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Fiscal Policies for Job Creation and Innovation: The Experiences of US States

Abstract

This paper reviews selected fiscal policy initiatives undertaken by US states to encourage job creation and innovation. We begin with a discussion of some general considerations about the design of tax policies summarized in a tax policy design table. Four policies are reviewed: job creation tax credits, research and development tax credits, a set of tax policies targeted to the biotechnology industry, and a broad set of tax policies that attract star scientists. The experiences at the state level are used to evaluate the effectiveness of these employment and knowledge-capital tax incentives in creating jobs and spurring innovation. The paper concludes with four other considerations need to be taken into account in selecting policies.

JEL-Codes: H710, H250.

Keywords: targeted state fiscal policies, employment tax incentives, job creation, knowledge-capital tax incentives, innovation.

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> You never want a serious crisis to go to waste. And what I mean by that is an opportunity to do things that you think you could not do before.
>
> Rahm Emmanuel, 2008

> There is enormous inertia—a tyranny of the status quo—in private and especially governmental arrangements. Only a crisis—actual or perceived—produces real change.
>
> Milton Friedman, 1982

Crises can be catalysts. During the Global Financial Crisis, Rahm Emmanuel, President Obama's chief of staff at the time, suggested that the 2008 calamity created the opportunity for new policies. Milton Friedman echoed a similar sentiment twenty-six years earlier. The post-Pandemic world may well provide similar prospects. As South Korea and other G20 economies emerge from the Covid-19 Pandemic, it may be an opportune time to consider new solutions to extant challenges—creating jobs , crafting quality jobs, and adapting to structural changes due to "knowledge capital."

This paper explores how targeted fiscal policies can address these challenges and provides evidence based on the experiences of US states. Section II begins by discussing tax policy design issues. At one level, the impact of the tax incentives we consider are easily understood and merely involve an adjustment of relative prices. However, complications quickly arise when constructing the fiscal incentive. We consider six issues that characterize any fiscal incentive and form our tax policy design table: permanent vs. temporary, broad vs. narrow, rolling vs. fixed bases, immediate vs. delayed, purchases vs. revenues, and complete vs. partial loss offsets.

Sections III and IV consider employment and knowledge-capital tax incentives that have been pursued by US states. Job creation tax credits (JCTCs) have been adopted in nineteen states, and we use this information to evaluate their impact on increasing employment. Biases (labeled the "anticipatory dip" and "compensating rebound") related to specific features of the JCTCs are identified. The true initial impact of JCTCs is small. However, the longer-run cumulative effect is significant and implies a fairly low cost per job created of approximately $15,000 and an associated local fiscal multiplier ranging from 1.1 (with high factor substitution) to 4.2 (with low factor substitution).

Section IV presents a similar analysis for three types of knowledge capital focusing on firms, a knowledge-capital-intensive industry, and individuals, respectively. Owing to substantial spillovers and externalities, there is a prima facie case that there is underinvestment in knowledge capital (Arrow, 1962). Research and development tax credits (RDTCs) have been adopted in at least thirty-two states. Firms respond with a substantial increase in research and development (R&D) investment; the long-run elasticity is 2.5. The biotech industry (BT) is seen by many as one of the leading industries using knowledge capital. Several states have offered incentives for BT location and investment, and the evidence indicates that the tax policies can be effective. For instance, Moretti and Wilson (2014) found that BTs resulted in an increase in biotech star scientists of 15 percent after three years. An important dimension of knowledge capital is the input of star scientists who are uniquely qualified to lead frontier research. This star scientist human capital (SSHK) is shown to be very responsive to tax policy.

Section V summarizes our discussion and introduces four additional factors that inform the selection of tax policies: alternative uses of fiscal resources, tax competition among states, the choice of stimulating employment with employment or capital tax incentives, and changes in the work environment due to the Pandemic.

II. Policy Design Issues

This section discusses in general terms the targeted fiscal policies that are considered specifically in the next two sections. At one level, the impact of tax incentives is easily understood. Income taxes are assessed against firms, fiscal incentives lower taxes on certain activities, and purchases are thus stimulated.[1] For example, if firms receive a tax credit for hiring workers or buying R&D-related equipment, then they will employ more workers and purchase more R&D equipment. Moreover, the resulting "income effect" may increase cash flow, attenuate finance constraints, and further stimulate the desired activity.

