

Effective Corporate Tax Reform in the Global Innovation Economy

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The corporate tax code should explicitly promote the international competitiveness of American businesses and encourage innovation by providing incentives for the drivers of productivity and innovation: investment in R&D; new capital equipment, especially information and communications technology (IT); and workforce education and training.

An effective corporate tax system reflects current economic realities. As such, there is a need for fundamental reform of the U.S. corporate tax system for it is based on principles that may have made sense a generation ago, but no longer do. However, while there is increasing interest in corporate tax reform, including Obama administration proposals to limit deferral of foreign source income, there is little agreement on what reform should look like. This paper seeks to inform this debate by articulating principles to guide reform and proposing recommendations based on those principles.

For many tax policy experts, effective corporate tax reform means simplifying the code by cutting exemptions and reducing rates. Though appealing in its simplicity, the conventional view is misguided. Rather, a reformed corporate tax code should explicitly promote the international competitiveness of American businesses and encourage innovation by providing incentives for the drivers of productivity and innovation: investment in R&D; new capital equipment, especially information and communications technology (IT); and workforce training. This can and should be done in a way that is fiscally responsible and progressive. In this sense, the goal of reform should be neither to simply reduce rates as many on the right propose nor to raise rates as many on the

left propose. Rather it should be to make the corporate tax code a driver of innovation, productivity and global competitiveness.

To do this, policymakers need to consider six key principles:

Principle 1: Differentiate between individual taxes and corporate taxes and focus on making the individual tax code more progressive.

Principle 2: An effective corporate tax code is neither simple nor neutral.

Principle 3: An effective corporate tax code should explicitly spur innovation and productivity.

Principle 4: Nations need competitive corporate tax systems in a global economy.

Principle 5: Tax reform should shift revenue collection from mobile sources of economic activity toward immobile ones.

Principle 6: Recognize that international tax competition is here to stay.

On the basis of these principles, we believe that the U.S. tax code can and should be a driver of competitiveness, productivity, and innovation. To do that, we recommend that Congress:

A. Significantly Expand the Research and Development Tax Credit. A number of steps are needed to make the R&D credit more effective, including increasing the rate of the Alternative Simplified Credit (ASC). But the credit can also drive new innovation if Congress broadens the current credit for collaborative energy-related research to any area of research and expands the rate from 20 percent to 40 percent. Finally, by broadening the definition of qualifying R&D expenditures to include not just product R&D, but also process R&D, Congress could help manufacturers in particular become more competitive.

B. Allow Companies to Expense in the First Year Expenditures on Capital Equipment. Currently companies must depreciate investments in capital equipment over a number of years. Allowing first year expensing would result in more investment in capital equipment while at the same time improving overall U.S. tax competitiveness.

C. Allow Expenditures on Employee Training to Qualify for the Alternative Simplified R&D Credit. Making workforce training investments eligible for a tax credit would spur firms to invest more in the training of their U.S. workforces, enabling them to be more competitive and productive.

Making these changes would not only make the U.S. corporate tax code more competitive with other nations, leading to more higher wage jobs in the United States, it would also spur firms to invest more in the building blocks of growth: research and development, new capital equipment, and workforce training.

KEY PRINCIPLES OF CORPORATE TAX REFORM

Principle 1: Differentiate Between Individual Taxes And Corporate Taxes And Focus On Making The Former More Progressive

While the individual tax code directly affects many more Americans, inefficiencies and biases in the corporate tax code fail to promote the productivity and innovative capability of businesses in America, hampering the economy and indirectly affecting all Americans. Yet, in the debate over tax reform all too often both the public and policymakers lump the individual tax system and the corporate system together. As University of Michigan tax economist Joel Slemrod notes, “To many voters the corporation tax is a linchpin to any progressive tax system.”¹ Indeed, many liberal advocates call for higher taxes on both higher-income individuals and corporations, believing that both actions foster greater fairness.

Despite what many on the left argue, raising corporate taxes does not necessarily increase income equality. There are two reasons. First, corporate taxes, like all costs affecting corporations (*e.g.*, higher energy prices), are passed on to consumers. To be sure, if taxes are reduced on one particular firm, that firm would be able to use the savings to boost profits, with a not insignificant share likely to go to higher-income stockholders. However, if taxes are cut across the board on all firms, there might be a short-term increase in profits, but competition would soon force firms to pass along the savings from lower taxes in the form of lower prices (and perhaps also higher wages). Of course, this is dependent on the degree of competition in individual markets, but with increases in international competition, more markets are more competitive. Conversely, if taxes are increased, profits may fall in the short run, but in the long run they should revert to the normal rate of profit. This is why there is no historical relation between corporate taxes and profits. Thus, forcing corporate America to “pay its fair share” simply means that consumers would pay more for goods and services. There is no free lunch.

However, it is true that raising taxes on business would mean that the government would raise revenues from foreign, as well as American, consumers (and potentially from foreign shareholders, depending on the competitiveness of particular product and service markets).

But even here there is no free lunch. Higher taxes would increase prices for goods and services made in America, making them less competitive in global markets, further driving up the trade deficit. At the same time, lower taxes on business would mean that foreign consumers would benefit from lower prices, but establishments in the United States would be more competitive and the trade deficit would be lower. This is similar to the effects that changes in the value of the dollar have on American and foreign consumers and businesses in the United States.

A host of studies finds no relationship between higher marginal personal income tax rates and growth. In contrast, studies find that higher corporate taxes reduce investment, new business start-ups, and inward foreign direct investment.

Second, even if a small share of corporate taxes is ultimately borne by shareholders, it's more progressive to tax the income directly at the individual level than at the corporate level. As Slemrod notes, the reason is that the corporate income tax serves as a withholding tax for individuals for corporate source income.² As such, to the extent that higher taxes are not passed through in the form of higher prices, a high corporate tax rate imposes higher taxes on shareholders. But because shareholders include both high-income individuals as well as middle- and low-income individuals (most of whom receive corporate source income through pension funds and other retirement programs), imposing a high tax on corporate income means that both high and low-income individuals pay the same rate. Slemrod goes on to argue that under this view the total tax on corporate source income would be tailored to the appropriate personal tax rate of the shareholder. From this perspective, it would be more equitable to raise the rates on corporate income when it is received by higher income individual (*e.g.*, tax dividends and most capital gains as ordinary income). Taxing income flows directly when they are enjoyed by shareholders is more progressive than taxing it at the corporate level.

If many on the left see higher tax rates on wealthy individuals and corporations as the key to a more just society, many on the right see lower taxes on wealthy

individuals and corporations as the key to a more prosperous society. In fact, changes to the individual and corporate tax systems have very different implications for growth and fairness. Despite what many on the right argue, while higher taxes on corporations do hurt growth, a host of other studies finds no relationship between higher marginal personal income tax rates and growth.³ In contrast, studies find that higher corporate taxes reduce investment, new business start-ups, and inward foreign direct investment.⁴ For example, in a cross-country analysis of business investment and entrepreneurship, Djankov and Ganser found no relationship between higher personal income taxes and investment and startups, but a negative relationship between the latter and the effective corporate tax rate.⁵ As they note, "corporate taxes have a substantial adverse effect on investment and entrepreneurship."⁶ Similarly, Lee and Gordon estimate that a cut in the corporate tax rate by 10 percentage points will raise a nation's annual growth rate by one to two percentage points.⁷ This is because organizations (private, non-profit, and public) largely drive economic growth, and higher tax rates on individuals have little or no effect on organizations.

Principle 2: An Effective Corporate Tax Code Is Neither Simple Nor Neutral

For many tax economists the ideal tax code is one that raises the necessary amount of revenue in the least distorting way. They hold this view because they believe that markets work effectively and therefore that taxes should have a minimal influence on the economy, leaving decisions solely to be determined by market actors.⁸ The Brookings Institution's William Gale sums up the conventional view, "The *sine qua non* of meaningful tax reform is to clean out and rationalize the exclusions, exemptions, deductions, and credits in the tax system."⁹ This was the thinking behind the 1986 Tax Reform Act and it is the thinking behind many proposals today.

To be sure there are many provisions in the tax code that have little economic rationale. But this overriding push toward simplification stems from more than wanting to prune ill-advised provisions from the tax code. It stems from the underlying principle of the prevailing neoclassical economics doctrine which holds that any tax distorts prices from what the "market" would naturally produce and therefore leads to economic welfare losses. Albeit, some neo-classical economists will ac-

knowledge that a tax provision can be used to correct a market imperfection, most commonly an externality, but most view such market failures as occurring only rarely, and even then, most believe that acknowledging market failures opens up a Pandora's box of all kinds of tax provisions, some useful, but most not.

