none of which may lead to

more accurate budget scores than under the CBO's and JCT's current approach.

In May, 2003, for example, the Joint Committee on Taxation (which scores tax legislation) provided a dynamic analysis of the House version of the tax cut legislation that was enacted in 2003.[7] JCT used three different macro models with multiple sets of assumptions to come up with 5 different predictions of the budgetary impacts.

The JCT's dynamic analysis found that the feedback effects would be deficit reducing and would reduce the net revenue loss from the proposed tax cut legislation relative to the conventional CBO estimate by anywhere from 5.8 to 27.5 percent over the first five years (2003—2008), and 2.6 to 23.4 percent over the next five years through 2013. Now, nearly 12 years later, we can look back and accurately assess which of the scores was most accurate. It turns out that the most accurate was the conventional JCT score because all of the macro models failed to anticipate the great recession, and their revenue estimates were thus wildly optimistic and worse than the conventional estimate. To get an idea of how off-base the dynamic scores were, consider that they all expected GDP in 2013 to be larger than the roughly $17.9 trillion that the conventional score anticipated.[8] Actual GDP in 2013 amounted to just $16.6 trillion, a difference of $1.3 trillion.[9]

The lesson: macro models are still in their infancy. The large differences in their predictions are a function of both the different assumptions built into the models and the varying sensitivity of each model to those assumptions. Because we do not fully understand how the economy actually works, macro models are necessarily built on theoretical assumptions or educated guesses about the way the real economy works, many of which we know are sometimes not true and many others which have little hard data to back them up. Most macro models, for example, assume that the economy is typically at full employment or will quickly return to full employment.[10] Neither has been the case for the past six years.

The macro models undergirding dynamic scoring have numerous controversial and unproven built-in assumptions

Most macro models assume that there are significant supply-side work incentive effects due to tax cuts. The argument goes like this—when given a tax cut, people will choose to work longer and harder thereby spurring economic growth. The theoretical basis for this assumption is that a tax cut increases the returns to working as workers can keep a larger share of their earnings, causing workers to substitute more work for leisure. But there is a plausible theoretical reason to assume the opposite: Tax cuts discourage work because they raise take home pay and enable workers to afford more leisure and less work.

Similarly, most macro models assume that tax cuts on income from investments spur more investment, faster economic growth, and job creation. But here too, theory leads to contradictory conclusions. A tax cut on returns to investment, such as a dividends

tax cut, may, in theory, make investment more attractive and thereby induce additional investment and faster economic growth. Yet a tax cut that raises current and future investment yields may simply cause individuals to consume more and thereby save and invest less, slowing long-run economic growth and job creation.

The assumptions embedded in the macro models are not always carefully empirically based

Whatever the merits of these theoretical arguments, there are numerous studies that have tried to quantify these incentive effects in the real world and have come to contradictory conclusions about whether there are incentive or disincentive effects. Most of these studies conclude that the effects on incentives to work and invest due to tax cuts, whether positive or negative, are very small—much smaller than typically assumed in many macro models.[11]

It is important to understand this particular theoretical and technical problem with macro models and dynamic scoring—they have embedded within them implicit or explicit supply-side behavioral responses, in terms of work effort and investment, to tax changes that are larger than can be justified by empirical evidence. In other words, these models typically assume larger changes in work effort and investment in response to tax changes than can be supported by a careful analysis of the data. This means that they could overstate the beneficial growth effects and subsequent positive feedback effects on budgets of tax cut proposals and exaggerate the detrimental effects on growth of tax increases.

In a recent careful comparison of the empirical estimates of supply-side responses to the estimates of supply-side responses embedded in eight of the most widely used macro models, including four models used by CBO or JCT, the Congressional Research Service finds that some models "make little attempt to connect the elasticities associated with labor supply to the ones found in empirical evidence."[12] Elasticities in economics parlance measures how one variable responds to another variable, such as how much work and investment change in response to a tax change. The Congressional Research Service also finds that some models had assumptions about the behavioral responses to taxes on investment income that were large, "unlikely and not empirically studied."