However, complications arise when policymakers construct the fiscal incentive. Policymakers need to decide if the goal is to encourage economic activity in the long run or the short run. In the former case, the economic development incentive should be *permanent*. A *temporary* policy with a limited duration would be appropriate for delivering a short run, countercyclical stimulus.

Whether the coverage is *broad* or *narrow* is a second decision. If a policy goal is to stimulate one industry or a particular set of workers, the scope of the incentive needs to be narrowed and targeted accordingly. In some cases, incentives apply widely to, for example, all state taxpayers, and fiscal costs rise proportionately. Broad-based policies have the advantage of avoiding any "stigma" that might arise if the tax incentive is interpreted as a signal of low productivity for a subset of workers or firms (Bartik, 2001, chap. 8; Katz, 1998).

Targeted fiscal incentives are usually intended to subsidize new activity, say employment, that would not have been undertaken absent the subsidy. A general public finance "rule" is that policies should affect as much as possible the marginal employment decision, the one made in response to the incentive. Otherwise, employment that would have been undertaken even without the policy (so called infra-marginal activities) receives benefits; these deadweight losses raise the fiscal cost of the policy. It is very difficult to isolate the marginal decision precisely. As an approximation, policymakers focus on measuring the incremental change, defined as employment in the current period relative to a base measuring employment in the

[1] The tax policies considered in this paper only affect firms, except in one case—personal taxes that influence the location decisions of star scientists, as discussed in Section IV.

prior period (perhaps averaged over several prior periods).[2] The base can be *rolling* or *fixed*. For a rolling base, today's current employment becomes the base in the subsequent period. For a fixed base, no such updating occurs, the base is determined for a fixed period, and the base does not change in subsequent periods. The tax credit is based on the incremental employment and remuneration details in the legislation.

The rolling-base procedure does not accurately measure marginal employment. Consider an example where, in period t, employment was 100 workers and, in periods t+1 and t+2, the firm plans to hire six new workers absent the effects of any hiring incentives in each period. However, when the incentives are in place, the firm decides to hire four additional workers in each period. These four workers represent the true marginal impact of the incentive. However, under the rolling base, incremental employment is ten workers in periods t+1 and t+2, and thus there is some deadweight loss from subsidizing infra-marginal employment decisions.

The problem of deadweight loss is exacerbated when a fixed base is used to define incremental employment. In this case, incremental employment is also ten in period t+1 but rises to twenty in period t+2. In future periods, the deadweight loss will continue to grow.

The rolling base dramatically reduces the impact of the tax incentive relative to a fixed base. With a rolling base, eligible incremental employment receives an incentive today but at the expense of eliminating the incentive on incremental employment tomorrow. A representative calculation suggests that, with a rolling base, the effective incentive is only 6.5 percent of the legislated incentive in a given period.[3]

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[2] For example, Georgia's JCTC legislation defines the level of employment eligible for the credit as follows: "The number of new full-time jobs to which this Code section shall be applicable shall be determined each month by comparing the number of full-time employees subject to Georgia income tax withholding as of the last payroll period of such month or as the payroll period during each month used for the purpose of reports to the Department of Labor with the number of such employees for the previous month."

[3] The calculation proceeds as follows. The positive value of the stimulus today is \$1. The negative value of eliminating the incentive tomorrow is $-\$1/(1+\rho)$, where ρ is the real discount rate. The overall stimulus is $\rho/(1+\rho)$. Since ρ is generally a small number, the rolling-base feature drives a large wedge between the legislated and effective incentives. Assuming an expected long-run nominal return on equity of 10 percent and an expected long-run inflation rate of 3 percent, ρ is 7 percent, and $\rho/(1+\rho) \approx 0.065$. While the rolling-base feature affects the pattern of incentives over the planning horizon, it does not affect their present value; see Chirinko and Wilson (2021a) for further discussion.

When passed by a legislature and signed by the governor, state incentives become effective immediately or are delayed to some future date.[4] Delay may be inevitable because of the need to organize an administrative apparatus, create forms, advertise, etc., but it sets in motion an interesting but unfortunate dynamic. To understand this dynamic, consider the relation between signing and qualifying dates for an employment incentive. Forward-looking behavior suggests that, when the qualifying date occurs after the signing date, firms anticipate the forthcoming incentive. This behavior is referred to as "fiscal foresight." In this case, firms have an incentive to initially decrease employment during the implementation period (the period between the signing and qualifying dates) and then to compensate for this decrease by raising employment sharply at the qualifying date.[5] We refer to this potential negative effect as an Anticipatory Dip (AD), and the subsequent offsetting positive effect as a Compensating Rebound (CR).