It wasn't always this way. As University of Colorado political scientist Sven Steinmo argues, it is only in the last 30 years that the idea of tax reform has come to be defined as lowering rates and cutting loopholes. He notes that "a 'good tax system' has moved from being one that explicitly introduced distortions into the capitalist marketplace to one that minimizes these distortions. In short, a 'good tax system,' it is widely believed by both the left and the right, keeps the government out of private economic decision making."¹⁰

But there is an alternative view grounded in a different economic doctrine, "innovation economics."¹¹ According to this view the overarching goal of economic policy generally, and tax policy specifically, is not to facilitate the efficient allocation of scarce goods and services by reducing distortions, but rather to spur the effective creation of new goods and services and increased productivity through robust innovation policies. In this sense, innovation economics holds that market forces alone often do not produce optimal outcomes and that public policies, including tax policy, to correct for these mismatches, can enhance societal welfare. In this sense, the quest for simplicity should not override efforts to craft a corporate tax code that more effectively spurs productivity and innovation.

Principle 3: The Corporate Tax Code Should Explicitly Spur Innovation And Productivity

Because markets don't always allocate resources to optimize productivity and innovation, government has a key role to play in providing better incentives for private actors to increase investments that drive innovation and productivity. This means that effective corporate tax reform strengthens, not weakens, incentives for firms to invest in these activities. As discussed below, it is clear what these activities are: investment in new generations of capital equipment (including computers and software), conduct of research and development, and training the workforce with skills needed to develop and use innovations.

To be sure, taking these steps goes in the opposite direction of simplicity. But the assumption that price "distortions" induced by the tax code are by definition welfare-reducing is based on the view that: 1) the market efficiently allocates economic activity, and 2) that any gains from a tax-induced reallocation would be offset by losses due to allocation inefficiency. In fact, as Canadian government economist Aleb ab Iorwerth argues, "there is no presumption that distortions are necessarily welfare-reducing. Distortions that favor the contributors to long-run growth will be welfare-enhancing."¹² As discussed below, there is ample evidence that not only do market failures lead to underinvestment in research and development, capital equipment, and workforce training, but that the gains from additional investment in these areas are significant and would produce gains that would significantly outweigh any losses to allocation efficiency.

The quest for simplicity should not override efforts to craft a corporate tax code that more effectively spurs productivity and innovation.

This is not to say that efforts at corporate reform should not work to reduce special deductions, exemptions, and credits that cannot be justified on a productivity or innovation basis. Indeed, a reconstituted corporate tax code which closes parochial loopholes would likely have modest positive impacts on growth. But if the dogged faith in simplicity ends up trumping efforts to shape the code as a driver of innovation, it will have led to less growth and innovation, not more. So the choice should not be between a corporate tax code riddled with particular exemptions and credits and a completely neutral code. Rather the code should reduce ineffective exemptions and incentives while expanding effective ones focused on innovation and growth-enhancing activities characterized by significant spillovers or other market failures.

Principle 4: Nations Need Competitive Corporate Tax Systems In A Global Economy

In a relatively closed economy with relatively immobile capital, high corporate tax rates may reduce investment

but they do little to affect the location of investment. This situation essentially described the United States economy until the late 1970s. But since then competition for internationally mobile investment has significantly increased, spurred by reduced trade and capital barriers and technological innovations.

In response, most nations have established competitiveness policies, including more competitive corporate tax codes. Deveraux, Lockwood, and Redoano find that corporate tax rates have declined over the last 30 years and that international tax competition is the principle driver of these declines.¹³ In the early 1980s the average statutory rate amongst OECD nations was nearly 50 percent; by 2001 the rate had fallen to under 35 percent. Some formerly high tax nations have reduced their taxes dramatically. For example, the statutory corporate tax rate in Sweden in 1982 was 60 percent; by 1999 it had been reduced to 28 percent. Not only have corporate rates declined, but a growing number of nations, particularly Asian nations, use targeted tax incentives (such as tax holidays on new plants) to attract internationally mobile investment.

The reason for these declines is that countries are increasingly using their corporate tax code to create more attractive locations for internationally mobile investment.¹⁴ Lower effective rates spur greater inward foreign direct investment (and reduce outflows) and this effect has grown over time. Altshuler finds that the elasticity of foreign direct investment to corporate tax rates has increased from 1.5 to 3 from 1984 to 1992, indicating that a 1 percentage point reduction in the host country tax rate raises foreign direct investment by 3 percentage points.¹⁵ A decade later, the effect was even larger at 3.7.¹⁶

While this international tax-based competition for economic activity is relatively new, it has been going on at the U.S. state level for over half a century. Indeed, when the U.S. economy became fully national in scope after WWII, states were forced to compete for increasingly mobile corporate investment. As a result, states had no choice but to lower their corporate tax rates and/or increase their corporate tax incentives in order to compete. Because of this, from 1970 to 2008, corporate taxes as a share of overall state tax revenues fell from 8.3 percent to 6.2 percent. Now the United States finds itself in the position U.S. states did after

WWII; it has to compete for internationally mobile investment, particularly that providing higher value-added, high wage jobs.

Principle 5: Tax Reform Should Shift Revenue From Mobile Sources Of Economic Activity Toward Relatively Immobile Ones

Consideration of issues of global competition need to be a key part of tax reform efforts. Yet, as Desiri and Hines note, “in many countries, particularly high-income countries such as the United States, corporate tax provisions are designed on the basis of domestic considerations. Subsequently, modifications intended to address problems and opportunities that arise due to global capital and goods markets are incorporated, often as afterthoughts.”¹⁷

Corporate tax rates have declined over the last 30 years and international tax competition is the principle driver of these declines.

It is time to design a corporate tax system that treats globally-traded activity differently than activity that is less mobile. To understand why, consider that regional economists distinguish between two kinds of economic sectors: traded and non-traded. The output of the former is largely sold to people (or firms) who live outside the region where it is produced, while the latter is sold largely to people who live in the region. Few people travel outside their community to get a haircut. In contrast, few people buy a car that is produced in their community, unless they live in a place like Detroit. In this sense, barber services are not traded while automobile production is. At the margin tax rates would have little or no effect on the location of non-traded sectors, but they can have an effect on the location of traded sectors. This is why all 50 state tax codes give preferences, such as special tax exemptions for manufacturers, to traded firms.

Thus, a key challenge for governments is to raise revenues in ways that minimize the competitive disadvantage on the region’s attractiveness to mobile capital. This means increasing the share of revenue from less mobile capital while reducing the share from mobile capital. For example, lowering top marginal tax rates

on individual income would have almost no effect on mobile investment. In contrast, more generous tax incentives for R&D, new capital equipment, and expenditures on workforce training would lead to increased mobile investment, while also addressing market failures that lower growth.

Reducing taxes on more mobile capital does not necessarily have to lead to reduced government revenues. In fact, studies find no relationship between declines in corporate tax rates and public spending.¹⁸ There are two reasons for this. First, lower corporate taxes generate more growth, making up at least some of the lost tax revenues. Clausen finds that the combined revenue-maximizing corporate income tax rate is 33%, significantly lower than the combined U.S.-state rate. One reason is that higher tax rates lead to less investment (and thereby lower tax revenues) and also more income shifting.¹⁹

Nations with lower corporate tax rates also raise more revenues from less mobile sources. These nations use sources of revenues such as value-added taxes and taxes on energy to replace declines in corporate tax revenues. For example, most European nations have used their value added tax system (a tax on purchases that is border adjustable) to offset reductions in their effective corporate tax rates.

Principle 6: Recognize That International Tax Competition Is Here To Stay

Societies have a legitimate wish to ensure that their governments receive adequate revenues, particularly with growing budget deficits and entitlement expenditures. But the need to raise adequate revenues runs counter to the need to maintain an internationally competitive corporate tax system. Because of this conflict, some see the increase in international competition for mobile economic activity as a “race to the bottom” and would seek to unilaterally withdraw from the competition. This is a motivation for the Obama administration’s effort to limit deferral of foreign source corporate income. However, nations cannot effectively pull out of the tax competition “game” without negative consequences for their own economic competitiveness, as the United States has seen over the last 15 years with its growing trade deficit.

If unilateral action isn’t feasible, some would advocate harmonizing global tax systems. In fact, the OECD and the European Union introduced initiatives in the late 1990s designed to do just this, with little success. Absent a much stronger form of global governance (unlikely in the best of circumstances), such efforts will not bear fruit. There is simply too much to be gained by countries “cutting their own deals” with internationally mobile capital, as evidenced by the policies of nations like China who regularly provide special tax incentives to firms to locate there. While regional coordination (*e.g.*, NAFTA, the EU, etc.) might be more attainable, although still difficult, the gains from coordination at this level are quite small.²⁰

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Even if greater coordination were possible, it may not be desirable. Some studies have found that tax competition has positive economic impacts. For example, Sorenson found that tax competition leads to higher GDP, higher wages, and greater investment than either tax systems of global or regional coordination or tax systems that levy taxes on national location of the corporation (like the United States does).²¹

As a result, given the inevitability of corporate tax competition, policymakers need to use it to generate the most beneficial results for their nations. This does not, however, necessarily mean simply cutting rates, but rather cutting effective tax rates by providing much more generous incentives for investment in research and development, new capital equipment, and skills.