Macro models exclude theoretically and empirically supported evidence of supply-side effects of public investment

At the same time as they include questionable assumptions about the supply-side effects of taxes, macro models generally exclude supply-side effects of government spending programs even when they can be supported theoretically and by empirical evidence. For instance, a public investment in infrastructure could lower business transportation costs and increase productivity, thereby making private investment more attractive. If so, then

the public investment will induce more private investment, stimulate growth, and create jobs. A growing body of empirical research shows that public investment does indeed have a positive supply-side impact by inducing or "crowding-in" private investment. [13]

This supply-side effect of public investment causes faster economic growth and leads to job creation. To the extent that macro models ignore this supply-side effect of public spending, they will understate the growth effects of government investment and the positive budgetary feedback effects that dynamic scoring, if done correctly, should be able to capture. In short, macro model estimates of economic outcomes are overly determined by their built-in supply-side assumptions, which are biased in favor of tax cuts and against spending increases.

Macro models exclude evidence-based effects of economic inequality

Then there are a host of assumptions for which we have evidence but which are not included in these models, sometimes because we do not know how to incorporate them into the models. There is growing evidence, for example, that high levels of economic inequality (such as those prevailing in the United States over the past few decades) slow economic growth.[14] Similarly, evidence is accumulating that tax cuts benefiting the wealthiest, such as business tax cuts and reductions in the top marginal personal income tax rates, contribute to income inequality.[15] If this new research is correct, then tax cuts for the rich may contribute to income inequality and slow economic growth—exactly the opposite growth effect of what many macro models assume and predict. Macro models generally do not take these potentially negative effects of tax cuts into account.

Macro models exclude evidence-based effects of numerous policies

Even when the empirical evidence is overwhelming, macro models may ignore the data. Fifty years of careful research demonstrates that investments in high-quality early childhood education programs have enormous long-term payoffs in the form of faster economic growth.[16] These investments partly or largely pay for themselves by generating faster growth, more earnings, and large increases in government revenues.

Similarly, there are well-documented positive growth-and-revenue effects of policies that raise academic achievement and narrow educational achievement gaps between children from wealthy families and other children. A new study that I wrote for the Washington Center for Equitable Growth documents these positive effects on our economic growth and federal fiscal health over the next 35 and 65 years.[17] But look for those assumptions in a macro model and you will come up empty.

Macro models provide different estimates of growth impacts of policy depending on guesses of how the policy may be financed

To make matters worse, each macro models spits out different predictions about the growth effects of legislation depending on the assumptions fed into the model about how the legislation will be financed. All tax and spending proposals are financed and the financing methods affect the economy in differing ways. Consider a $100 billion tax cut proposal. Will the tax cut be paid for by cutting $100 billion in spending, raising $100 billion in other taxes, borrowing $100 billion, or some combination of all three? The fact is, we do not know today how legislation will be financed over time, but the financing method we input into a macro model will affect the model's prediction for future economic growth.

If JCT guesses incorrectly how the tax cut will be financed in the future, then their dynamic score will necessarily be wrong even if the macro models they use are accurately constructed. That's why it's important to note that under conventional scoring there is no need for CBO or JCT to guess about future and unknowable congressional actions that will impact how much a current proposal will cost or save because a conventional score does not attempt to measure growth effects.

So, if we insist on dynamic scoring, which macro model, with which assumptions, will we use? Will we rely on those models whose assumptions give the most favorable answers, the least favorable answers, or something in between? Will that make budgeting more accurate? Or will it be more susceptible to manipulation and less accurate? Right now, the answers to these questions are highly debatable compared to the consensus surrounding the current conventional method of scoring used by CBO and JCT.

Dynamic scoring causes a coordination problem with standard government economic and budget forecasts

There is also a non-trivial coordination problem that arises when dynamic scoring is used under the new House rule. At present, CBO makes a series of budget and economic forecasts using baseline economic assumptions that are updated twice every year. If dynamic scoring is used to analyze certain pieces of legislation and the new proposals are deemed to have economic impacts, even very small ones, then to maintain the consistency and accuracy of the regular CBO forecasts the baseline economic assumptions would have to be updated every time those new proposals are passed into law. If the new House rule had been in effect in 2014, then it would have required the application of dynamic scoring to three proposals which, had they passed, would have necessitated a more than doubling of the number of annual baseline updates.