The vast majority of fiscal policies are anticipated before they go into effect.[6] Anticipation arises for two reasons: as noted above, there is a lag between when the policy is formally adopted (implementation lag) and when it is implemented, and a lag between when the policy is discussed, deliberated, and amended and formally adopted (preview lag). Fiscal foresight occurs when forward-looking agents anticipate a future policy change. The quantitative importance of fiscal foresight is a key policy question and has been the subject of much previous empirical research and debate that has not yielded a consensus.

Policymakers need to decide whether the tax incentive applies to purchases or to revenues. Most policies offer incentives associated with the purchase of the services of inputs (employees, various forms of capital). In recent years, "patent boxes" have become a popular tool for attracting knowledge capital.[7] A patent box identifies the revenue stream from a

[4] In some cases, the qualifying date occurs retroactively, before the signing date.

[5] Somewhat surprisingly, fiscal foresight is far from sufficient for policy-induced incentives to perversely affect firm behavior. Chirinko and Wilson (2022b) derive the three necessary conditions for firm behavior to be distorted.

[6] Exceptions are uncommon. Two instances occurred with monetary policy reforms: the 2016 currency reform in India (announced on a Tuesday at 8:15 PM) and the 1979 switch to monetary targeting by the Federal Reserve System (announced on a Saturday at 6:00 PM).

[7] See Guenther (2017) for an excellent primer on patent boxes.

particular input (e.g., R&D capital), and hence is only useful if that stream can be separated from other revenues. The leasing of intellectual property is particularly convenient in this regard, and knowledge capital is the dominant use of patent boxes. However, as shown by Schwab and Todtenhaupt (2021), patent box regimes are likely to be much more effective stimulants of R&D activity when paired with requirements that the R&D activity itself, not just the ownership of the resulting patents, takes place domestically.

Tax incentives affect firms by lowering their tax liabilities. However, absent taxable income, the incentive is moot. In order for the fiscal incentives to remain effective in this not infrequent situation, the policy usually provides for complete or partial loss offsets. Complete loss offsets eliminate this problem by directly refunding any incentive due to the firm, thus preserving the stimulus. Alternatively, partial loss offsets allow the tax credit to be carried back, carried forward, or both, when computing tax liabilities. Firms are able to use the credit to offset past tax payments or future tax liabilities. This offset is partial because the time value of money discounts the value of these deductions against taxable income.

These six characteristics are summarized in the following tax policy design table that will be useful in discussing the four tax policies in Sections III and IV:[8]

Table 3-1. Characteristics of Tax Policy

Permanent	**Temporary**
Broad	**Narrow**
Rolling Base	**Fixed Base**
Immediate	**Delayed**
Purchases	**Revenues**
Complete Loss Offset	**Partial Loss Offset**

[8] This table is not meant to be exhaustive, as there are other characteristics— for example, clawback and recapture provisions, transferability, statewide caps, taxpayer caps, and qualification criteria—that affect the value of targeted fiscal policies.

III. Employment Tax Incentives

1. Description

Job Creation tax credits are credits against a state's business income taxes, which are typically corporate income taxes (assessed on C-corporations) and individual income taxes, such as those assessed on S-corporations, limited liability partnerships, and other pass-through entities for which business income is passed through to owners as individual income. The nineteen JCTCs we focus on are broad-based with few or no restrictions on eligible industries or eligible geographic areas within the state. They are permanent and intended to foster long-run economic development. These credits are refundable in a little under half of JCTC states. Other states allow the credit to be either carried back or carried forward, or both.

JCTCs take different forms across states. In most states with JCTCs, the legislation explicitly provides a tax credit rate as a fraction of each new hire's annual wages. In other JCTC states, the legislation specifies a rate based on each new hire's income tax withholdings. In a third set of JCTC states, the legislation specifies an annual dollar tax credit per new employee. In some states, firms can take the credit for multiple years as long as the new hire (or more accurately, the incremental addition to the firm's level of employment) is retained.