Finally, while corporate tax competition can spur growth and investment, it may have negative impacts on income equality. In one model, global tax coordination leads to a five percent decline in GDP, but a one percent increase in overall social welfare (because lower-income individuals benefit and equal increases for them relative to higher-income individuals were move

valuable to society).²² But the goal for U.S. policymakers should be to achieve gains in GDP that also lead to more income equality. One way to do this is to boost corporate tax incentives for innovation while at the same time raising top marginal rates and other progressive taxes (e.g., individual taxes on dividends and capital) and also raise increasing revenue from taxing activities with clear negative externalities, such as greenhouse gas emissions.

THE CASE FOR USING THE TAX CODE TO DRIVE INNOVATION AND PRODUCTIVITY

There is little consensus among economists over how to structure the corporate tax code to drive growth and innovation. Conventional neo-classical economists argue that the major driver of growth is capital formation. In other words, more capital produces growth. Moreover, they believe that the tax code should be neutral with respect to corporate decision making, with perhaps the exception of a small number of cases where the societal returns from investment exceed private returns. But they set the bar quite high for these exceptions and only for perhaps corporate research do some acknowledge that the tax code should favor a particular activity.

If the externalities from investing in capital equipment are higher than investing in, say, subprime mortgages, then society is better off if the tax code encourages more investment in capital equipment, even if that means that effective tax rate on income from subprime mortgages is marginally higher.

For example, many conventional neo-classical economists dismiss the view that there are market failures, including spillovers, in corporate investment in capital equipment. As tax economist Jane Gravelle argues, “conventional economic analysis of capital income taxation suggests that providing subsidies for particular types of investment is inefficient. Economic analysis suggests that capital is allocated efficiently and the economy is more productive, absent some market failure or other existing distortion, if all capital income is taxed at the same rate.”²³ This is why many conventional neo-classical economists oppose incentives for capital investment, arguing that the foregone revenues would be

better spent on deficit reduction. For example, Gravelle argues that “the most serious problem with an investment tax credit is that it absorbs tax revenues that could probably be used in ways that would be more successful in achieving the goals of an efficient economy.”²⁴ But the definition of efficient is a tautology: something is efficient if the market invests in it and the market only invests in things that are efficient. But if the externalities from investing in capital equipment are higher than investing in, say, subprime mortgages, then society is better off if the tax code encourages more investment in capital equipment, even if that means that effective tax rate on income from subprime mortgages is marginally higher.

Economists who embrace the innovation economics doctrine (also referred to as “new growth theory” or “endogenous growth theory”) argue that the major driver of growth is innovation and technical change.²⁵ Moreover, they believe that with respect to the inputs to technical change, externalities and other market failures are more widespread than is conventionally viewed. As such, the market acting alone will underproduce growth, and the tax code is one of several tools that should be used to maximize growth.

Which side is correct? The bottom line is that while both sides marshal evidence and arguments for their positions, advocates, if they are honest, will admit that economics has not provided definitive answers. As one neo-classical economist notes: “The neoclassical model is silent on the causes of total factor productivity growth, largely because economists have yet to provide a complete description of the sources of growth in technology.”²⁶ As a result, making effective economic policy in general and corporate tax policy in specific requires judgments based not on science, but on views of how the economy works and relative importance of different values.

However, the growing empirical literature in innovation economics does suggest that while we cannot be sure as to how precisely growth is generated, there are factors that appear to be more important than others, particularly investment in research, capital equipment, particularly IT equipment, and skills. Tax incentives targeting activities like these can effectively incentivize further investment and growth and expand societal welfare. But they can do so only if the investment deci-

sion is relatively sensitive to changes in marginal costs (e.g., tax incentives spur changed behavior) and if the benefits of the investment accrue to more than just the firm making the investment.

Investment Decisions In Research, New Equipment And Workforce Development Are All Responsive To Changes In Marginal Costs.

Activities differ in the degree to which they are sensitive to price differences. This sensitivity – which economists call price elasticity – is quite low for some activities, such as purchases of grocery staples, but quite high for other activities, such as purchases of luxury items.

At the firm level, certain expenditures are more responsive to price differentials than others. For example, firms' decisions to hire *additional* workers are relatively insensitive to modest differences in employment taxes (e.g., social security taxes) because the decision is based largely on whether there is adequate demand for the firm's output. Likewise, firm decisions to invest in *additional* equipment are not that sensitive to modest differences in the costs of new equipment, since that purchase decision is largely based on whether the equipment is needed to meet expanded demand for the firm's output.

However, firms will invest more in training existing workers if they receive a tax benefit for doing so, since this raises the rate of return of the training investment. Likewise, investments in new capital equipment to replace existing equipment are sensitive to the price of the equipment for the same reason. In both cases, firms are investing in new capital (knowledge capital in the former and physical capital in the latter), and the decision to do so is based in large part on the expected rate of return.

Studies have confirmed this. Hassett and Hubbard report that the elasticity of investment with respect to the cost of capital is between -0.5 and -1.0.²⁷ In other words, lowering the after-tax cost of capital by 1 percent leads to a 0.5 to 1 percent increase in capital purchases. Cabellero also finds an elasticity of around -1.0.²⁸ Chirinko found that the number is somewhat lower, but still significant (-0.4).²⁹ Studies at the plant level find lower levels, with -0.23 for equipment and -0.07 for structures. Moreover, investments in some

kinds of equipment are more sensitive to price changes. Tevlin and Whelan find that a 1 percent after-tax reduction in the price of computers leads to a 1.59 percent increase in adoption over the long run.³⁰ Similarly, effects are in place with respect to investments in skills and research. A range of scholarly studies finds that lowering the cost of research by one dollar (through the R&D tax credit) spurs firms to invest an additional one to two dollars in R&D.³¹

Investments In Research, Workforce Training, And New Equipment, Particularly In Information Technology, Yield Total Societal Benefits In Excess Of Private Benefits.

Economists have long studied the phenomenon of spillovers, where the actions of one party affect others. If certain activities do not have significant positive spillovers and government favors them in the tax code, companies will invest more in them than is societally optimal. In contrast, if there are significant positive spillovers from particular activities, companies will invest less in them than is societally optimal absent some kind of subsidies, such as tax incentives.

Investments in research, new plant and equipment, and workforce development all have significant positive spillovers, meaning that companies do not capture all of the benefits of investing in them. The result is that companies will invest less in these areas than is societally optimal. This gap, between the level of spending supported by the market alone and the social optimum, justifies a role for government.

The social rate of return on R&D spending significantly outstrips the private rate of return on which private investment decisions hinge, suggesting that the socially optimal level of R&D spending is much higher than the amount private parties would invest on their own accord.³² However, under federal tax law, only R&D to develop new products is eligible for the R&D credit, on the justification that only product R&D exhibits spillovers. But there are also spillovers from process R&D (research done to improve the process of production in firms). In fact, it is possible that process R&D spillovers are potentially greater than product R&D spillovers because it is harder to protect the intellectual property generated and is less rivalrous (many firms can use a better process, but it is harder for many firms to produce the same new product, given finite market demand).

Given the paucity of data on process *vs.* product R&D, there are few studies of differentiation in spillovers. However, Ornaghi finds “statistically significant knowledge spillover associations for process and product innovation.”³³ Moreover, these “knowledge spillovers play an important role in improving the quality of products, and to a lesser extent, in increasing the productivity of the firm.”³⁴ At least one study finds that firms invest more in product R&D when they invest more in process R&D.³⁵ So spurring process R&D also spurs product R&D. Cefis *et al.* point out that positive externalities in process R&D indicate relatively high technological spillovers in this type of innovation. This corresponds to findings from a study of Italian firms that process innovations are often informal and hence less protected, and that there are relatively high spillovers from process R&D.³⁶

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Why do firms appear not to be able to capture all the benefits of process R&D? One reason is that the knowledge of a new way to make a product or process is hard to keep secret. For example, when Toyota invested considerable sums to develop its innovative lean production system, it was not able to keep this a secret. Other firms in discrete parts industries, including auto firms, learned of the innovations and copied them to raise their productivity.³⁷ This kind of learning is quite common.³⁸ And while trade secrets can help limit these kinds of knowledge spillovers, with the increased mobility of workers, it’s hard for firms to keep these secret. In fact, one important channel of process knowledge diffusion is the mobility of process R&D engineers.³⁹

There are also spillovers from capital investment, particularly in information technology. One of the earliest studies finding this was performed by economists Lawrence Summers and Brad DeLong.⁴⁰ While this study has since been criticized by some neo-classical

economists,⁴¹ other studies have found similar results. Jonathan Temple finds externalities from capital investment.⁴² Likewise, Xavier Sala-i Martin finds that both equipment and non-equipment investment are strongly and positively related to growth, but that equipment investment has about four times the effect on growth as non-equipment investment (*e.g.*, buildings).⁴³ Kenneth Judd finds that imperfect competition in intermediate capital goods, because innovation is concentrated there, implies that the price is higher than marginal cost.⁴⁴ Therefore, he argues there should be greater subsidy for goods with prices significantly higher than marginal costs, and these are more likely to be equipment than structures.

