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We're #27!: The United States Lags Far Behind in R&D Tax Incentive Generosity

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In 2012, the United States ranks just 27th out of 42 countries studied in terms of R&D tax incentive generosity, down from 23rd just five years ago.

With the U.S. unemployment rate stuck at over eight percent, one would expect a laser-like focus in Washington on simple tools that would increase growth. One key tool is the federal R&D tax credit: increasing the rate of the Alternative Simplified Credit (ASC) from 14 to 20 percent would increase annual GDP growth by $66 billion and create at least 162,000 jobs. Yet despite its efficacy, the United States continues to fall behind other nations in the generosity of its R&D tax incentive. Other countries, including Brazil, Canada, China, France, and India, have implemented R&D tax incentive schemes that far exceed that of the United States in generosity. In fact, in 2012, ITIF estimates that the United States ranks just 27th out of 42 countries studied in terms of R&D tax incentive generosity, down from 23rd just five years ago.

This statistic is unmistakable and troubling. The United States was first nation to realize the importance of spurring R&D through the tax code, putting in place the R&D credit in 1981. As a result, the United States experienced an R&D stimulus that helped drive robust economic growth through the 1980s and 1990s. Yet, while proposals for increasing the R&D tax credit have come and gone—including most recently President Obama's call for a slight increase of the ASC to 17 percent—what was once the most generous R&D tax incentive in the world has now become one of the least generous. This means that when firms look for countries in which to invest in R&D, many other nations have a distinct, and in many cases, large tax advantage over the United States. This means that the United States loses out on the capital investment, economic growth and the high-wage R&D jobs that these investments would bring. Even more worrying, our low R&D tax credit gives other countries an innovation advantage over the United States, as their companies, both large and small, invest more heavily in R&D and gain the competitive advantage that stems from it. In a globalized world where innovation is the key to competitive advantage, this

means that firms within United States are less able to gain global market share in technology-based industries and new areas of growth. The result: stagnant economic growth and persistent unemployment—precisely the symptoms we see today.

R&D DRIVES ECONOMIC GROWTH

R&D is the fundamental driver of innovation, and in developed, knowledge-based economies, innovation powers long-run economic growth. For example, a study published by the UK National Endowment for Science, Technology and the Arts (NESTA) found that two-thirds of UK private-sector productivity growth between 2000 and 2007 was a result of innovation.[1] Klenow and Rodríguez-Clare decomposed the cross-country differences in income per-worker into shares that could be attributed to physical capital, human capital, and total factor productivity, and they found that more than 90 percent of the variation in the growth of income per worker was a result of how effectively capital is used (that is, innovation), with differences in the actual amount of human and physical capital accounting for just 9 percent.[2]

Without R&D tax incentives, companies will not conduct enough R&D, and thus society is worse off without R&D tax incentives.

Innovation is also positively correlated to job growth in the mid- to long-term.[3] Innovation leads to job growth in three fundamental ways. First, innovation gives a nation's firms a first-mover advantage in new products and services, expanding exports and creating expansionary employment effects in the short term. In fact, in the United States, growth in exports leads to twice as many jobs as an equivalent expansion of sales domestically.[4] Second, innovation's expansionary effects lead to a virtuous cycle of expanding employment. For example, in the early- to mid-1990s, the emergence of information technology as a general purpose technology drove broad-based economic growth, creating hundreds of thousands of new jobs, which, in turn, led to additional job growth in supporting industries. Finally, when innovation leads to higher productivity, it also leads to increased wages and lower prices, both of which expand domestic economic activity and create jobs.[5]

Efforts to boost R&D are also important because the level of private sector research investment is suboptimal from a societal perspective. Studies have found that the economy-wide social rate of return from corporate R&D activities is at least twice the estimated returns that a company itself receives.[6] For example, Tewksbury, Crandall, and Crane examine the rate of return from twenty prominent innovations and find a median private rate of return of 27 percent but a median social rate of return of a whopping 99 percent, almost four times higher.[7] Bloom, Schankerman and Van Reenen found that spillovers from R&D were so large that the R&D investment of one firm raised the stock price of not only that firm but also of other firms in the same industry.[8] These significant spillover benefits from innovation mean that, even under "perfect" market conditions with strong intellectual property protections, the private sector will underinvest in R&D. While some critics of the credit claim that companies will conduct R&D even without the credit, this is beside the point. The point is that without R&D tax incentives companies will not conduct *enough* R&D, and thus society is worse off without R&D tax incentives.

TAX INCENTIVES BOOST R&D

R&D tax incentives have been shown to be effective tools with which to increase private investment in innovation. The benefits of R&D tax incentives are well supported by academic research. Almost all scholarly studies conducted since the early 1990s find R&D tax incentives to be both effective and efficient.[9] Hall and Van Reenen examined the U.S. credit from 1981 to 1991 and found that approximately two dollars in research were generated for every one dollar in tax expenditure.[10] A study of the pre-2011 regime of Australian R&D tax incentives finds that it produced about one dollar of R&D for every dollar of tax expenditure.[11] The Canadian tax credit, according to three separate studies, generates between 98 cents and $1.38 in additional R&D for every dollar of credit.[12] And more recently, a benefit-cost evaluation confirmed that the federal R&D tax credit creates a net economic gain for the Canadian economy of 11 cents per dollar of tax subsidy.[13] Several studies have evaluated the effect of tax incentives for research across a number of nations. In examining R&D tax incentives in 17 OECD nations, Guellec and van Pottelsberghe find that incentives effectively stimulate business R&D.[14] Falk finds that every dollar of R&D tax expenditure stimulates at least 90 cents in additional business R&D.[15] Another cross-national study by Wolff and Reinthaler concludes that R&D tax subsidies stimulate at least one dollar of R&D for every dollar of tax expenditure.[16] Likewise, in a study of nine OECD nations, Bloom and Griffith find that every dollar of R&D tax expenditure stimulates approximately one dollar of business R&D. They also find that three countries (Australia, Canada, and Spain) that expanded their R&D tax incentives saw increases in private R&D, while incentive reductions in other nations had the opposite effect.[17]