These tax credits are intended to subsidize net job creation by businesses. That is, only new jobs that expand a business's total payroll employment level qualify for the tax credit. In many states, a firm can only claim the credit if the number of jobs and/or wages associated with new jobs is above a specified threshold and meets certain other requirements, such as providing health insurance. In order to target net job creation instead of gross job creation, policymakers define the base level of employment on a rolling basis. Six of the states adopted delayed tax credit programs (for which the signing date precedes the implementation date), while the remaining thirteen states had immediate programs (for which the signing date coincides with the implementation date or is retroactive). This distinction is very important for the identification of the Anticipatory Dip (AD) and the Cumulative Rebound (CR).

2. Evaluation

The impact of the JCTCs is estimated in a treatment panel model in Chirinko and Wilson (2022a), where the JCTCs are treatments (in the months during which the JCTCs are in place) and the non-JCTC data the control. Employment growth in response to states' adoption of a JCTC (delayed or immediate) during five separate intervals are shown in table 3-2.

Table 3-2. Employment Growth in Response to JCTCs

Interval	**Delayed**	**Immediate**
Pre-signing (5 months before the signing date)	-0.115	0.075
Before ((The number of months between the signing and qualifying dates; it varies by state and averages 4.5 months. There is no Before interval for Immediate JCTC states.)	-0.153	-------
At (the month of the qualifying date)	0.141	0.047
After (36 months after the qualifying date)	0.684	0.684
Cumulative (Net impact over all months)	0.557	0.806
Anticipatory Dip (AD)*	0.268	
Compensating Rebound (CR)*	0.094	
Employment growth (monthly average)	0.112	

* The AD is the sum of employment growth in the Pre-signing and Before intervals for those states adopting delayed tax credit programs. The CR is the difference between employment growth in the At intervals for those states adopting delayed and immediate tax credit programs.

These results document an important AD and CR. The Cumulative effect is large relative to the average monthly employment growth.

These estimates can be translated into two interesting statistics. The cost per job is approximately $15,000. Seventy-five percent of this figure reflects infra-marginal employment growth and twenty-five percent the desired marginal increase. Comparable cost per job from other studies varies widely: $2,280, $13,329, $37,000, $140,000.[9] The local multiplier ranges from 1.1 (with high factor substitution) to 4.2 (with low factor substitution).

[9] These four cost per job estimates are drawn from Faulk (2002), Kesselman, Williamson, and Berndt (1977), Bartik and Bishop (2009), and Cahuc, Carcillo, and Le Barbanchon (2019), respectively.

IV. Knowledge Capital Tax Incentives

States in the United States vary widely in their tax policies that affect innovation incentives – both incentives for doing more innovation vs. less innovation and incentives regarding where in the country to engage in innovative activities. Many states have enacted policies explicitly aimed at spurring innovation in their own states. Two prominent such policies, which we analyze here, are research and development tax credits (RDTCs) and special business tax credits for innovation sectors such as biotechnology (biotech tax incentives, BTs).

In addition, states differ widely in the rates and progressivity of their overall business and individual income taxes. Whether or not spurring in-state innovation was a consideration by policymakers in choosing their overall tax structures, policies do matter importantly to the private sector's decisions on how much innovation to undertake, and where. In particular, state tax policies can spur high-skilled employment, effectively raising the level of human capital in the state. Here we discuss evidence showing how statewide taxes affect innovation-sector employment, specifically by adding human capital in the biotech sector and attracting star scientist human capital (SSHK).

1. Description

The first of the policies mentioned above, research and development tax credits (RDTCs), has become common. The federal government introduced an RDTC in 1981. Individual states soon followed suit, with Minnesota adopting a credit in 1982 and other states gradually joining the club in the years since. By 2006, thirty-two states had enacted an RDTC (Wilson, 2009).

An RDTC is a credit against income tax—corporate, individual, or both—equal to some amount based on a business's qualified research and development (R&D) spending. States follow the federal Internal Revenue Code definition of qualified R&D, which covers wages, intermediate expenses, and rental costs of equipment and structures used in research that is "technological in nature" and undertaken for a new or improved business purpose. Some states have "nonincremental" credits and some have incremental credits. The amount of nonincremental credits is a function (typically, a small percentage) of a firm's total qualified R&D expenditures in the tax year. These credits have the benefit of simplicity, though they have the downside of rewarding infra-marginal R&D spending.