Studies at the industry and firm level have also found compelling evidence of capital equipment spillovers, particularly in information technology (hardware, software, and telecommunications). Van Ark finds that the spillovers from investment in new capital equipment are larger than the size of the benefits accrued by the investing firm.⁴⁵ Lorin Hitt finds that the spillovers from firms’ investments in IT are “significant and almost as large in size as the effects of their own IT investment.”⁴⁶ In other words, firms capture on average only about half the total societal benefits from their investments in IT, suggesting that the current level of IT investment is significantly less than societally optimal.

Why are firms not able to capture all the benefits from their investments in capital equipment? There are at least six reasons. First, increased capital expenditures spur innovation in the capital goods industry as higher sales enable capital goods suppliers to fund more R&D, leading to even better capital goods equipment. Increased sales also move the capital goods industry down the production cost curve faster, allowing it to lower the price on future units, which in turn spurs adoption of even more capital equipment. Second, lower prices for equipment mean that equipment used in scientific research is cheaper, leading to more investment in it and more research breakthroughs. Third, investments in new products give workers knowledge about these new investments and they in turn transmit this information to their next employer, leading them to also invest in new machinery. Indeed, users of new equipment learn what modifications need to be made and then transfer this experience to other firms

through a host of means, from inter-firm labor movement to trade shows and professional association meetings. Fourth, some equipment, especially information technology, has network effects where the benefits to other firms from a firm adopting the technology are significant. As Hitt notes, “firm-level investments in communications technologies can create benefits for business partners. Alternatively, investments in information technologies can produce knowledge that can spill over between firms.”⁴⁷ For example, when logistics firms adopted advanced information technologies in the 1980s, they were able to support just-in-time production processes by manufacturers. So while logistics firms benefited by investing in IT, so too did their customers. Fifth, in some innovation-based industries, especially capital goods industries, prices are often above marginal costs, in part because of increasing returns to scale. Consequently, rates of adoption will be too low.⁴⁸ However, since prices are higher than marginal cost, this is akin to a private tax that will lead demand to be lower than societally optimal. Sixth, as new equipment is replaced, it usually becomes more energy efficient, generating benefits firms don’t capture fully (such as reduced CO2 emissions).

This is not to say that all kinds of corporate capital investment have all of these characteristics. When a company buys a desk or a car or even builds a new building it is more likely to reap the full benefit from it. But when it buys new equipment it is not likely to be able to capture all the benefits. And these spillovers are likely to be even larger for information technology, in part because the learning cost curve appears to be steeper and because the network effects are larger.

In addition, investments in workforce development training have positive spillovers as well. One kind of externality to workforce training expenditures relates to the fact that firm decisions to invest in more productive and capital intensive workplaces depends in part on the skills of the workers. But the decisions of workers to acquire skills also depends on the extent to which firms put in place advanced, “high-performance” production processes to take advantage of increased worker skills.

At the macroeconomic level, Elvio Accinelli has shown that there is strategic complementarity between the percentage of high-skill workers and high-value added, innovative firms in an economy.⁴⁹ Accinelli

finds that economies can be in perfect neo-classical equilibrium at either high levels of innovation, or in a “poverty trap” of low skills and underinvestment in innovation. Since the poverty trap can be avoided if the number of innovative firms in an economy exceeds a threshold level leading to an increased number of skilled workers, there is a role for public policy to move economies to a high-level equilibrium on innovation.

Finally, firms are also likely to under-train their employees because of the risk of worker turnover, which has increased over the last two decades. Shorter employee tenure means that firm investments in their workers’ human capital will yield the firm a lower rate of return (although the rate of return for society will be higher). This is likely a major reason why corporate training expenditures have declined significantly from \$180 billion in 1999 to \$139 billion in 2007, and even more as a share of GDP, from 1.8 percent in 1999 to only 1.0 percent in 2007.⁵⁰

POLICY RECOMMENDATIONS: CRAFTING AN INNOVATION-BASED CORPORATE TAX CODE

The U.S. corporate tax system faces three main challenges: 1) relatively high compliance costs; 2) statutory and effective rates relatively high compared to other nations⁵¹; and 3) weak incentives for investments in the building blocks of economic prosperity: investment in research, new capital equipment, and skills. Simplifying the tax code by reducing unproductive exemptions and credits while dramatically expanding incentives to invest in the building blocks of economic growth can effectively address all three challenges. Doing so would not only spur growth but would also improve U.S. competitiveness (and reduce the amount of tax deferred by multinational firms) by reducing the tax differential between the United States and other nations.

Recommendation 1: Expand The Research And Development Tax Credit

Research and development (R&D) is the principal way industry creates knowledge that can be commercialized into economically valuable products and services, and the R&D tax credit is one of the main ways the federal government supports private sector R&D activities.⁵² The R&D credit is available for qualified expenditures in the United States, which primarily in-

clude the wages paid to employees engaging in qualified research activities, 65% of the fees paid to external contractors for the performance of qualified research, and supplies used in conducting qualified research (but not equipment used in research). Firms can choose from two main credits: a credit equal to 20 percent of all qualified R&D expenditures above a firm-specific base level of R&D expenses, or the Alternative Simplified Credit, which provides a credit of 14 percent on qualified R&D expenses above 50 percent of average research expenses for the preceding three years.

At its current level, the R&D credit is a less important source of competitive advantage than it once was. As nations have sought to compete in the innovation economy many have put in place or expanded R&D tax incentives. In 1992, the United States had the most generous tax treatment of research expenditures among 30 OECD nations. By 2007, the United States had fallen to 17th for large firms (18th for small-medium enterprises), in large part because other nations increased their R&D tax incentives. In some Canadian provinces, for example, firms can obtain a 40 percent credit on all their R&D expenditures. Australia recently proposed a flat 40 percent credit on all business R&D. These levels are more than 5 times as generous as U.S. levels.

Boosting the R&D tax credit will not only increase the amount of R&D conducted by firms in the United States, it will make America a more competitive location internationally for R&D-based economic activities, boosting exports and in turn creating more high-paying production jobs.⁵³ To accomplish this, Congress should take several steps:

1) Make the R&D tax credit permanent. R&D tax incentives in virtually all nations except the United States are permanent features of the tax code. Since its enactment in 1981, the R&D tax credit has been extended 12 times and expired twice, including in 2006.⁵⁴ The uncertainty over the credit's existence adds risk to the already risky research investments made by companies and reduces its effectiveness. An OECD study found that the less stability and greater uncertainty of the credit, the less likely it is to have a positive effect on stimulating R&D.⁵⁵ One reason Congress has not made the credit permanent is because the expenditures must be scored for five years, raising the budgeted cost.

Yet, extending the credit each year does not lower its actual cost significantly, but it does allow the costs to be passed on to next year's budget.⁵⁶

2) Expand the Alternative Simplified Credit (ASC).

Permanence is useful, but expansion is critical. Therefore, Congress should expand the ASC by enacting a three-tier credit. Firms would continue to receive a credit of 14 percent of the amount of qualified expenses greater than 50 percent and below or equal to 75 percent of the average qualified research expenses. For qualified expenses greater than 75 percent and below or equal to 100 percent firms would receive a credit of 20 percent, and for qualified research exceeding 100 percent of the base the credit would increase to 40 percent.

3) Broaden the definition of qualifying R&D expenditures to include process R&D.

A large share of innovation is process innovation—the development of new ways of producing a product or service. Much of this is science and technology-intensive, but under current rules expenditures on process R&D are not eligible for the credit.⁵⁷ One result is that traditional manufacturing firms get less benefit from the credit than high-tech firms engaged in product development. Expanding eligible expenditures to process R&D would not only encourage firms to conduct more R&D, thereby leading to higher productivity, it would also reduce the cost differential between manufacturing located in the United States and other nations.

4) Broaden the credit for collaborative energy-related research to any area of collaborative research and expand the rate from 20 percent to 40 percent.