The new House rule is biased against pro-growth policy

Clearly there are good reasons to be concerned about the growth-undermining biases of dynamic scoring in the new House rule. Instead of correcting the anti-growth bias of conventional scoring, dynamic scoring may exacerbate the problem because the new House dynamic scoring proposal does not apply to discretionary spending, thereby ignoring potential growth effects of investments in many areas including in research, health, education, and infrastructure.

Consider a large tax cut proposal that benefits the wealthiest taxpayers and compare it to an equal-sized investment in infrastructure. Some of the latest empirically-based economic research suggests that the true growth effect of such a tax cut proposal may be negative.[18] But, given the assumptions built into the macro models, under dynamic scoring it would likely be judged to have a pro-growth effect and cost less than the conventional score would suggest. The infrastructure investment, by contrast, may have a positive impact on growth and may actually cost less than the tax cut proposal. But, by the conventional scoring that the pro-growth investment would be subject to under the new House rule the investment would be assumed to have no effect on growth and would thus be incorrectly judged to cost more than the equal-sized but dynamically scored, anti-growth tax cut proposal.

To make matters much worse, macroeconomic models that find growth effects of tax cuts often do so only when they make the assumption that tax cuts will be paid for in the future by reductions in government spending and further assume that these future reductions in government investment will have no negative impact on growth. Provided this budgetary misinformation, policymakers may vote for growth-retarding, growth-neutral, or relatively slow growth-promoting tax cut proposals over relatively faster growth-promoting investments.

Conclusion

Given the uncertainty and biases inherent in the assumptions undergirding currently existing macro models, it makes little sense to use dynamic scoring. But if we are going to use dynamic scoring, at minimum it should be done in an appropriate and balanced manner and applied to expenditure programs as well as tax proposals. Unfortunately, dynamic scoring of all proposed legislation is clearly not feasible because CBO and JCT do not have the time or resources to dynamically score all proposals. While there is a cost to doing dynamic scoring there may frequently be little benefit because for most legislation the macroeconomic effects would be small and uncertain, and the feedback effects on the budget would likely be negligible.

Indeed, arguably one of the best reasons to use accurate dynamic scoring would be to check the empirically unverified claims made by some Members of Congress that their pet legislative proposals would pay for themselves by boosting growth and subsequent revenues. But given the costly nature of dynamic scoring and the insignificant budgetary impacts of most proposed legislation, it should be restricted to analyzing the macroeconomic effects of only significant proposals—all significant policies, including spending proposals as well as tax proposals.

If dynamic scoring were done across the board for all significant tax and spending proposals using highly accurate macro models then thoughtful people should be for its use. But given the reality of unsophisticated and inaccurate macro modeling, built on less than thorough, rigorous, and evidence-based assumptions, and subject to biases and manipulation, we would do better to continue using the conservative, less expensive, and transparent conventional scoring method. The use of dynamic scoring given the current state of the art, may cause greater budgetary uncertainty and less accurate budget forecasts.

Perhaps most damaging, the new House rule may preclude careful evaluation of tax and spending proposals and lead to public policy distortions that will slow down long-run economic growth, weaken job creation, and undermine economic well–being.

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Endnotes

1 Letter from Douglas W. Elmendorf, Director of the Congressional Budget Office, to Senator Harry Reid, Majority Leader of the United States Senate, November 18, 2009.

2 For example, an estimate of the budgetary impact of increasing the share of medical costs that Medicare recipients must pay out of pocket would take into account that individuals would react to the change in Medicare by going to the doctor less frequently. Similarly, an estimate of the revenue raised by an increase in taxes on dividends would take into consideration that the tax increase would cause individuals to shift their income from dividends to other forms of income, such as capital gains income.