Incremental credits, on the other hand, reward only R&D spending above a "base level" meant to approximate the counterfactual R&D spending by a business in the absence of the credit. This base level is usually determined by the firm's current (tax year) sales multiplied by its past R&D-to-sales ratio. However, states differ importantly in how they define "past." Some use a rolling-base definition: a rolling/moving average of the R&D-to-sales ratio over recent years. This design has the benefit of reflecting changes over time in the nature of the firm, such as its age, product mix, or profitability, and hence changes in the counterfactual no-credit R&D spending expected of the firm. But the rolling-base design also introduces a significant cost to the firm in that R&D spending performed this year increases its base level in subsequent years, which greatly reduces the effective value of the credit.

To remedy this design flaw, many states (following the federal government since 1991) use a fixed-base definition, which refers to a firm's sales-to-R&D ratio at a fixed period of time in the past, usually a period prior to enactment of the RDTC. This design avoids the problem of current R&D reducing the base level in future years, but it has the downside of not reflecting changes in the nature of the firm over time and of not being able to handle newer firms. Most states with fixed-base RDTCs have an alternative base definition for newer firms (such as fixing the base to the initial years of the firm's operations or using a rolling base).

State RDTCs also vary in whether they are refundable. Refundability has the benefit of offering an R&D incentive to firms without taxable profits, which is particularly relevant for startup firms and young high-tech firms that often operate with losses until they become established. Refundability also allows an RDTC to be more countercyclical.

Instead of or in addition to the RDTC, many states offer fiscal incentives to firms in specific sectors that generate knowledge capital. One common such incentive used by states is a biotech tax incentive (BT). Moretti and Wilson (2014) document and study eleven state BTs. Most of these tax incentives are only available to biotech firms, such as tax credits for investment or job creation and/or sales and use tax exemptions, but they also include one low-interest startup loan program and one grant program.

Note that the same general design issues discussed previously (see Table 3-1) apply when it comes to tax incentives offered to a specific sector. In particular, for tax credits offered to biotech and similar sectors, the same issues of marginal vs. infra-marginal incentives, fiscal foresight, and credit refundability are important.

As mentioned above, targeted tax incentives like RDTCs and BTs do not influence business decisions in isolation but rather as part of the overall tax cost/benefit associated with any given decision. In particular, the corporate and individual income tax rates of a jurisdiction should also enter into the calculations of any business considering investing, hiring, or performing R&D in that jurisdiction. For instance, a firm considering how much to spend on R&D in a state should take into account not just the R&D tax credit (its rate, base definition, refundability, etc.), but also the income tax it will have to pay on the profits eventually generated by that R&D.[10] These considerations are captured by the user cost of capital concept (Hall and Jorgenson, 1967), which is a common measure of the full after-tax cost in a given jurisdiction of employing a capital asset, be it R&D/intellectual property, buildings, or machinery.

In addition, as mentioned above, the overall net taxation of individual and business income, reflecting income tax rates as well as credits, affects high-skill human capital, such as star scientist human capital (SSHK). Accordingly, the same design issues that affect the value of tax incentives like RDTCs and BTs will also affect the incentives for SSHK.

2. Evaluation

A number of studies in recent years have exploited the temporal and spatial variation in state RDTCs and other tax policies to assess their effectiveness at stimulating R&D and other inputs into the "innovation production function." Wilson (2009) finds that state RDTCs have a very large positive effect on R&D performed within the state. Specifically, he estimates that a 10 percent decline in the user cost of R&D—which captures both the tax benefits from an RDTC and the tax costs from a state's corporate income tax—is associated with a 25 percent long-run increase in in-state R&D spending.[11] Wu (2008) finds that state RDTCs increase the number of high-tech business establishments in a state, both in absolute terms and relative to non-high-tech establishments. A study by Fazio, Guzman, and Stern (2019) finds that RDTCs are associated with significant increases in both the quality and quantity of entrepreneurship in the state, with

[10] Another tax benefit of R&D spending, allowed by all states and the federal government, is the deductibility of R&D expenses from taxable income. However, in practice, this is a relatively minor incentive because wages and intermediate expenses are already deductible regardless of whether they are used for R&D performance. So the incentive only involves allowing immediate expensing of equipment and structures used in R&D, which on average are a small share of total R&D spending.