As part of the Energy Policy Act of 2005, Congress created an energy research credit that allowed companies to claim a credit equal to 20 percent of the payments to qualified research consortia (of five or more firms), universities, or federal laboratories for energy research. Congress should go further and allow firms to take a flat credit of 40 percent for any collaborative research conducted at universities, federal laboratories, and research consortia.

There are several reasons to treat collaborative research more generously. First, participation in research consortia has a positive impact on firms' own R&D expenditures and research productivity.⁵⁸ Second, most

collaborative research is more basic and exploratory than research typically conducted by a single company. Moreover, the research results are often shared, often through scientific publications. As a result, firms are less able to capture the benefits of collaborative research, leading them to under invest in such research relative to socially optimal levels.⁵⁹

Other countries, including Denmark, Hungary, Japan, Norway, Spain and the United Kingdom, provide firms more generous tax incentives for collaborative R&D.⁶⁰

Recommendation 2: Transform the R&D Tax Credit into a Knowledge Tax Credit by Making Workforce Development Expenditures Eligible

The competitiveness of American industry depends in part on the skills of American workers. Given the rapid increase in education levels abroad, it is clear that the skills of American workers must be strengthened both pre-market—through better high school curricula and higher college matriculation and completion rates—but also through on-the-job training. Training and on-going education are critical components of robust productivity growth and rising worker incomes. And a key way workers get skills is through training provided on the job by employers.

Therefore, to spur greater workforce training while at the same time lowering the effective corporate tax rate, Congress should allow expenditures on employee training to be added to qualified research expenditures under the R&D tax credit. To ensure that companies use this credit to focus on the skills of the majority of their workers, and not just managers, firms taking advantage of the credit would need to abide by rules similar to those for pension program distribution, which limit focus on highly compensated employees.

Recommendation 3: Allow Companies to Expense in the First Year Expenditures on New Capital Plant and Equipment

An effective growth policy needs to be based in part on lower prices for equipment and machinery. One way to do this is to let firms expense all the cost of equipment in the first year instead of having to amortize the costs over a number of years. Allowing for the expensing of purchases of plant and equipment will reduce the after-tax price of investment, raising the

level of domestic investment and the productivity of workers. While expensing allows a tax-paying entity to deduct the full cost of assets in the year of purchase, depreciation spreads these deductions over a federally-determined asset lifetime, costing firms more because they have less capital in early years. Compared to first-year expensing, depreciation, thus, increases the cost of investment spending, reducing the internal rate of return of investment projects. Facing lower returns on their investments, firms therefore spend less on physical assets that would otherwise enhance the productivity of their workers. Moreover, moving to first-year expensing will make investments in highly capital-intensive facilities that are likely to comprise many of the next generation industries (*e.g.*, renewable energy, nano-technology, etc.) more economical, and therefore more likely to be built in the United States.

Aside from changing the calculus of business investment decisions, depreciation adds a layer of inefficiency due to the static nature of depreciation schedules determined by a removed federal bureaucracy. The economic useful life of identical assets varies between firms and across industries; the useful life of assets according to the tax code is effectively the same for all firms, regardless of intensity of use or circumstance. The process of determining the useful life of new technologies is also problematic; often the useful lives of newly developed assets is gauged relative to older assets which they may replace—for example, in early years the useful life of desktop computers was determined to be similar to that of a typewriter. A rising rate of innovation makes this centralized process increasingly obsolete and more likely to penalize early adopters of new technology. As a result, allowing companies to expense all investment in the first year would not only reduce the after-tax cost of equipment, but also reduce the complexity of the tax code. Figuring out and complying with the convoluted crosswalk of depreciation methods and asset lives entails considerable costs.

In addition, shifting to expensing all plant and equipment purchases will improve cash flows of tax-paying entities, reducing the need for risky debt financing and easing the credit constraints that afflict small and non-corporate businesses. Improved cash flows combined with higher internal rates of return will shift hundreds of billions of dollars of potential investment across the threshold of affordability, expanding the operations of U.S. firms and growing the economy.

If Congress wanted to limit the financial impacts of moving to a first year expensing regime, it could limit it only to IT equipment and software. There are three reasons to focus on IT equipment, instead of all equipment, or even all capital investment (e.g., including buildings).

First, in an era of fiscal limitations, extending expensing to all capital equipment would be more expensive, particularly because the depreciation schedules for other capital is in many cases significantly longer than for IT capital.

Second, IT investments are more evenly distributed through the economy, meaning that there will be wider-spread support for this policy than one focused on all capital investment (and investing the same amount of tax expenditures). The standard deviation between major industries for investment in the industry as a share of investment overall is 5.6 percent for IT equipment vs. 6.4 percent for Overall Machinery Investment.⁶¹

Finally, even more so than other capital, IT capital investment appears to produce total benefits that exceed the benefits the companies making these investments receive. Because IT transforms organizations and leads to innovations within other organizations, it operates in the same way as research and knowledge, with high spillovers that may be taken advantage of by other organizations. A number of studies have found that IT investments generate increases in productivity significantly greater than other kinds of capital investment.⁶²

Some argue that expensing does not spur firms to invest more. But it's important to distinguish between short-term expensing provisions put in place in economic slowdowns and permanent expensing. In 2002, 2003, and 2008 Congress passed temporary expensing provisions. The 2002 tax code change allowed for thirty percent of investment to be immediately expensed; the remaining 70 percent of the purchase value was depreciated according to the traditional schedule. In 2003 first-year expensing was increased to 50 percent of the purchase price. The continued stagnation of business investment in the years following these write-off provisions has led some to conclude that this type of tax policy is ineffective. This view, however, is refuted

by empirical evidence. Desai and Goolsbee concluded that the expensing provisions were effective in changing the incentives for investments, but were not strong enough to counter the other economic forces affecting business investment in the early years of this decade.⁶³ Other researchers have also concluded that though they were small in absolute magnitude, the 2002 and 2003 bonus depreciation allowance did effectively increase investment.⁶⁴ Full expensing would also efficaciously change the incentives for investment, but would do so to a larger degree and thus be more effective in actually increasing investment in an economic environment where companies are more inclined to expand investment.⁶⁵ While a permanent shift to full expensing will not be as effective in increasing investment in the short run as a temporary measure would be, in the long run the price of investment will be forever lower, leading to increased investment.

Ending deferral would make capital export neutrality worse, because U.S. firms producing overseas for the U.S. market would potentially face higher taxes than foreign firms producing overseas for the U.S. market.

It is important to also note that enacting expensing could also have favorable distributional impacts. Improved equipment quality will increase worker productivity and some of this increase will go to wages. Beaudry and Green argue that insufficient increases in physical capital have led to a wider income distribution.⁶⁶ Capital has been attracted to knowledge workers, and away from those with lower skills, leading to falling wages. As a result, providing incentives for capital investment may mitigate rising inequality because of differences in educational attainment.

Recommendation 4: Exempt These Provisions From The Alternative Minimum Tax

Even if these incentives are expanded and put in place, some firms will be unable to use them in current tax years because they face alternative minimum tax (AMT) requirements. The presence of the corporate AMT limits the effectiveness of these incentives, not only because it means that some companies facing the AMT do not receive an incentive from the provi-

sions, but also because the AMT raises uncertainty about whether firms will be able to take a credit.⁶⁷ In 1998, 11,874 companies, representing an estimated 10 percent of corporate assets, had the use of credits (including the R&D tax credit) curtailed because of the AMT.⁶⁸ While the corporate AMT may serve an overall useful goal, applying it to these pro-innovation activities, it is at odds with the national goal of boosting investment in growth-producing activities.

PAYING FOR THESE INCENTIVES

Making the corporate tax code a more robust tool to drive innovation, productivity and competitiveness will not be free. While the recommendations made here are likely to have dynamic growth effects that will lead to some offsetting revenue gains for the federal government, the budgetary impact in the short run will be negative. As such, it is important to identify steps that can be taken to offset these costs.

Rather than limit deferral, a more effective step to achieve both goals would be to reduce the effective U.S. corporate tax rate through the kinds of innovation incentives described above.

The Obama Administration Proposal to End Deferral

One proposal on the table is to end or limit the deferral of foreign source income. According to the Obama administration, limiting deferral would raise an additional \$210 billion over 10 years.⁶⁹ In an effort to sell the plan to the business community, the administration has committed to support making the R&D tax credit permanent. However, this is not really an offset as the credit has been regularly renewed (or reinstated) in the past and is likely to be in the future. So making the credit permanent, while an important step to provide companies with certainty, does not materially reduce corporate taxes below the status quo.

Before discussing the merits of limiting deferral it's important to briefly review it. The United States is one of only a few nations with a territorial tax system, charging taxes on U.S. companies regardless of where that income is earned. However, under current law, affiliates of U.S. corporations can defer taxes owed the U.S. government until they repatriate the money

to the United States. The Obama administration has proposed limiting deferral so that U.S. corporations pay more taxes immediately. Besides raising revenue to pay for some of its spending and public investment commitments, limiting deferral, according to the Administration, reduces the incentive for U.S. firms to invest in other nations with lower effective tax rates.

