Appendix H: Economic impact analysis

Weldon Cooper Center staff conducted ex-post economic impact analyses of Virginia economic incentives using REMI PI+ (Policy Insight Plus) software. REMI PI+ is a dynamic, multi-sector regional economic simulation model used for economic forecasting and measuring the impact of public policy changes on local economies. The model combines different contemporary regional economic modeling methods such as input-output analysis, econometric forecasting, and computable general equilibrium to characterize the mechanics and path of a regional economy. The model has been extensively peer-reviewed and is widely used by state agencies elsewhere in the nation to model economic and tax revenue impacts of economic development policies. The model used for this analysis was customized for the state of Virginia and includes 70 industry sectors. Outcome variables examined include total employment, state GDP, and personal income. In addition, a state tax revenue impact analysis was conducted based on a methodology described further below.

Economic impact modeling

The modeling of each program varies depending on the type of economic stimulus provided by the program and available information on program outcomes (Table H-1). The most comprehensive information on establishment-level performance outcomes was available for VJIP and the Virginia Talent Accelerator Program because program staff track employment, capital investment, and/or other performance metrics related to the specific economic aims of the programs. Performance outcomes were not available for tax incentives such as the worker training tax credit and sales and use tax exemptions. Thus, those programs were generally modeled as decreasing firm capital cost or production costs or increasing the amount of sales for tax exemptions that targeted out-of-state firm purchases. Programs were modeled as decreasing firms' costs of capital for the taxicab parts and radio exemption because it applies to purchasing replacement parts and equipment. They were modeled as decreasing firm production costs for the remaining sales and use exemptions because the exemptions could apply to both equipment and various production supplies.

The certain printed materials for out-of-state distribution exemption has two parts that were modeled differently. One part is aimed at reducing the cost of obtaining eligible printed materials for Virginia direct mail businesses. This was represented as a reduction in production costs for the professional and technical services industry. The second part reduces the sales and use tax burden for certain out-of-state sales. This was introduced as an increase in out-of-state sales for the printing industry. Industry demand for the production inputs was assumed to be of unit elasticity.

For the economic impact analyses for VJIP and the Virginia Talent Accelerator Program, only completed projects were counted. Furthermore, only a portion of the reported employment and other activity is attributed to the incentive based on a computed "but for" factor (see below.) Outcomes and expenditures were grouped for analysis purposes based on the date/year when awards were completed. Because the Virginia Talent Accelerator Program was established in 2019, only two years of completed projects (2022–2023) were available for this analysis.

The REMI *firm* employment option is used for VJIP to model the firm employment increase. This option assumes that firm sales associated with incentivized job creation may displace to various

degrees the sales of other Virginia-based firms in the same industry based on industry market-area characteristics. For the Virginia Talent Accelerator Program, however, the *industry* employment option is used. This option assumes that the firm sales associated with incentivized job creation are made outside the state and do not directly displace Virginia economic activity in the same industry. Projects were viewed as being mainly targeted at a higher proportion of large, tradeable good sector businesses than VJIP based on an analysis using IMPLAN data.

To generate input data to capture the effect of firm retraining for VJIP on wages and salaries and value added by industry were obtained from the Virginia REMI PI+ model. The effect on compensation was assumed to be the project completed wage rate multiplied by the estimated wage increase resulting from the VJIP funded training based on a survey of firms conducted in 2017–18. Ratios of value added per wages were formed for each REMI industry. These ratios were then multiplied by estimated compensation increases (1.5 percent) that resulted from firm retraining for the firms that were assumed to have been incentivized by the VJIP retraining grant to obtain the output/productivity effect. The results by year were assigned to the REMI policy variables "Compensation" and "Industry Sales/Exogenous Production" by REMI industry. In addition, a proportion (based on the "but for" computation discussed below) of firm expenditures were assigned to the REMI policy variable "Industry sales" for the educational services industry. Lastly, new capital investment associated with the training program was assigned to the REMI "Investment Spending" policy variable for non-residential equipment based on the computed "but for" factor. This method is the same as used in a previous review of the VJIP program. (See Work*force and Small Business Incentives*, JLARC 2018.)