[11] A more recent study by Billings, Musazi, Volz, and Jones (2020) similarly finds that state R&D tends to increase with RDTCs and decrease with corporate income tax rates.

most of the impact occurring five or more years after the credit adoption. Bloom, Schankerman, and Van Reenen (2013) investigate the positive spillovers (due to knowledge dissemination) and negative spillovers (due to business stealing by rivals) from firm R&D spending. They exploit variation in state and federal RDTCs to identify the causal effects of R&D on these spillovers, finding that the positive spillovers of R&D dominate, with the implication that public fiscal support for R&D is socially optimal.

Moretti and Wilson (2014) study the effectiveness of RDTCs and biotech-specific subsidy/tax incentives (BTs) for stimulating in-state activity in the biotech sector. They estimate that a 10 percent decline in the user cost of R&D leads to a 22 percent increase in the number of star scientists in the biotech sector over the subsequent three years. Similarly, they find the number of biotech star scientists increases 15 percent over three years in response to BTs. Similarly, Akcigit, Grigsby, Nicholas, and Stantcheva (2022) use state-level panel data to examine the impact of personal and corporate taxes on various measures of innovation, including number of inventors, patent counts, and patent citations. They find strong evidence that both personal and corporate taxes affect innovation.

The results discussed above focus on the effects of state RDTCs and other tax incentives on *within-state* innovative activity. A number of these studies also address the question of whether state tax incentives increase total innovation nationally or just affect the location of innovation within the country. For instance, Wilson (2009) finds that the large increase in within-state R&D in response to an RDTC is offset by an equivalent decrease in out-of-state R&D, with the implication that state RDTCs collectively have little impact on national R&D. Akcigit et al. (2022) document a similar result. They show that the bulk of the tax effects they find on innovation stem from cross-state mobility rather than within-state intensive margin responses. These results on the mobility responses of innovation to taxes echo similar results found for other factors of production. Chirinko and Wilson (2008) find a “zero-sum game” result like that of Wilson (2009) but pertaining to the effect of state investment tax credits (ITCs) on the capital stock, though both the in-state and out-of-state elasticities are far lower than in the case of R&D. Giroud and Rauh (2017) examine the effect of state personal and corporate taxes on employment and the number of establishments of multi-state firms. They found significant tax effects, with mobility/reallocation explaining about half of the responses of these factors. The results from these studies suggest that while different factors of production may differ substantially in their sensitivity to taxes—likely as a result of different elasticities of substitution in the production function—in the long run, they are all geographically mobile and seek out the locations that maximize firms' after-tax profits.

The above results indicate that R&D, and innovative activity in general, is a very geographically mobile factor of production and sensitive to local taxation. Moretti and Wilson (2017) provide direct evidence on this question. They study the geographic location and migration decisions of star scientists (i.e., SSHK), measured by patent counts and citations, and how these decisions are influenced by changes in state taxes. They consider not only RDTCs, but also ITCs, corporate income tax rates, and personal income tax rates. Each of these state tax policies is found to affect both the long-run number of star scientists in the state and also their migration decisions. For example, when one state decreases its top personal tax rate relative to that in another state, Moretti and Wilson find that net migration of star scientists between these two states shifts in favor of the tax-cutting state. The results are similar (with opposite signs for credits) for corporate tax policies, consistent with the fact that locational outcomes of such workers are jointly determined by both labor demand, which depends in part on business taxes, and labor supply, which depends in part on personal taxes.

V. Summary And Further Considerations

This paper reviews selected fiscal policy initiatives undertaken by US states to encourage job creation and innovation.[12] We began our analysis with some general considerations about the design of tax policies and summarized that discussion in terms of the tax policy design table. Four policies were reviewed: job creation tax credits, research and development tax credits, a set of tax policies targeted to the bio-technology industry, and a broad set of tax policies that attract star scientists. We used the experiences at the state level to evaluate the effectiveness of these policies in creating jobs and spurring innovation.

Apart from their effectiveness, four other considerations need to be taken into account in selecting policies. First, it must be kept in mind that fiscal resources are a scarce good and must be allocated to yield the highest return. Thus, the desirability of a policy cannot be viewed in isolation, but it must be compared to the cost of funds and returns from pursuing alternative policies.