Ending deferral would move to the ideal of what tax economists call “capital import neutrality,” where firms should face the same tax rate regardless of where their activities are based. But economists also talk about “capital export neutrality,” the concept that a firm should face the same tax rate as other firms in the same jurisdiction. Ending deferral would make capital export neutrality worse, because U.S. firms producing overseas for the U.S. market would potentially face higher taxes than foreign firms producing overseas for the U.S. market. Absent global tax harmonization, it is not possible to achieve both import and export capital neutrality.

Let's look at both assumptions behind limiting deferral. The first is that ending deferral will increase revenue. This appears to be likely. However, according to some studies the amount of revenue raised is likely to be less than expected because of the ability of multi-national companies to shelter income or relocate their headquarters operations so that they do not pay the higher U.S. rate. Bartelsman and Beetsma estimate that at the margin on average 68 to 87 percent of increased tax revenues from practices like ending deferral are lost due to companies shifting income around nations.⁷⁰ They argue that while tighter enforcement of some tax practices like transfer pricing would reduce these shares, if the tax differentials are significant enough, they would encourage companies to move their headquarters and reincorporate in other, lower tax nations.

The second assumption is that ending deferral would lead to more U.S. jobs. On the surface this argument is appealing. If U.S. companies face lower taxes on production overseas than they do in the United States, they have an incentive to move production to low tax nations and then ship the products (or services) back to the United States. Ending deferral, the argument goes, would level the playing field and stop “subsidizing” the export of jobs. According to this view, investments overseas by U.S. firms are substitutes for investments by U.S. firms in the United States.

But it is not this simple. If U.S. affiliates are in a lower tax nation and sell much of what they produce there to nations other than the United States, then requiring these facilities to pay the higher U.S. tax rate will make them less competitive with firms from other nations that are subject only to the lower national rate. Since these competitor firms enjoy lower costs, they are likely to export more, including to the United States, taking market share away from U.S. firms (either producing domestically or in other nations). In this case, making foreign affiliates of U.S. firms pay the higher U.S. rate may not result in more production in the United States, but rather the same number of imports, but with more coming from foreign firms. In addition, by reducing deferral, U.S. firms would be disadvantaged in buying foreign firms located in foreign nations with lower corporate taxes than the United States, compared to firms facing the lower taxes while foreign firms would have an advantage to buy U.S. affiliates located overseas.

Even if there is no substitution effect and no competitive disadvantage to U.S. firms, it's not clear that limiting deferral actually leads to increased investment in the United States. Desai, Foley, and Hines argue that there is a complementarity between high and low tax nations and that "reduced costs of using tax havens are likely to stimulate investment in high-tax countries. These results stand in contrast to the assumptions in much of the tax competition literature and the beliefs of many concerned policymakers."⁷¹ Likewise Devereux argues that "from a national perspective it is optimal to exempt outbound investment from tax."⁷²

Their logic (and empirical model) is based on the notion that low tax nations permit foreign investors to avoid some of the tax burdens imposed by domestic authorities, thereby maintaining foreign investment levels in high tax nations. A related reason is that deferral leads firms to keep larger amounts of cash outside the home nation, limiting reinvestment of that money in activities domestically.⁷³ One study found that deferral leads firms to hold almost double the amount of cash offshore of firms that do not face deferral.

Another way to understand this is to consider the assumption about how new investment is financed. If 1 dollar of new foreign investment crowds out 1 dollar of domestic investment, then taxing foreign source income at the same rate and ending deferral makes more sense. Companies have a limited amount of money and

will use the money to invest either at home or abroad. However, if both kinds of investment are financed at the margin by global capital markets, then this result does not hold. And given the rise of global capital markets, at least a portion of multinational investments overseas are complements and not substitutes.

Finally, basing taxation on the corporate location of the company could lead companies to relocate to other nations that do not apply territorial tax systems so that they would pay higher U.S. taxes on U.S. income and lower taxes on income from lower tax nations. Devereux argues that "in such a setting, there is no rationale for the government hosting the parent company to tax its worldwide income."⁷⁴

Congress could repeal the portion of the 2003 Jobs and Growth Tax Reform and Reconciliation Act which reduced the top individual tax rates on dividend income to 15 percent for investors in the top four tax brackets and 5 percent for investors in the bottom two tax brackets.

Thus, at best it appears that ending or limiting deferral could have mixed results, perhaps spurring some activity to locate or remain in the United States but also reducing jobs in the United States by U.S. headquartered companies that serve global operations (e.g., R&D, management, sales, marketing, etc). As Clausen notes, ending deferral would "exacerbate concerns regarding the international competitiveness of U.S. based multinational firms, as U.S. firms would face a tax disadvantage relative to firms based in other countries when operating in low tax markets."⁷⁵

So which of these results is better for the United States? Is what's good for GM still good for the United States? It does appear that the United States is better off with strong U.S. multinationals and even better with strong U.S. multinationals that also invest robustly in the United States, especially in high value-added employment. Rather than limit deferral to try to achieve the latter goal, a more effective step to achieve both goals would be to reduce the effective U.S. corporate tax rate through the kinds of innovation incentives described above. Doing so would: 1) provide strong incentives for firms to invest in the United States in the build-

ing blocks of growth: research, capital equipment and workforce training; and 2) reduce the effective tax rate differentials between the United States and other nations, thereby reducing the need for U.S. companies to hold foreign source income overseas while at the same time encouraging U.S. and foreign companies to invest more in the U.S. than in formerly lower-tax nations.

Other Sources of Offsetting Income

Rather than seek to repeal or limit deferral, a more effective way of gaining tax revenues needed to fund the proposed incentives is to increase taxes on immobile or untraded sources of income. Several steps could be taken.

Congress could repeal the portion of the 2003 Jobs and Growth Tax Reform and Reconciliation Act which reduced the top individual tax rates on dividend income to 15 percent for investors in the top four tax brackets and 5 percent for investors in the bottom two tax brackets. While these tax breaks to investors have big price tags, they do not appear to have bought the economy much in terms of new investment. The dividend tax cut did not reduce the cost of capital for marginal investments and the 2003 individual rate reductions had “little or no effect on investment.”⁷⁶ Repealing this tax break can help to finance productivity-enhancing tax incentives which will benefit all Americans, not just corporate equity holders. In fact, over 70 percent of the tax benefits of the dividend tax cut went to the top five percent of income earners; restoring the dividend tax structure of the 1990s would help counter the trend toward greater income inequality while not limiting investment or growth.⁷⁷ In addition, raising the top marginal rates back to the Clinton era rates or even slightly higher can help restore income inequality to levels experienced in the 1990s, without harming economic growth or innovation.

Congress could also use money raised from selling carbon offsets to partially replace the funding lost by the establishment of these innovation incentives. It's not

that others have not proposed similar offsets, but the conventional proposal of raising taxes on carbon and reducing it on labor is misguided. It has become almost a mantra among many involved in efforts to combat global warming to argue that “we should tax carbon, not work.”⁷⁸ In other words government should tax carbon and reduce taxes on work (presumably Social Security payroll taxes) to increase its production (*e.g.*, the number of jobs). But compared to activities like buying a new computer to replace an old one, hiring decisions are not very sensitive to marginal changes in costs.⁷⁹ Thus, while reductions in employment taxes would have no macroeconomic impact, expanding tax incentives for investments in skills, research and equipment investment would have a positive effect.

CONCLUSION

The United States is at risk of losing its global competitive advantage and with it faster per-capita income growth.⁸⁰ To effectively respond will require the United States to take concerted and strategic actions in many areas, including a more strategic trade policy, a proactive innovation policy, and investments in key public infrastructures, including digital infrastructures like broadband. But we also need to transform the corporate tax code into an energetic tool to support private sector efforts to innovate and be more productive.

While the tax benefits of these innovation incentives may ostensibly resemble tax giveaways to corporate America akin to the lobbyist-driven loopholes in the existing tax code or the concessions that are at the heart of conservative tax policy, these targeted tax expenditures are designed to responsibly promote economic growth in ways that will directly benefit American workers. As such, we believe that both sides of the political aisle can and should embrace them with the goal of helping to put America's economy on a sustained path to growth and competitiveness going forward.