Employment	162,000 additional direct, indirect and induced jobs created or retained
Patents	3,850 U.S. utility patents filed annually
Productivity	0.64 percent increase in annual productivity
GDP	$66 billion increase in annual economic output
Federal Tax Revenues	Tax revenues exceed costs after 15 years

Table 1: Estimated Effects of Increasing the Alternative Simplified Tax Credit From 14 Percent to 20 Percent[18]

A 2010 ITIF study found that increasing the U.S. Alternative Simplified Credit (ASC) from 14 percent to 20 percent would create 162,000 jobs, generate 3850 new patents each year, increase productivity by 0.64 percent and GDP by $66 billion per year, and that increased federal tax revenues would exceed the tax expenditure costs of the credit within 15 years.[19] (See Table 1) Moreover, expanding the R&D tax credit would not only increase innovation, but would also lower effective corporate tax rates, especially on the kinds of industries that compete most intensively in the global economy. This affects the decisions for multinational firms both in terms of how much R&D they conduct and where they conduct it, with a stronger U.S. credit increasing the amount of R&D conducted in the

United States, thus increasing domestic investment. For this reason, the ITIF study likely understates the positive impact of an increase in the U.S. R&D credit.

R&D TAX INCENTIVES AND THE 2012 B-INDEX

Given the importance of R&D tax incentives in determining the global location of R&D, it is important to assess the generosity of countries' R&D tax incentives. The B-index is an economic model that does just that. In economic terms, the B-index model represents the before tax rate of return on one dollar of R&D investment, in present value terms (see Box 1). For easy interpretation, the B-index is often reported as the "tax subsidy ratio" (unity minus the B-index), which is, simply put, the proportion of one dollar of R&D expenditure that is subsidized by tax incentives. (Negative tax subsidy ratios reflect cases where there are no tax incentives and capital assets employed in R&D cannot be written off in the year they were incurred, but rather are depreciated over time.) In other words, the higher the tax subsidy ratio, the more generous the R&D tax incentive. Until 2009, the OECD employed the B-index to measure R&D tax incentive generosity. However, in 2011, the OECD changed their incentive rating methodology to one that no longer effectively measures R&D tax incentive generosity (see Box 2). For that reason, ITIF has updated the B-index methodology where the OECD left it in 2009, while adding four new countries (Indonesia, Malaysia, Slovenia, and Taiwan) to the analysis.

Moreover, expanding the R&D tax credit would not only increase innovation, but would also lower effective corporate tax rates, especially on the kinds of industries that compete most intensively in the global economy.

Generally, R&D tax incentives take three forms: (1) tax credits, (2) tax deductions, and (3) tax holidays and reductions. R&D tax credits are of two sorts. A volume credit is a flat credit that is generally independent of a firm's history of R&D expenditure over time (although volume credits may reward firms for high R&D intensity). Incremental credits, on the other hand, reward firms for increasing R&D expenditure or R&D intensity over time. Incremental credits tend to have a greater stimulative effect than volume credits but can be harder for firms to use as they introduce considerable uncertainty into firm decision making regarding the level of incentive the firm will actually receive.[20] Some systems, such as the U.S. Alternative Simplified Credit, are a combination of the volume and incremental approaches as it provides a credit on only 50 percent of the firm's base R&D expenditures as a share of sales over the last 3 years, but a credit on all increases.

Tax deductions, the second form, include three common types. Standard deductions allow firms to deduct up to 100 percent of their R&D expenditure from their taxable income. Super deductions allow deductions greater than 100 percent—that is, for a 200 percent super deduction, a dollar in R&D expenditure would allow a two-dollar deduction. Accelerated depreciation allows firms to reduce the value of a fixed asset involved in R&D at a higher rate during the early years of the asset's lifespan, yielding a larger deduction over the lifespan of the asset relative to normal depreciation rates.

The third form of incentive includes tax reductions and tax holidays. Because tax reductions and holidays are granted selectively, they are not included in the B-index model, which, by assumption, represents the "typical" firm within a country, rather than selected firms.

BOX 1: WHAT IS THE B-INDEX?

The B-index model measures the relative attractiveness of R&D tax treatment in a country or region. It is based on well-founded economic theory and designed so that it is easy to apply and capable of including all tax parameters, and can be used as a policy analysis tool.

The model is based on the marginal effective tax rate approach. The marginal model is designed specifically to look at the tax burden on income generated by an "additional dollar" invested in R&D, and to construct an overall measure of the corporate tax burden on marginal R&D investments in different countries. The marginal model provides a useful summary of the main features of business taxation and is effective in making international comparisons.