3 These growth effects are what economist refer to as macroeconomic effects.

4 See House of Representatives, Committee on the Budget. *Macroeconomic Scoring Q&A*. Washington, D.C. budget.house.gov/macroeconomicscoring/macroeconomic-scoring-qa.htm

5 See, for example, economic research on the effects of public investment and tax changes on the 2007-2009 U.S. economic recession: James Feyrer and Bruce Sacerdote, "Did the Stimulus Stimulate? Real Time Estimates of the Effect of the American Recovery and Reinvestment Act," Working Paper 16759, (National Bureau of Economic Research, 2011); Gabriel Chodorow-Reich, Laura Feiveson, Zachary Liscow, and William Gui Woolston. "Does State Fiscal Relief during Recessions Increase Employment? Evidence from the American Recovery and Reinvestment Act." *American Economic Journal: Economic Policy*, 4(3)(2012): 118-45; Daniel J. Wilson "Fiscal Spending Jobs Multipliers: Evidence from the 2009 American Recovery and Reinvestment Act." *American Economic Journal: Economic Policy*, 4(3)(2012): 251-82; Benjamin Page and Felix Reichling,"Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output from January 2011 Through March 2011," (Washington: Congressional Budget Office, 2011); Council of Economic Advisers, "The Economic Impact of the American Recovery and Reinvestment Act of 2009, Fifth Quarterly Report,"(2010); Alan Blinder and Mark Zandi, "How the Great Recession Was Brought to an End." Princeton University and Moody Analytics (2010). Hyunseung Oh and Ricardo Reis, "Targeted Transfers and the Fiscal Response to the Great Recession" *Journal of Monetary Economics*, 59(S)(2012): S50-S64.

6 The theory used in these models, of course, is often empirically based but sometimes, as explained later in this brief, only loosely so.

7 Joint Committee on Taxation, "Overview of Work of the Staff of the Joint Committee on Taxation to Model the Macroeconomic Effects of Proposed Tax Legislation to Comply with House Rules XIII.3. (h)(2), JCX-105-03 (2003).

8 Congressional Budget Office, "An Analysis of the President's Budgetary Proposals for Fiscal Year 2004," (March 2003).

9 Congressional Budget Office, "An Analysis of the President's 2015 Budget," (April 2014).

10 Although the specific number varies from model to model, most macro models assume full employment is achieved when unemployment stands at 5.5 percent or less.

11 See Robert McClelland and Shannon Mok, "A Review of Recent Research on Labor Supply Elasticities," Working Paper (Congressional Budget Office, October 12, 2012). Michael P. Keane, "Labor Supply and Taxes," *Journal of Economic Literature*, 6(4)(2011); Jane G. Gravelle, *The Economic Effects of Taxing Capital Income*, (Cambridge: MIT Press, 1994), Danny Yagan, "Capital Tax Reform and the Real Economy: The Effects of the 2003 Dividend Tax Cut," (2014).

12 Jane G. Gravelle, "Dynamic Scoring for Tax Legislation: A Review of Models," (Washington: Congressional Research Service, 2014).

13 For a revue of this literature see Josh Bivens, "Public Investment: The Next 'New Thing' For Powering Economic Growth." Briefing Paper no, 338 (Washington: Economic Policy Institute, April 2012).

14 See Jonathan D. Ostry, Andrew Berg, and Charalambos G. Tsangarides, *Redistribution, Inequality, and Growth*, Discussion Note, IMF Staff Discussion Note (Washington, D.C.: International Monetary Fund, February 2014), http://www.imf.org/external/pubs/ft/sdn/2014/sdn1402.pdf. Ugo G. Panizza, "Income Inequality and Economic Growth: Evidence from American Data, United Nations Conference on Trade and Development," (2002); Roy van der Weide and Branko Milanovic, "Inequality is Bad for Growth of the Poor"(Washington: World Bank Group, 2014), http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-6963; Federico Cingano, "Trends in income inequality and its impact on economic growth", Working Paper 163 (OECD Social, Employment and Migration Working Papers, 2014), http://www.oecd-ilibrary.org/social-issues-migration-health/trends-in-income-inequality-and-its-impact-on-economic-growth_5jxrjncwxv6j-en. Standard & Poor, "How Increasing Income Inequality Is Dampening U.S. Economic Growth, And Possible Ways to Change the Tide" (2014), https://www.globalcreditportal.com/ratingsdirect/renderArticle.do?articleId=1351366&SctArtId=255732&from=CM&nsl_code=LIME&sourceObjectId=8741033&sourceRevId=1&fee_ind=N&exp_date=20240804-19:41:13. For a review of this literature, see Heather Boushey and Carter C. Price, *How Are Economic Inequality and Growth Connected? A Review of Recent Research* (Washington, DC: Washington Center for Equitable Growth, October 2014), http://equitablegrowth.ms.techprogress.org/?post_type=work&p=6900&preview=true.