ENDNOTES

1. Jon Bakija and Joel Slemrod, *Taxing Ourselves: A Citizen's Guide to the Debate over Taxes* (Cambridge, MA: MIT Press, 2004).
2. Ibid.
3. For example, Randall Mariger, an economist at the Federal Reserve Board, found that the 1986 tax cuts increased labor supply between 1985 and 1986, but by less than one percent. When looking at the tax cuts of the 1980s economists Jonathan Gruber and Emmanuel Saez found only “modest effects on income of the tax cuts,” and they suggest that their measures are on the higher side. Moreover, these effects have declined over time as more women have entered the workforce. At least two studies have found that married women’s wage elasticity (the degree to which their work hours respond to their real wage, including their after-tax earnings) has actually been going down since the mid-1980s and has been either zero or negative since then. Cited in Peter R. Orszag, “Marginal Tax Rate Reductions and the Economy: What Would Be the Long-Term Effects of the Bush Tax Cut?” Center on Budget and Policy Priorities, Washington, D.C., March 16, 2001 <www.cbpp.org/3-15-01tax.htm> (accessed November 21, 2005). Randall Mariger, “Labor Supply and the Tax Reform Act of 1986: Evidence from Panel Data,” Board of Governors of the Federal Reserve System, Washington, D.C., June 1994. Kyoo-il Kim and José Carlos Rodríguez-Pueblita, “Are Married Women Secondary Workers? The Evolution of Married Women’s Labor Supply in the U.S. from 1983 to 2000,” Congressional Budget Office, Washington, D.C., December 2005; and B. T Heim, “The Incredible Shrinking Elasticities: Married Female Labor Supply, 1979-2003,” *working paper*, Duke University, 2004 (cited by Kim and Rodríguez-Pueblita). In addition, see Robert D. Atkinson, *Supply-Side Follies: Why Conservative Economics Fails, Liberal Economics Falters, and Innovation Economics is the Answer* (Lanham, MD: Rowman & Littlefield Publishers, 2006).
4. Simeon Djankov, Timothy Ganser, Caralee McLiesh, Rita Ramalho, and Andrei Shleifer, “The Effects of Corporate Taxation on Investment and Entrepreneurship” (Washington, D.C.: World Bank, 2008). They actually find a positive relationship (higher personal income taxes lead to more investment and startups, but when outlier nations of China and Vietnam are removed, there is no relationship).
5. Actually the relationship was positive, but when outlier nations of China and Vietnam were removed there was no relationship.
6. A 10 percentage point increase in the 1st year effective corporate tax rate reduces the aggregate investment to GDP ratio by about 10 percent (or about 2 percentage points from the mean of 21 percent). Djankove, Ganser, McLiesh, Ramalho and Shleifer, op. cit., 27.
7. Roger Gordon and Young Lee, “Tax Structure and Economic Growth,” *Journal of Public Economics* 89 (2005): 1027-43.
8. The standard view is expressed by Devereux when he states “production is allocated efficiently if it’s not possible to reallocate resources between activities in a way that would increase total output.” Alan Auerbach, Michael Devereux, and Helen Simpson, “Taxing Corporate Income,” *NBER Working Paper Series No.14494* (2008).
9. NationalJournal.com, National Journal Expert Blogs: Economy, William Gale’s response to “Tax Reform Handcuffs,” May 4, 2009 <economy.nationaljournal.com/2009/05/tax-reform-handcuffs.php> (accessed July 14, 2009).
10. Sven Steinmo, “The Evolution of Policy Ideas: Tax Policy in the 20th Century,” Department of Political Science, University of Colorado, Boulder, Colorado, January 16, 2002 <stripe.colorado.edu/~steinmo/ideas.pdf> (accessed July 14, 2009).
11. See www.innovationeconomics.org.
12. Aleb ab Iorwerth, “Canada’s Low Business R&D Intensity: the Role of Industry Composition,” *Working Paper 2005-03*, Department of Finance Canada, Canada, 2003: 11 <www.fin.gc.ca/wp/2005-03-eng.asp>.

13. Michael Devereux, Ben Lockwood and Michela Redoano, "Horizontal and Vertical Indirect Tax Competition: Theory and Some Evidence from the USA," *Journal of Public Economics* 91 (2007): 451-479.
14. Devereux, Lockwood, and Redoano find that a 1 percentage point decline in the weighted average statutory corporate tax rate in other nations tends to reduce the corporate tax rate in the home country by about 0.7 percentage points. Conversely, they find that increases in corporate tax rates by low tax European nations would lead to an increase in corporate investment in the United States and other nations. See Devereux, Lockwood and Redoano, op. cit., 2007.
15. Rosanna Altshuler, Harry Grubert, and T. Scott Newlon, "Has U.S. Investment Abroad Become More Sensitive to Tax Rates?" *International Taxation and Multinational Activity*, ed. James Hines (Chicago, IL: University of Chicago Press, 2004).
16. Ruud de Mooij and Sief Ederveen, "Taxation and Foreign Direct Investment: A Synthesis of Empirical Research," *International Tax and Public Finance* 10(6)(2003): 673-93. Likewise, Hufbauer and Grieco estimate that a 5 percentage point increase in corporate taxation depresses inward FDI by about 15 percent.
17. Mihir Desai and James Hines, "Old Rules and New Realities: Corporate Tax Policy in a Global Setting," *Ross School of Business Paper No. 920*, (October 2004).
18. Devereux, Lockwood, and Redoano find that there is no relation. Likewise, Slemrod finds the same result, that "across countries there is no association of the expenditure-GDP ratio with the corporate statutory rate. Joel B. Slemrod "Are Corporate Tax Rates, or Countries, Converging," *Journal of Public Economics* 88 (6) (2004): 1169-1186.
19. K.A. Clausing, "Taxing Corporations in OECD Countries: A Cross-Country Analysis of Revenues," *Draft Working Paper*, November 2004.
20. Peter Sorenson, "International Tax Coordination: Regionalism Versus Globalisation," *Journal of Public Economics* 88 (2004).
21. Peter Sorenson, "International Tax Competition: A New Framework for Analysis," *Economic Analysis and Policy* 33 (2003): 179.
22. Sorenson, op. cit., 2003.
23. Jane Gravelle, "What Can Private Investment Incentives Accomplish? The Case," *National Tax Journal* 46(3) (1993): 277.
24. Ibid., 275-90.
25. Robert D. Atkinson and David B. Audretsch, "Economic Doctrines and Policy Differences: Has the Washington Policy Debate Been Asking the Wrong Questions," Information Technology and Innovation Foundation, Washington, D.C., September 2008 <www.itif.org/files/EconomicDoctrine.pdf> (accessed July 16, 2009).
26. Robert Arnold, *Recent Developments in the Theory of Long-Run Growth: A Critical Evaluation* (Washington, D.C.: Congressional Budget Office, 1994).
27. Kevin Hassett and Glenn Hubbard, "Tax Policy and Investment," *NBER Working Paper No. W5683*, July 1996.
28. Richard Caballero, Eduardo Engel and John Haltiwanger, "Aggregate Employment Dynamics: Building From Microeconomic Evidence," *NBER Working Papers No. 5042*, 1995.
29. Robert Chirinko, Steven Fazzari and Andrew Myer, "The Elusive Elasticity: A Long-Panel Approach to Estimating the Price Sensitivity of Business Capital," 10th International Conference on Panel Data, July 5-6, 2002.
30. Stacy Tevlin and Karl Whelan, "Explaining the Investment Boom of the 1990s," *Journal of Money, Credit, and Banking* 35 (2003): 1-22.