TABLE H-1
REMI policy variables

Name of incentive	REMI model policy variables	Modeling description	REMI industry (sector number)
Worker Training Tax Credit	Compensation and Prices->Production Costs->Production Costs	Model economic impact on firms as reduced production costs equal to estimated tax credit utilization.	Cost savings assigned to REMI industries based on NAICS codes of firms for tax credit users.

Name of incentive	REMI model policy variables	Modeling description	REMI industry (sector number)
Virginia Jobs Investment Program (VJIP)--Job Creation	(1) Labor and Capital Demand>-Employment>-Firm>-Industry, (2) Labor and Capital Demand>-Employment>-Farm Employment	Model job creation by industry based on 0.6% "but for" assumption.	Employment assigned to REMI industries based on NAICS codes of firms for completed grants.
Virginia Jobs Investment Program (VJIP)--Training	(1) Output and Demand>-Real Disposable Income>-Compensation (Adjust compensation by amount of training related wage increase). (2) Output and Demand>-Output (Adjust by ratio of value-added to training related wage increase), (3) Output and Demand>-Industry Sales (Exogenous Production)>-Educational services; (4) Output and Demand>-Investment Spending>-Equipment.	Model wage and output increase by industry based on 0.6% "but for" assumption and 1.5% wage and salary increase with proportionate output increase. Also, model educational services purchases and capital investment based on same "but for" factor.	Employment assigned to REMI industries based on NAICS codes of firms for completed grants.
Virginia Talent Accelerator Program	Labor and Capital Demand>-Employment>-Industry >-Industry	Model job creation by industry based on 0.5% (and 1.1%) “but for" assumption.	Employment assigned to REMI industries based on NAICS codes of firms for completed grants.
Taxi parts and radios exemption	Compensation and Prices->Production Costs->Capital Costs	Model economic impact based on reduced capital cost equal to tax exemption tax revenue effect for transit and ground passenger transportation industry.	Transit and ground passenger transportation (35)

Name of incentive	REMI model policy variables	Modeling description	REMI industry (sector number)
Certain printed materials for out-of-state distribution exemption	Compensation and Prices->Production Costs->Production Costs	Model economic impact based increased sales for printing and related support activities industry and as reduced production cost equal to tax exemption tax revenue effect for professional and technical services industry.	Printing and related support activities (24), Professional and technical services (49)
High-speed electrostatic duplicators exemption	Compensation and Prices->Production Costs->Production Costs	Model economic impact based on reduced production cost equal to tax exemption tax revenue effect. Assign to administrative and support services industry.	Administrative and support services (51)
Contractor temporary storage exemption	Compensation and Prices->Production Costs->Production Costs	Model economic impact based on reduced production cost equal to tax exemption tax revenue effect. Assign to warehousing and storage industry.	Warehousing and storage (38)
Out-of-state nuclear facility repair exemption	Compensation and Prices->Production Costs->Production Costs	Model economic impact based on reduced production cost equal to tax exemption tax revenue effect. Assign to repair and maintenance services industry.	Repair and maintenance (63)
Uniform rental and laundry businesses exemption	Compensation and Prices->Production Costs->Production Costs	Model economic impact based on reduced production cost equal to tax exemption tax revenue effect. Assign to personal and laundry services industry.	Personal and laundry services (64)

NOTE: Although Architectural, Engineering, and Related Services data was used to compute the revenue impact of the out-of-state nuclear exemption state tax revenue impact, it was modeled as an industrial repair and maintenance activity for modeling economic and revenue impact since this sector best characterizes the activity incentivized.

For each economic impact analysis, the opportunity cost of state funds was accounted for by raising personal income taxes. Personal income taxes are the largest source of tax revenue for the general fund and thus seemed appropriate as a source for offsetting the cost of the incentive programs.