Second, tax policies in one jurisdiction—be it a state or a country—affect not only jobs and knowledge-capital in that jurisdiction, but also the tax rates adopted in neighboring jurisdictions. This "tax competition" has been studied extensively in terms of the slope of the "reaction functions": the change in the tax rate in the home jurisdiction relative to the change in the same tax rate in the neighboring jurisdiction. The common view is that this slope is positive, and there is a "race to the bottom," as a cut in a tax rate by the neighboring jurisdiction leads the home jurisdiction to respond with a comparable cut. Indeed, there have been many past legal and legislative efforts in the US to impose some measure of tax harmonization among US states (Stark and Wilson, 2006), and recent international movements toward a common global minimum corporate tax are motivated by this concern.

However, the "race to the bottom" result is far from certain. As emphasized by Chirinko and Wilson (2017), the key parameter determining the slope of the reaction function is the extent to which added income tilts the demand for private goods relative to public goods (when stated as percentage changes, this parameter is the income elasticity of private goods relative to public

[12] There are many other public policies that encourage job creation and innovation. See the collection of chapters in Bartik (2020) and Goolsbee and Jones (2022), the "toolkit of policies" in Bloom, Van Reenen, and Williams (2019), and the business incentives evaluated in Slattery and Zidar (2020).

goods). Consider the case when the capital tax rate for a neighboring state rises. In turn, mobile capital (eventually) flows into the home state and the tax base rises. If the income elasticity of private goods relative to public goods is sufficiently positive, then residents will prefer to use this income “windfall” to finance a tax cut—a negative or “see-saw” tax reaction—allowing higher private goods consumption while still maintaining current levels of public goods provision. Alternatively, if the income elasticity of private goods relative to public goods is negative, then residents will prefer to use the windfall to disproportionately increase public goods consumption, necessitating a higher capital tax rate—a positive or “race to the bottom” tax reaction. Thus the slope of the reaction function depends on whether private goods as a whole are a luxury or a necessity or, alternatively, whether Wagner’s Law is valid.[13]

Apart from the ambiguity of the sign of the slope, the theoretical model in Chirinko and Wilson (2017) has an additional implication that the absolute value of the slope increases with the mobility of capital. Tax instruments that target new, highly mobile capital (e.g., the ITCs for knowledge capital) should have larger reaction function slopes than do instruments targeting old, less mobile capital (e.g., the corporate income tax rate for PPE capital).

A third consideration confronts a paradox. Job growth is a frequent goal of policymakers, and in many cases the adopted policies provide incentives to accumulate capital. Since capital and labor are usually viewed as substitutes, the pursuit of capital tax incentives is a curious way to increase employment. Fuest and Huber (2000) have considered this issue in a theoretical model where union bargaining leads to above-market wages and hence unemployment (relative to a full-employment benchmark). Capital subsidies lead to an expansion of the number of firms and hence employment in a more efficient manner than direct employment subsidies, which may lead to higher wages. While the results of that paper are model specific, it does remind us that taking into consideration the details of the economic environment—especially when they depart from the canonical model—is important in selecting appropriate policies.

A fourth consideration is the extent to which Pandemic-induced modifications in the work environment will continue and, if so, how targeted fiscal policies will be affected. Teleworking, spurred by the Covid-19 Pandemic, might persist and increase the mobility of

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[13] Wagner’s Law states that the share of government spending (as a percentage of GDP) increases with aggregate income (per capita). It is named after the nineteenth-century German economist Adolph Wagner.

high-skill labor and knowledge capital. Such a situation would have at least two effects. Targeted tax policies designed to attract firms to a specific location may become more effective as worker mobility increases since firms could relocate headquarters or other facilities without requiring employees to also relocate. However, from the jurisdiction's perspective, location-focused tax incentives may be less attractive if workers live elsewhere because their value added to the jurisdiction is less. For example, luring Amazon HQ2 to Virginia only to discover that a large number of the company's employees now work outside the state diminishes the value to the state of granting tax incentives.

The Pandemic has changed attitudes toward traditional work, as reflected in the large number of voluntary job departures during the "Great Resignation." Workers have developed a greater desire for flexible work arrangements and perhaps a shift of preferences in favor of more leisure and less work. In this new environment, the effectiveness of the tax policies discussed here will surely be altered. Whether these changes are sustainable remains to be seen. but if they become a permanent fixture in the workplace, they will create an additional challenge to designing effective fiscal policies to create jobs, craft quality jobs, and adapt to structural changes due to "knowledge capital."

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