In economic terms, the B-index model represents a before tax rate of return on one dollar ($1) of R&D investment—in present value. In accounting terms, the B-index formula represents a ratio of the after-tax cost (ATC) of $1 of expenditure on R&D divided by 1 less the corporate income tax rate. The ATC enters the numerator of the B-index equation. It is defined as the net cost to the company of investing in R&D, taking account of all available tax incentives for R&D. Tax incentives lower the ATC of an R&D project.

Corporate income tax rates influence the level of ATC, as well. The higher the tax rate the lower the ATC of R&D, which gives an impression that having high corporate income tax rates is beneficial to the firm. To eliminate as much as possible the impact of tax incentives from the impact of the corporate income tax rate, the study applies the measure of the before-tax index.

The name "B-index" captures the fact that the model describes the minimum *benefit* to cost ratio at which an R&D investment becomes profitable given a jurisdiction's income tax treatment for firms performing R&D. The name is rather cryptic, however, for those using the index. Thus other transformations of the B-index have evolved that help to better understand the nature of the index. Among them is a tax-subsidy ratio (i.e. the value of the B-index subtracted from unity), which has been used extensively by the OECD.

$$\text{B-index} = (1-A)/(1-t)$$

Where:

A = the net present discounted value of depreciation allowances, tax credits and other R&D tax incentives available (i.e., after-tax cost)

t = corporate income tax rate

The United States B-Index Rank

The United States has two main credits: the "regular" tax credit equates to 20 percent of eligible R&D expenditure exceeding a complicated base amount; the alternative simplified credit (ASC) R&D tax credit allows firms, both small and large, a tax credit of 14 percent on eligible R&D expenditure exceeding 50 percent of the average of the three prior years'

expenditure. The 2012 B-index uses an average of the regular credit and the Alternative Simplified Credit weighted by their respective shares in research claims. Notably, unlike those of most other nations, the U.S. credit is not permanent; Congress must renew it every few years.

India leads the world in R&D tax generosity for both small- and medium-sized enterprises (SMEs) and large firms by allowing a 200 percent super deduction for in-house R&D expenditures.

In the 2012 B-index, the United States ranks just 27th out of the 42 countries studied. In contrast, other nations provide firms in their nations with much stronger incentives. India leads the world in R&D tax generosity for both small- and medium-sized enterprises (SMEs) and large firms by allowing a 200 percent super deduction for in-house R&D expenditures, a super deduction of 125 percent to 200 percent for payments made to contractors carrying out R&D in India, and a 100 percent deduction for R&D expenses that do not otherwise qualify for the other deductions (see figures 1 and 2).[21] France comes in second for SMEs and fourth for large firms by offering an R&D tax credit equal to 30 percent of the first €100 million of eligible R&D expenditure and then 5 percent beyond that. Ranked seventh (SMEs) and fifth (large firms), Denmark provides enterprises with a 200 percent super deduction. Canada, ranked fifth for SMEs and 13th for large firms, also provides a generous tax credit, with large enterprises eligible for a 20 percent non-refundable credit and small Canadian controlled private corporations (CCPCs) eligible for a 35 percent refundable credit. Malaysia is ranked sixth for large firms and eighth for SMEs, providing a 200 percent super deduction for qualified R&D expenditure. Brazil is ranked seventh for large companies and 10th for SMEs, allowing a 160 percent super deduction, and up to a 180 percent super deduction if certain conditions are met. China, ranked 20th for SMEs and 16th for large firms, offers a 150 percent R&D super deduction and either immediate expensing or accelerated depreciation for qualified R&D equipment.[22]