REMI PI+ discontinued tax revenue estimation as part of its base package beginning with the 2.0 version and moved improved revenue modeling capabilities into its new REMI Tax PI model. To conduct tax revenue analysis, this study scaled revenues to economic outputs using the procedure described in Regional Economic Models, Inc. (2012). State tax revenues were derived from the Census

of Government's *State and Local Government Finance* and *Annual Survey of State Tax Collections*. Revenue estimates are calculated by multiplying state revenue rates by the corresponding base quantity, which included state-level demand for selected industries (general sales tax, selective sales tax, license taxes), state-level personal income less transfer payments (individual income tax), corporate income tax (gross domestic product), and personal income (other taxes). The tax revenue impact analysis does not include the effect of economic development incentives on other revenues, including non-general revenues. Nor does it estimate the effect on local tax revenues. Lastly, it does not estimate the effect of economic development incentives on government expenditures at the state or local level.

"But for" calculations for VJIP and Virginia Talent Accelerator Program

Estimation of the "but for" VJIP and the Virginia Talent Accelerator Programs relies on research by Bartik (2018) on the role of the relative intensity or size of incentive relative to locating or expanding firm cost of operations in influencing company site decisions. The "but for" effect is the percentage of firm growth during the period that can be attributed to the incentive and is determined by a tax-elasticity-based formula. The intuition behind the formula is that smaller incentives relative to the firm's expanded or newly relocated operations are less likely to "tip the balance" in a firm's location decision than larger incentives. For instance, Bartik estimates that the Wisconsin Foxconn incentive deal (approximately $230,000 per job) reduced operating costs for the firm on a discounted basis over time by 30 percent. This 30 percent cost reduction would influence the location and expansion decision 97 percent of the time on average. In contrast, an incentive that constitutes just 0.1 percent of the amount would affect only 1 percent of the location/expansion decisions.

The formula (derivation which is explained in Appendix D of Bartik [2018]) is as follows:

(Ea-Eb)/Ea=(1-(1-s)(-R)

Where "E_a" is the employment before the incentive, "E_b" is the employment after the incentive, "R" is the elasticity of long-run business activity for business costs (and assumed to be equivalent to -10 in line with business activity tax elasticities of -0.5 and the finding that business taxes represent about 5 percent of value-added or R=-.5/.05=-10), and "s" is the relative incentive size (i.e., present value of incentives as a proportion of present value of stream of company value added over the 20-year period).

For grants with job creation information, it was necessary to convert job creation into dollar values. This was done by computing the incentive award value as a percentage of the discounted stream of production costs for a 20-year project lifespan, using a 12 percent real discount rate as outlined by Bartik (2018). Production costs are proxied by value-added, which are payments made to capital and labor. Value-added per employee by industry was obtained from REMI and merged with the incentive records using a REMI to NAICS bridge to compute value-added equivalents. The stream of value-added and incentives are discounted over time to determine the present value of costs and cost savings. Bartik recommends using 12 percent as the discount rate because it best represents the time value of money for private companies.

Incentives' share of project costs are estimated to be approximately 0.6 percent for VJIP and 0.5 percent for the Virginia Talent Accelerator Program. A second estimate of the impacts for the Virginia Talent Accelerator Program was calculated. Program expenditures represent the actual marginal costs

to VEDP of the services rather than their market value. Based on interviews with VEDP staff, the market value of the services are approximately twice the program expenses. Therefore, a second "but for" was based on the incentive value being twice the program/project expenses, or approximately 1 percent.

Since the "but for" effect formula is based on firm reactions to business cost changes due to tax changes, it more typifies the likely firm response to a typical by-right tax cut rather than discretionary incentive. Ordinarily, greater discretion and agency due diligence might be expected to improve the likelihood of an incentive of a given size to move the needle by selecting only those projects most at risk of moving or expanding elsewhere rather than providing the incentive across the board. No adjustments were made for programs that had these elements; thus, they may sometimes represent conservative "but for" assumptions.