31. Bronwyn H. Hall and Jon van Reenen, "How Effective are Fiscal Incentives for R&D? A Review of the Evidence," *Research Policy* 29 (2000): 449-469.
32. Jeffrey Bernstein and M. Ishaq Nadiri, "Product Demand, Cost of Production, Spillovers, and the Social Rate of Return to R&D," *NBER Working Paper No. 3625*, 1993.
33. Carmine Orhaghi, "Spillovers in Product and Process Innovation: Evidence from Manufacturing Firms," *Working Paper No. 02-32*, Economics Series 13, Departamento de Economía, Universidad Carlos III de Madrid, Spain, February 2003 <docubib.uc3m.es/WORKINGPAPERS/WE/we023213.pdf>.
34. *Ibid.*, 37.
35. Ping Lin and Kamal Saggi, "Product Differentiation, Process R&D and the Nature of Market Competition," *European Economic Review* 46(1) (2002): 201-11.
36. Elena Cefis, Stephanie Rosenkranz and Utz Weitzel, "Effects of coordinated strategies on product and process R&D," *Journal of Economics* 96 (2009): 193-222.
37. Jeffrey Dyer and Kentaro Nobeoka, "Creating and Managing a High Performance Knowledge-Sharing Network: The Toyota Case," Center for Technology, Policy, and Industrial Development, Cambridge, MA, 1998.
38. Perhaps the most famous example is when Samuel Slater, a worker in the Arkwright textile mill in England in the late 1700s moved to the Rhode Island with the plans for a textile mill, even though taking the plans out of the country was punishable by death. His knowledge formed the basis for the U.S. textile industry.
39. Jarle Moen, "Is Mobility of Technical Personnel a Source of R&D Spillovers?" *Journal of Labor Economics* 23(1) (2005): 81-114.
40. Bradford DeLong and Lawrence Summers, "Equipment Investment and Economic Growth: How Strong is the Nexus?" *Brookings Papers on Economic Activity* 23, Brookings Institution, Washington, D.C., 1992.
41. See Nicholas Oulton and Garry Young, "How High is the Social Rate of Return to Investment," *Oxford Review of Economic Policy* 12(2) (1996): 48.69.
42. Jonathan Temple and Hans-Joachim Voth, "Human capital, equipment investment, and industrialization," *European Economic Review* 42(7) (1998): 1343-62.
43. Xavier Sala-i-Martin, "15 Years of New Growth Economics: What Have We Learnt?" Keynote address to the fifth annual conference of the Central Bank of Chile The Challenges of Economic Growth, Santiago, Chile, November 29-30, 2001.
44. Kenneth Judd and Karl Schmedders, "Optimal Rules for Patent Races", *Discussion Papers 1343*, (Chicago, IL: Center for Mathematic Studies in Economics and Management Science, 2002).
45. Bart Van Ark. "Measuring the New Economy, An International Comparative Perspective," *Review of Income and Wealth* 48 (2002): 1-14.
46. Lorin M. Hitt and Prasanna Tambe, "Measuring Spillovers from Information Technology Investments," Proceedings of the 27th International Conference on Information Systems, Milwaukee, WI, 2006: 1793.
47. *Ibid.*

48. Aled ab Iorwerth, "Machines and the Economics of Growth," *Working Paper No. 2005-05* (Ottawa: Canadian Department of Finance, March 2005).
49. Elvio Accinelli, Silvia London, Edgar J. Sanchez Carrera, "Complimentarity and Imitative Behavior in the Populations of Firms and Workers," 2008 <ssrn.com/abstract=1136323> (accessed on February 28, 2008).
50. Andrew Paradise, "2008 State of the Industry Report," American Society for Training and Development, Washington, D.C., 2008.
51. See Robert D. Atkinson and Scott Andes, *The Atlantic Century: Benchmarking EU & U.S. Innovation and Competitiveness* (Washington, D.C.: Information Technology and Innovation Foundation, February 2009) for a ranking of U.S. tax rates compared to other nations.
52. The official name of the credit is the "Research and Experimentation Tax Credit."
53. Miguel León-Ledesma, "R&D Spillovers and Export Performance: Evidence from the OECD Countries," in *Studies in Economics* 14 (University of Kent, December 2000) <www.kent.ac.uk/economics/papers/papers-pdf/2000/0014.pdf> (accessed July 16, 2009).
54. Since its enactment in 1981, the credit has been extended 12 times.
55. Dominique Guellec & Bruno Van Pottelsberghe de la Potterie, "From R&D to Productivity Growth: Do the Institutional Settings and the Sources of Funds of R&D Matter?" *Oxford Bulletin of Economics and Statistics*, 66(3)(2004): 353-78.
56. If the uncertainty of the credit leads firms to invest less in R&D, it would mean that firms use the credit less and therefore the costs to the budget would be slightly less.
57. Section 41 of the tax code states that only product R&D qualifies for the credit. Qualified research is: "an expense for research and experimentation within the meaning of section 174, but must also be for the purpose of discovering information that is technological in nature. In addition, the application of the information must be intended for use in the development of a new or improved business component" of the taxpayer. The research must use the "scientific method of experimentation," and the purpose of the contemplated developed technology must be for a new or improved function.
58. L. Branstetter and M. Sakakibara, "Japanese Research Consortia: A Microeconomic Analysis of Industrial Policy," *Journal of Industrial Economics* 46 (1998): 207-233.
59. For example, spillovers from company-funded basic research are very high – over 150 percent according to one study: Albert N. Link, "Basic Research and Productivity Increase in Manufacturing: Additional Evidence," *The American Economic Review* 71(5)(December 1981): 1111-1112.
60. Denmark looks to promote public and private co-operation in R&D by having a 150% deduction of investments co-financed by a public university or research institute and the industry. Jacek Warda, "Tax Treatment of Investment in Intellectual Assets: An International Comparison," *OECD Science, Technology and Industry Working Papers* 4 (Paris: OECD, 2006).
61. ITIF analysis of Bureau of Economic Analysis data.
62. Gilchrist, Gurbaxani and Town and Plice and Kraemer found that in developed nations IT capital showed 5 to 8 times higher return on investment than non-IT capital. See Simon Gilchrist, Vijay Gurbaxani, and Robert Town, "Productivity and the PC Revolution," UC Irvine: Center for Research on Information Technology and Organization, April 2001. R.K. Plice and K.L. Kraemer, "Measuring Payoffs from Information-Technology Investments: New Evidence from Sectoral-Level Data on Developed and Developing Countries," Center for Research on Information Technology and Organization Working Paper, July 2001. A similar study in Australia found that IT investments were four to five times more productive than other types

- of capital. Simon K.S. Poon and Joseph G. Davis, "Estimating the Impact of IT Investments on Australian Productivity," Knowledge Management Research Group, University of Sydney (2002) <kmg.it.usyd.edu.au/research/pubs/ACIS2003.pdf>.
63. Mihir A. Desai and Austan D. Goolsbee, "Investment, Overhang, and Tax Policy," *Brookings Papers on Economic Activity* 2, Brookings Institution, Washington, D.C., 2004: 275-328.
64. Christopher L. House and Matthew D. Shapiro, "Temporary Investment Tax Incentives: Theory with Evidence from Bonus Depreciation," University of Michigan mimeo, January 2005.
65. Desai and Goolsbee, *op.cit.*, 2004, 285-355.
66. Paul Beaudry and D.A. Green, "Wages and employment in the United States and Germany: What explains the difference," *American Economic Review* 93 (2003): 573-602.
67. However, firms can carry forward unused credits for 20 years.
68. United States Department of the Treasury, "Corporate Alternative Minimum Tax Data," 2006 <treas.gov/press/releases/docs/Chart762.pdf> (accessed July 14, 2009).
69. Phil Mintz and Jane Sasseen, "Changing Corporate Tax Rules: A Tough Road Ahead," *BusinessWeek*, May 4, 2009 <www.businessweek.com/bwdaily/dnflash/content/may2009/db2009054_337394.htm> (accessed July 14, 2009).
70. Eric Bartelsman and Roel Beetsma, "Why Pay More? Corporate Tax Avoidance Through Transfer Pricing in OECD Countries," *Journal of Public Economics* 87 (2003).
71. Fritz Foley, Mihir Desai, and James Hines, "The Demand for Tax Havens," *Journal of Public Economics* 90 (2006): 513-31.
72. Auerbach, Devereux, and Simpson, *op. cit.*, 2008, 1.
73. Fritz Foley, Jay Hartzell, Sheridan Titman, and Garry Twite, "Why Do Firms Hold So Much Cash? A Tax-Based Explanation," *Journal of Financial Economics* 86 (3) (December 2007): 579-607.
74. Auerbach, Devereux, and Simpson, *op. cit.*, 2008.
75. Kimberly A. Clausing, "The Role of U.S. Tax Policy in Offshoring," Reed College, Department of Economics, Portland, OR, June 2005: 27 <www.brookings.edu/es/commentary/journals/tradeforum/2005btf_clausing.pdf> (accessed July 14, 2009).
76. Aviva Aron-Dine, "The Effects of the Capital Gains and Dividend Tax Cuts on the Economy and Revenues: Four Years Later, a Look at the Evidence," Center on Budget and Policy Priorities, Washington, D.C., July 12, 2007 <www.cbpp.org/files/7-10-07tax.pdf> (accessed July 14, 2009).
77. Joel Friedman and Robert Greenstein, "Exempting Corporate Dividends from Individual Income Taxes," Center for Budget and Policy Priorities, Washington, D.C., January 23, 2003 <www.cbpp.org/archiveSite/1-6-03tax.pdf> (accessed July 14, 2009).
78. James Rosen, "Inglis Promoting Carbon Tax," *The State*, May 14, 2009 <www.thestate.com/local/story/785872.html> (accessed July 14, 2009).
79. Selahattin Improhoroglu and Sagiri Kitao, "Labor Supply Elasticity and Social Security Reform," *Marshall Research Paper Series Working Paper MKT 12-08* (2008).
80. Atkinson and Andes, *op.cit.*, 2009, 12.

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ACKNOWLEDGEMENTS

The author wishes to thank the following reviewers for providing helpful comments on earlier drafts: Joe Kennedy, The Pew Charitable Trusts; and Howard Wial, The Brookings Institution.

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