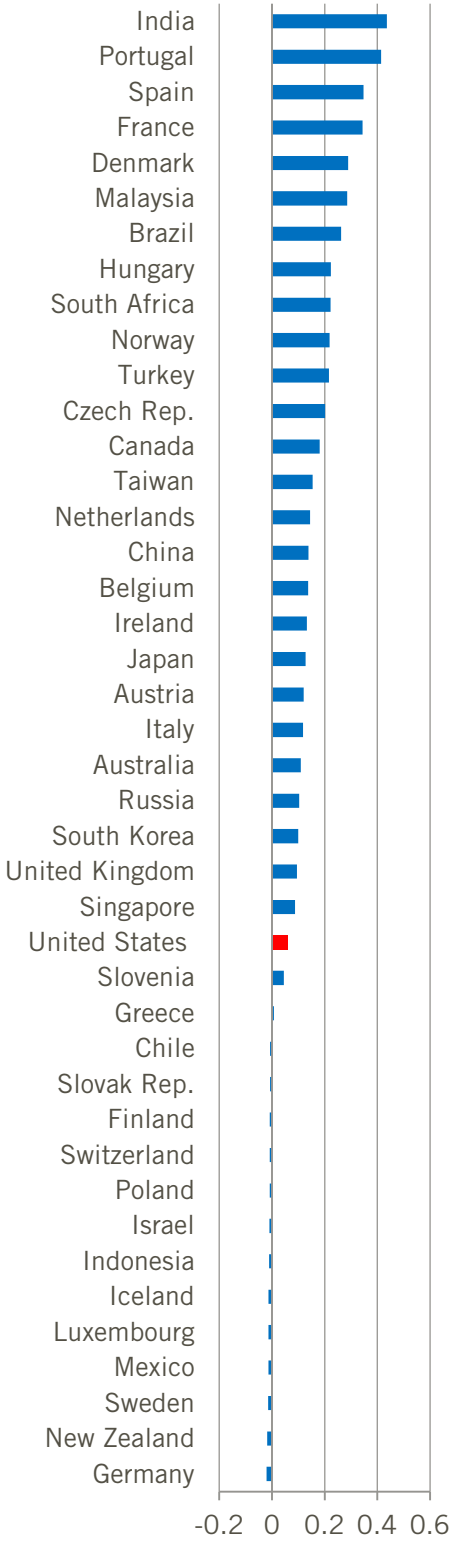

Figure 1: R&D Tax Subsidy Ratio for Large Enterprises

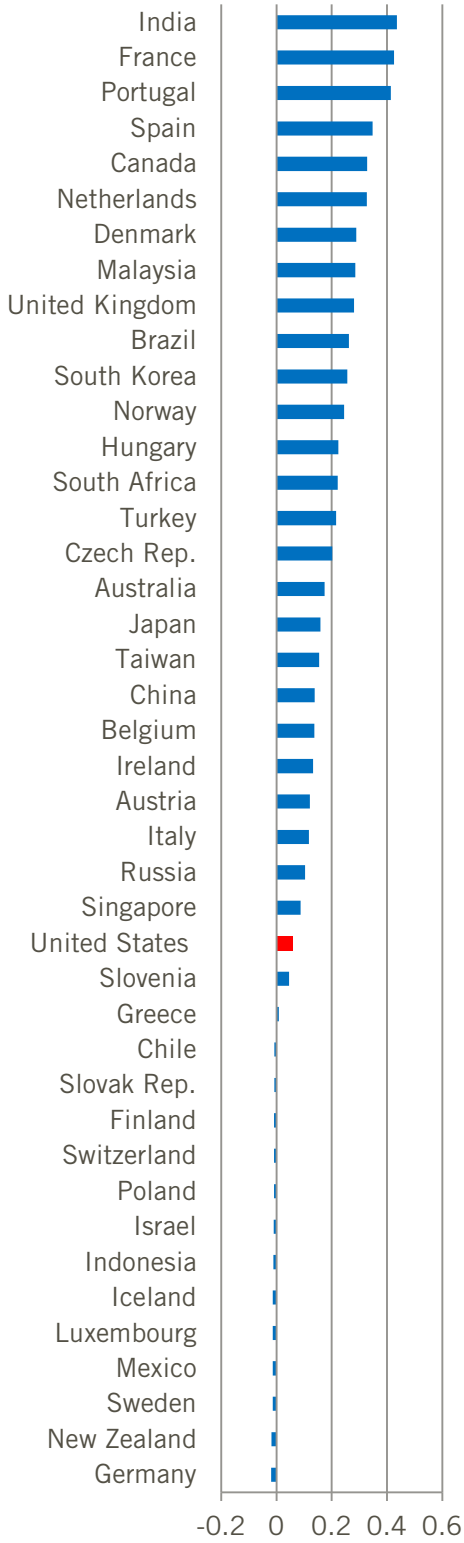

Figure 2: R&D Tax Subsidy Ratio for Small- and Medium-Sized Enterprises

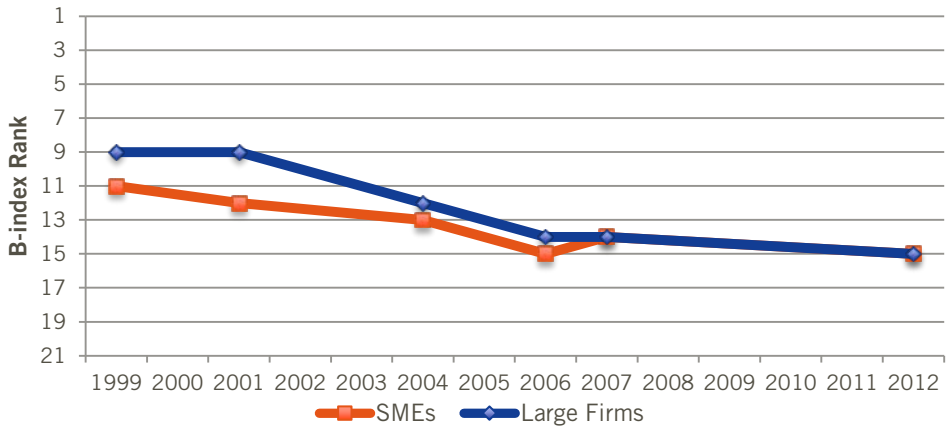

Figure 3: Among 21 OECD Countries, the United States' Rank in R&D Tax Incentive Generosity Has Declined

Over the years, while many of these countries have either implemented new incentives or expanded their existing incentives, the United States has not kept up. Although the United States established the ASC in 2006 at 12 percent and soon thereafter increased the rate to 14 percent, this was not enough to stem its decline in rank.[23] This fact is clear in Figure 3, where, using a consistent set of 21 OECD countries that have been studied using the B-index method since 1999, the United States has continued to fall in rank relative to its competitors. However, the full story is worse, as nearly half of the countries analyzed in the 2012 B-index have not been studied consistently since 1999. Figure 4 shows the U.S. rank as the B-index nations studies have been expanded over time. Generally, the more countries included in the analysis, the farther the United States rank drops over time, because those countries have either introduced or expanded generous R&D tax incentive programs.