15 Thomas Piketty, Emmanuel Saez, and Stefanie Stantcheva, "Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities," *American Economic Journal: Economic Policy* 6(1)(2014): 230–71, doi:10.1257/pol.6.1.230.

16 See Jack Shonkoff and Deborah Phillips. *From Neurons to Neighborhoods: The Science of Early Childhood Development*. (Washington: National Academy Press, 2000). Frances Campbell, Craig Ramey, Elizabeth Pungello, Joseph Sparling, and Shari Miller-Johnson. "Early Childhood Education: Young Adult Outcomes From the Abecedarian Project". *Applied Development Science*. 6 (1)(2002): 42-57; Leonard Masse and W. Steven Barnett. "A Benefit Cost Analysis of the Abecedarian Early Childhood Intervention" (New Brunswick, N.J.: National Institute for Early Education Research, Rutgers University, 2002). Arthur Reynolds, Judy Arthur, Judy Temple, Dylan Robertson, and Emily Mann. "Age 21 cost-benefit analysis of the Title 1 Chicago Child-Parent Centers" *Educational Evaluation and Policy Analysis*. 24 (4):, 267-303. Lawrence J. Schweinhart, Jeanne Montie, Zongping Xiang, W. Steven Barnett, Clive Belfield, and Milagros Nores. *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40* (Ypsilanti, Mich.: High/Scope Educational Research Foundation: 2005); Lynn Karoly, , Peter Greenwood, Susan Everingham, Jill Hoube, Rebecca Kilburn, C. Peter Rydell, Matthew Sanders, and James Chiesa. *Investing in Our Children: What We Know and Don't Know About the Costs and Benefits of Early Childhood Interventions*. (Washington, D.C.: Rand Corporation, 1998); Karoly, Lynn, M. Rebecca Kilburn, James H. Bigelow, Jonathan P. Caulkins, and Jill S. Cannon, *Assessing Costs and Benefits of Early Childhood Intervention Programs: Overview and Application to the Starting Early Starting Smart Program*. (Washington, D.C.: Rand Corporation, 2001). American Academy of Pediatrics, "Identifying Infants and Young Children with Developmental Disorders in the Medical Home: An Algorithm for Developmental Surveillance and Screening". *Pediatrics* 118 (1)(2006), pp. 405 -420 (doi: 10.1542/peds.2006-1231).

17 Robert G. Lynch, *The Economic and Fiscal Consequences of Improving U.S. Educational Outcomes* (Washington, DC: Washington Center for Equitable Growth, February 2015).

18 Thomas L. Hungerford, *Taxes and the Economy: An Economic Analysis of the Top Tax Rates Since 1945 (Updated)* (Washington, D.C.: Congressional Research Service, December 12, 2012); https://www.fas.org/sgp/crs/misc/R42729.pdf. Thomas Piketty, Emmanuel Saez, and Stefanie Stantcheva, "Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities," *American Economic Journal: Economic Policy* 6 (1)(2014): 230–71, doi:10.1257/pol.6.1.230. William G. Gale and Andrew A. Samwick, Effects of Income Tax Changes on Economic Growth, Brookings, September 9, 2014, available at http://www.brookings.edu/research/papers/2014/09/09-effects-income-tax-changes-economic-growth-gale-samwick

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