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Problems in Using Measures of Taxpayer Return on Investment to Evaluate Work Force Programs

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Abstract: This paper contrasts social and taxpayer return on investment measures of the Vocational Rehabilitation (VR) program in Virginia. To do this, we use the analyses in Dean et al. (2015, 2017, 2018) which demonstrate substantial social return to Virginia's VR program. Using this estimated model and administrative data on VR clients in Virginia, we simulate earnings that would be realized with and without VR service receipt by each client and estimate the costs of the services provided to each client. Then, given these simulation results, we compute the taxpayer return on investment. Since most VR recipients have a weak attachment to the labor market (i.e., relatively low employment rates and earnings), the relatively large estimated impact of VR on earnings translates into only a small impact on the taxpayer return. That is, the cost of VR is large relative to the lifetime changes in tax receipt. In particular, we estimate that only 29% of VR recipients have a positive taxpayer return.

Keywords: Vocational Rehabilitation; Return on Investment; Taxpayer Return; Social Return

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The public vocational rehabilitation program (VR) has faced increasing demands to demonstrate its effectiveness (Bua-Iam, Hampton, Sink, & Snuffer, 2013; Chan, Rosenthal & Pruett, 2008; U.S. GAO, 2012). The passage of the Workforce Innovation and Opportunity Act in 2014, which adds VR to the core programs that must report on participants' post-closure employment and earnings, has intensified the need for clear and convincing evidence of the program's impact. But the appropriate measure of what outcome VR programs impact is not a settled matter. To inform this debate, we estimate taxpayer return on investment measures of the Vocational Rehabilitation (VR) program in Virginia and contrast them with the existing estimates of the social rate of return.

In response to the need for credible analyses of VR programs, Dean et al. (2015, 2017, 2018; hereafter referred to as DPSS) present and estimate methodologically sound return on investment (ROI) models for Virginia's VR agency. The DPSS ROI models provide estimates on the long-run social rate of return (ROR): the discount rate that equilibrates the sum of monetary benefits to VR clients and the cost of the VR services to the taxpayers.[1] This measures the net impact that VR has on the well-being of all members of society. Using detailed longitudinal data on all persons who applied to receive VR services from the Virginia Department of Aging and Rehabilitation Services (DARS) in state fiscal year (SFY) 2000, DPSS estimate that VR has a

[1] A number of other recent papers examine the return on investment for VR programs in different states. Clapp et al. (2019), Hollenbeck (2019), McGuire-Kuletz & Tomlinson (2015), and Schmidt et al. (2019) provide a detailed description and literature review of VR ROI analyses.

large, positive impact on overall well-being in society via improved economic conditions for people with disabilities net of the cost of producing those improvements.

Although there are good reasons to favor the social rate of return as the appropriate measure of a government program's efficacy, policymakers, program administrators, and taxpayers are often interested in the return to the taxpayer. Taxpayer return is sometimes referred to as a budget impact analysis or revenue-expenditure analysis (Boardman et al., 2018). That policymakers and bureaucrats often focus on the taxpayer rather than economic return has long been recognized (see Boardman et al., 2018, Hudak & Wallack, 2015; Widavsky, 1966). Policymakers and program administrators in Virginia have often asked us about state taxpayer return of the VR program in Virginia, and many articles in the popular press and government documents focus on taxpayer rate of return (e.g., Kiernan, 2020; Soergel, 2020; U.S. Dept of Treasury, 2020). In contrast to the social return on investment, taxpayer return measures the impact VR has on the government budget via increased tax returns caused by the program net of the costs of the program. Examining the taxpayer ROI may be of importance to assessing the political viability of work-force training programs such as VR, but increased tax revenue and reduced government transfer payments have no social benefit; any improvement for the taxpayer is a loss of equal size to the client.

In this paper, we estimate the taxpayer ROI for the VR program in Virginia. To do this, we use findings and data from the DPSS analyses of the effects of VR on employment and earnings to estimate the impact of VR on tax revenues and the taxpayer ROI. In particular, we use the estimates reported in DPSS to simulate changes in federal and state income and sales tax, as well as state sale tax revenues. In contrast to the positive social rates of return in DPSS, we find starkly different taxpayer rates of return for the same individuals.