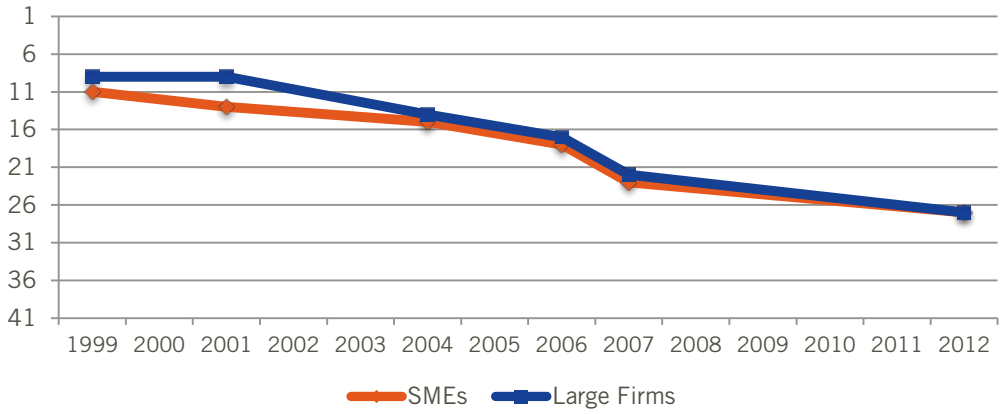

Figure 4: As Countries Increase their R&D Tax Incentives and Other Countries are added to the B-Index Analysis, the U.S. Rank Falls Precipitously

What is perhaps most striking is that in the last few years many nations, even those with national budget challenges, have significantly expanded their R&D tax incentives. Figure 5 shows the top five countries in terms of the extent to which they have expanded their R&D tax incentive schemes for large firms since 2007. India shows the biggest jump with 17 percent increase in incentive generosity. Prior to April 2010, India only provided a 150

percent super deduction for R&D investment. Its new system (described above) is substantially more generous, explaining its large increase in the B-index. In 2008, France established a new, generous R&D credit, in part because its leaders recognized that its overall corporate tax rate was not competitive enough. Italy established a 10 per cent tax credit, Denmark introduced a 200 percent super deduction, and Portugal upgraded its volume tax credit to 32.5 percent from a 20 percent rate.

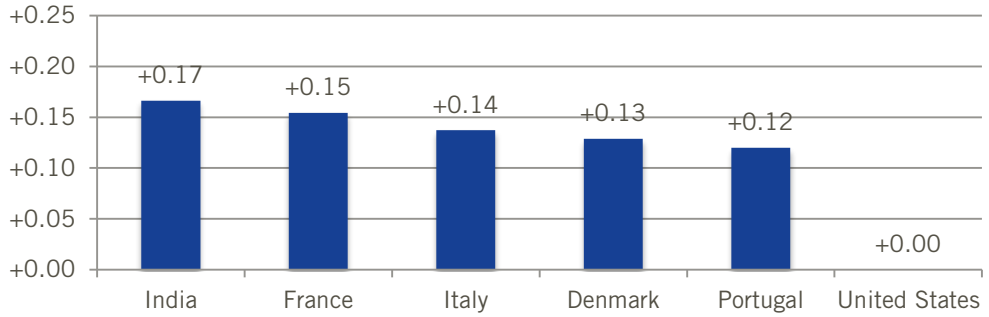

Figure 5: Top Five Increases in the R&D Tax Subsidy Ratio for Large Firms, 2007-2012, Compared to the United States (differential chance)[24]

For the United States to have the most generous R&D tax incentive in the world, surpassing India, Congress would need to increase the ASC from 14 percent to over 50 percent.

Just how far the United States lags behind other countries is strikingly apparent when looking at the ASC rates that would be required for it to rise in rank. As Figure 6 shows, to reach 15th in the large company B-index rankings, on par with Netherlands, the United States would need at least a 20 percent ASC rate. To reach tenth place, the United States would need at least a 27 percent credit. To reach Denmark in the fifth position would require a 35 percent credit. For the United States to have the most generous R&D tax incentive in the world, surpassing India, Congress would need to increase the ASC from 14 percent to 50 percent.[25] Notably, most of these numbers far exceed the 17 percent credit that President Obama has called for.

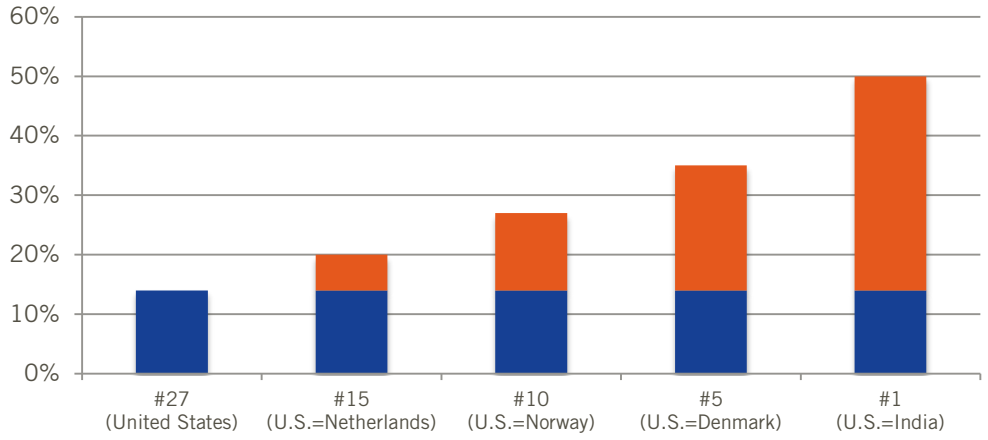

Figure 6: U.S. Alternative Simplified Credit Effective Rates Required to Grant the United States the #15, #10, #5, and #1 Positions in the B-index Rankings (Large Firms)

BOX 2: WHY MEASURING TAX INCENTIVES AS A SHARE OF GDP DOES NOT MEASURE GENEROSITY

In its 2011 *Science, Technology and Industry Scoreboard*, the OECD adopted a new methodology for gauging R&D tax incentives that measures the revenue cost of a country's tax incentives as a share of its GDP ("cost method"), replacing the B-index method that it had employed in previous *Scoreboards*. The OECD reasoned that the B-index did not capture the full complexity of R&D tax incentive schemes—for example, the B-index does not capture the impact of caps, tax refunds and carryovers. However, the cost method does not accurately capture R&D tax incentive generosity as it suffers from serious omission bias, in that the generosity of R&D tax incentives is only one factor that would determine the revenue cost of the tax incentives. The overall tax expenditure cost of R&D tax incentives is determined by two factors: the level of incentive and the overall level of R&D. And firms' R&D investment decisions—and thus the cost of R&D tax incentives—are influenced by a multitude of factors, including a country's industrial mix, interest rates, productivity, sales, business cycle fluctuations, and even cultural factors. In other words, the cost method is measuring a compendium of all these factors, not just tax incentive generosity. This is apparent when comparing United States' rank out of the 23 countries in the 2011 *Science, Technology and Industry Scoreboard* to the U.S. rank among those same countries in the 2012 B-index: the U.S. ranks 20th using the B-index method, but rises to 15th using the cost method. And the reason is that there is more corporate R&D in the United States than in many other nations, not because the U.S. credit is better. Thus, the OECD measure gives an overly optimistic assessment of the U.S. R&D tax incentive relative to other nations. While the B-index is not a perfect measure of tax incentive generosity—no such measure has yet been invented, although work to develop better measures is underway—it is the best published measure for gauging the relative strength of countries' R&D tax incentive schemes.

CONCLUSION

With the failure of the United States to keep up with the race for global innovation advantage, a rank of 27 in R&D tax incentive generosity represents a policy failure. Increasing the R&D tax credit would stimulate growth and create jobs, and it would improve the competitiveness of American industry, especially sectors which are more R&D intensive. As such, Congress should increase the Alternative Simplified Credit from 14 percent to at least 20 percent and make the credit permanent. Although it would cost the Treasury in the short term, it would also benefit both workers and consumers in the short term. Furthermore, after 15 years, tax revenues would begin to exceed the cost of foregone tax revenues in net present value terms. The sooner Congress raises and makes permanent the R&D tax credit, the better off the American economy will be.

APPENDIX A: 2012 B-INDEX RESULTS

Country	SMEs		Large Firms	
	B-index	Tax Subsidy (1-B-index)	B-index	Tax Subsidy (1-B-index)
Australia	0.83	0.17	0.89	0.11
Austria	0.88	0.12	0.88	0.12
Belgium	0.86	0.14	0.86	0.14
Brazil	0.74	0.26	0.74	0.26
Canada	0.67	0.33	0.82	0.18
Chile	1.01	-0.01	1.01	-0.01
China	0.86	0.14	0.86	0.14
Czech Republic	0.80	0.20	0.80	0.20
Denmark	0.71	0.29	0.71	0.29
Finland	1.01	-0.01	1.01	-0.01
France	0.57	0.43	0.66	0.34
Germany	1.02	-0.02	1.02	-0.02
Greece	0.99	0.01	0.99	0.01
Hungary	0.78	0.22	0.78	0.22
Iceland	1.01	-0.01	1.01	-0.01
India	0.56	0.44	0.56	0.44
Indonesia	1.01	-0.01	1.01	-0.01
Ireland	0.87	0.13	0.87	0.13
Israel	1.01	-0.01	1.01	-0.01
Italy	0.88	0.12	0.88	0.12
Japan	0.84	0.16	0.87	0.13
Luxembourg	1.01	-0.01	1.01	-0.01
Malaysia	0.71	0.29	0.71	0.29
Mexico	1.01	-0.01	1.01	-0.01
Netherlands	0.67	0.33	0.86	0.14
New Zealand	1.02	-0.02	1.02	-0.02

Norway	0.75	0.25	0.78	0.22
Poland	1.01	-0.01	1.01	-0.01
Portugal	0.59	0.41	0.59	0.41
Russia	0.90	0.10	0.90	0.10
Singapore	0.91	0.09	0.91	0.09
Slovak Republic	1.01	-0.01	1.01	-0.01
Slovenia	0.95	0.05	0.95	0.05
South Africa	0.78	0.22	0.78	0.22
South Korea	0.74	0.26	0.90	0.10
Spain	0.65	0.35	0.65	0.35
Sweden	1.01	-0.01	1.01	-0.01
Switzerland	1.01	-0.01	1.01	-0.01
Taiwan	0.85	0.15	0.85	0.15
Turkey	0.78	0.22	0.78	0.22
United Kingdom	0.72	0.28	0.90	0.11
United States*	0.94	0.06	0.94	0.06

*U.S. figure is an average of the Alternative Simplified Credit (ASC) and the Regular Credit, weighted by their respective shares in research claims.

APPENDIX B: SUMMARY OF R&D TAX INCENTIVES, 2011-2012

Country	Corporate Income Tax Rate Large/Small Firm %	Rate on Level %	Rate on Increment %	Base for Increment[1]	Expense Base	Deducted From
OECD						
Australia						
R&D Tax Offset[2]	30	40 large (45 small refundable)			Current Expenses Machinery	Tax
Austria						
Tax Credit	25	10			Current Expenses, Machinery, Buildings	Tax
Belgium						
Investment Deduction	33.99	14.5			Machinery, Buildings	Income
Withholding Tax Credit		75			Research	Income
Canada						
Tax Credit	26.1/15.5					
Small Company		35			Current Expenses	Tax
Large Company		20			Machinery	
Czech Republic						
R&D Allowance	19	200			Current Expenses	Income
Chile	17	No in-house R&D tax incentives				
Denmark						
R&D Allowance	25	200			Current Expenses	Income
Finland	26	No R&D Tax Incentives				
France[3]	33.33					
R&D 100 M Euro		30			Current Expenses & Depreciation	Tax
Over 100 M Euro		5				
Germany	29.37	No R&D Tax Incentives				

Greece	20					
R&D Allowance			50	2 Yrs	Current Expenses	Income
Hungary	19					
R&D Allowance		200			Current Expenses, Machinery	Income
Iceland	20	No R&D Tax Incentives				
Ireland	12.5					
Tax Credit			25	2003 R&D Spend	Current Expenses & Machinery	Tax
Tax Credit-Buildings		25			Buildings	Tax
Israel	24	No R&D Tax Incentives				
Italy	31.4					
Tax Credit		10			Current Expenses & Machinery	Tax
Japan	38.01/30					
Tax Credit Large Firm		8–10			Current Expenses & Machinery Depreciation	
Tax Credit Small Firm		12				Tax
Korea	24.2/11					
Tax Credit Large Firm		3–6	or 40%	4 Yrs	Current Expenses	Tax
Tax Credit Small Firm		25	Or 50%	4 Yrs		
Facilities Tax Credit		10			Machinery	Tax
Luxembourg	28.8	No R&D tax incentives				
Mexico	30	No R&D Tax Incentives				
Netherlands	25.5/20					
Wage Cost Deduction		18 (50 small)			Research Wages	Income
RDA Allowance		140			All Expenses Less Research Wages	Income
New Zealand	28	No R&D Tax Incentives				
Norway (refundable)	28	18 (20 small)			Current Expenses & Machinery	Tax

Poland	19	No R&D Tax Incentives				
Portugal	26.5					
Tax Credit		32.5	(+)[4] 50	2 Yrs	Current Expenses & Machinery	Tax
Slovak Republic	19	No R&D Tax Incentives				
Slovenia	20					
R&D Allowance		120			Current expenses	Income
Spain	30					
Tax Credit		25	(+) 42	2 yrs	Current Expenses	Tax
Credit for Capital R&D		8			Machinery	
Sweden	26.3	No R&D Tax Incentives				
Switzerland (Zurich)	21.17	No R&D Tax Incentives				
Turkey	20					
R&D Allowance		200			Current Expenses	Income
United Kingdom	26/20					
R&D Allowance						
Small Firm		225			Current Expenses	Income
Large Firm		130			Current Expenses	Income
United States[5]	35					
Regular Tax Credit			20		Maximum 50% of Current Expenses	Tax
Alternative Simplified Credit			14	50% of 3-Yr base	Current Expenses	Tax
Emerging Economies						
Brazil	34					
R&D Allowance		160			Current Expenses	Income
China[6]	25					
R&D Allowance		150			Current Expenses	Income
India	33.22					
R&D Allowance		200			Current Expenses & Machinery	Income

Indonesia	25	No R&D Tax Incentives		
Malaysia	25			
R&D Allowance		200	Current Expenses	Income
Russia	20			
R&D Allowance		150	Current Expenses	Income
Singapore	17			
R&D Allowance		150	Current Expenses	Income
South Africa	34.55			
R&D Allowance		150	Current Expenses	Income
Taiwan	17			
R&D Tax Credit		15	Current Expenses	Income

Notes:

1. Moving average over specified number of preceding years.
2. Australia's R&D expenses are not deductible from taxable income.
3. 50% tax credit for companies applying for the credit for the first time and 40% in the second year; 60% flat tax credit on all R&D expenditures made in partnership with a laboratory.
4. (+) In conjunction with the volume tax incentive.
5. The U.S. research tax credit has expired in 2012 but will likely be extended retroactively.
6. Provided that R&D spend increased minimum 10% over the preceding year.

Sources:

Compiled based on sources including Deloitte, *Global Survey of R&D Tax Incentives*, 2011 http://www.deloitte.com/assets/Dcom-Canada/Local%20Assets/Documents/Tax/EN/2011/ca_ en_tax_RD_Global_RD_Survey_TaxIncentives_111011.pdf, OECD Science, Technology and Industry Scoreboard 2009, *Tax Treatment of R&D*, Section 2.14; and individual OECD and government publications and websites, R&D tax incentive Google alert websites and other tax consultants. Main source for corporate income tax rates: KPMG International, *Corporate and Indirect Tax Survey 2011*, www.kpmg.com.

APPENDIX C: TECHNICAL NOTES

Components of the B-Index Model

The model includes the following components of R&D cost structure and applicable tax provisions:

- Current expenditures: wages and salaries of R&D personnel and the cost of materials and supplies used in the R&D process.
- Capital expenditures incurred in R&D: the cost of machinery and equipment and facilities/buildings.
- Depreciation of capital assets used in R&D: these assets are typically depreciated over the useful life according to two methods: declining balance or straight line.[26]
- Super-allowances (deductions) on R&D expenditures: these provisions allow firms conducting R&D to deduct more from their taxable income than they actually spend on R&D.
- Tax credits: unlike super-allowances credits are applied against income tax payable. The benefit of the credit can be non-taxable or taxable (as in Australia, Canada and the United States).
- Statutory corporate income tax rates.

Critical Assumptions

The B-index model measures stylized total generosity (maximum full value) of the tax system. Thus it operates under the overarching assumption of no tax exhaustion i.e. firms have sufficient income to claim a full amount of R&D tax incentives in the current year. Implications include the use of top income tax rate in calculations and no carryovers of tax incentives since they are used up immediately in the current year.

Many countries have different types of caps or ceilings limiting the amount of support that companies may receive. This might in some cases define not only the level of generosity but also the profile of the tax incentive. A low cap will, for example, imply that the scheme first of all targets small companies and has a limited impact on larger businesses that invest more in R&D.[27] The model ignores these caps for the sake of quantification of maximum benefit. [28] R&D expenditures made by companies are assumed not to exceed various ceilings or thresholds. Finally, definitions of R&D expenditures for tax purposes and eligible costs are assumed to be homogenous across comparator countries.

Elements Not Included in the Model

The model does not include taxes and related incentives that do not pertain to direct corporate income taxation. As such personal income taxes, value added taxes, commodity taxes, property taxes, payroll taxes, taxes on wealth and capital, and grants and subsidies (i.e. positive taxes) are not included.

The model includes R&D tax incentives broadly which are broadly available to business. Tax incentives targeted for specific sectors, technologies and activities (e.g., public-private collaboration) and regional development are excluded

Technical Assumptions

For consistent comparisons, the model measures country B-indexes under constant and uniform technical assumptions. These assumptions include:

- R&D expenditures are split into current expenses and capital expenses, using an average proportion of 90 per cent and 10 per cent, respectively.
- Wages and salaries (a component of current costs) are assumed to represent 60 per cent of total R&D expenditures.
- Capital expenses are divided equally between machinery and equipment (5 per cent), and buildings (5 per cent).
- Time factor: the B-index model is expressed in present value terms (net return over time). It is assumed that for all the countries compared, the discount rate is constant and holds at 10 per cent.[29]

ENDNOTES

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23. The B-index tax subsidy ratio shows a small drop for the U.S. credit between 2007 and 2012. This is because, prior to 2012, the B-index rated only the "regular" tax credit, whereas the 2012 B-index uses an average of the regular credit and the Alternative Simplified Credit weighted by their respective shares in research claims.
24. The B-index tax subsidy ratio shows a small drop for the U.S. credit between 2007 and 2012. This is because, prior to 2012, the B-index rated only the "regular" tax credit, whereas the 2012 B-index uses an average of the regular credit and the Alternative Simplified Credit weighted by their respective shares in research claims. Hence, because this drop reflects only methodology change rather than policy change, the United States figure is adjusted to 0.00 in the chart.
25. The rates quoted here are effective rates. Since the ASC is calculated as a percentage rate of the amount by which the current year qualified research expenditures are greater than 50 percent of the average qualified research expenditures over the three previous years, at the discount rate of the B-index (10 percent), the nominal statutory rates would need to be significantly higher. For example, to match India, the statutory ASC rate would need to be approximately 85 percent.
26. The net-of-tax cost of R&D will be lower in those countries which allow an immediate or accelerated write-off of expenditures on R&D plant and equipment.
27. European Commission, *Expert Group on Impacts of R&D Tax Incentives, Design and Evaluation of Tax Incentives for Business Research and Development* (Brussels: European Commission, 2009), pg. 17, http://ec.europa.eu/invest-in-research/pdf/download_en/tax_expert_group_final_report_2009.pdf.
28. Including ceilings may produce more realistic indicator of generosity but requires breakdown of R&D expenditures into those within the cap (eligible for a tax credit) and outside the cap (not eligible for the credit). It is difficult to obtain such data from tax authorities and special assumptions are required that may bias the results. Despite these difficulties, work is underway to include caps in the B-index model. The new model will also capture more economic parameters connected to business R&D investment decisions.
29. No other financial rate is used in the model. The discount rate has been kept unchanged to ensure comparability over time of the B-index with previous B-index studies.

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ABOUT ITIF

The Information Technology and Innovation Foundation (ITIF) is a Washington, D.C.-based think tank at the cutting edge of designing innovation strategies and technology policies to create economic opportunities and improve quality of life in the United States and around the world. Founded in 2006, ITIF is a 501(c) 3 nonprofit, non-partisan organization that documents the beneficial role technology plays in our lives and provides pragmatic ideas for improving technology-driven productivity, boosting competitiveness, and meeting today's global challenges through innovation.

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