Our analysis uses data from the 2000 cohort studied in DPSS. While the data is from an earlier cohort, DPSS's framework is methodologically sound and the resulting research has been widely cited. Additionally, more recent analyses using data from 2007 and 2012 have produced similar or even smaller social ROI estimates (see Schmidt et al., 2019, and Clapp et al., 2024a and 2024b), suggesting that our primary conclusions about the contrast between social and taxpayer returns are not sensitive to the specific period under investigation.

ROI Framework

The basic ROI framework is summarized in Table 1 (see Friedlander, Greenberg, and Robins, 1997). Only the monetary benefits and costs are listed in this table. In particular, we display the expected signs of effects of VR on earnings, tax payments, government transfer programs, and operating costs. The plus and minus symbols indicate whether the VR program is expected to be a monetary benefit (+) or cost (-) from the perspectives of the VR client, the taxpayer, and society, and question marks indicate that theory does not provide an unambiguous sign on the effect. In this framework, VR clients are disabled individuals receiving services from the state vocational rehabilitation agency that aims to improve employment outcomes, taxpayers are those funding the services through tax revenues, and society represents the entire community including VR clients and taxpayers (i.e., residents in Virginia). Finally, earnings refer to the wage income VR clients generate through employment.

To understand the basic connections, suppose VR increases earnings of clients. This is a direct monetary benefit to VR clients that has no impact on other taxpayers. At the same time, increased earnings may lead to increased income and sales taxes from the client. This is a monetary cost to the VR client but a benefit to other taxpayers. Since the increase in earnings will not be fully taxed, the net effect for VR clients will be positive. That is, the monetary benefit

of increased earnings will not fully offset by the cost of additional taxes. The return for taxpayers, however, depends on whether these additional tax collections exceed the operating cost of the program. If so, the taxpayers' return will be positive, but otherwise it is negative.

Table 1: Accounting Framework for Return on Investment Analyses of VR Programs

VR Program Effect	VR Clients	Taxpayers/Nonclients	Society
Earnings	+	0	+
State Income Taxes	-	+	0
State Sales Taxes	-	+	0
Federal Income Taxes	-	+	0
Government Transfer Programs	?	?	0
Operating Costs	0	-	-
Net Effect	+	?	?

Note: The plus symbol (+) indicates the expected return is positive, the minus (-) indicates a negative expect return, the zero (0) indicates no expected effect of VR, and the question mark (?) indicates the direction of the expected effects of VR is uncertain.

Social benefits equal the sum of benefits to VR clients and to the taxpayer. Some factors, such as increased tax revenue and reduced government transfer payments, have no social benefit because any improvement for the taxpayer is a loss of equal size to the client. For example, if VR services cause an increase in tax payments from recipients, this is regarded as a cost to program group members, as an equal savings or benefit to taxpayers, and as neither a benefit nor a cost to

society. Additional taxes from VR clients are simply a transfer of income from one segment of society (VR clients) to another (taxpayers). Increases in earnings, in contrast, benefit VR clients but are neither benefits nor costs to taxpayers. Because VR clients benefit from the increase in earnings without offsetting costs occurring elsewhere, society as a whole also benefits.

In general, an ROI analysis provides a simple indicator of whether the VR program has positive or negative net benefits (i.e., benefits minus costs). DPSS focus on net social benefits. The social perspective is usually viewed by economists as the appropriate one for measuring the efficiency of social programs because it accounts for the total impact VR has on well-being across all members of society, not just a subset of those members (i.e., those who pay income and other taxes). It is crucial for understanding the contribution of VR to social welfare and improved living conditions for people with disabilities. Policymakers, however, often focus on the taxpayer perspective, that is, on whether the program increases or decreases the government budget balance (surplus or deficit), and by extension, the taxes of their constituents.

The Effect of VR on Other Taxes and Transfer Payments

Our focus is on state and federal income taxes and state sales taxes. Positive labor market effects of VR may also affect other tax revenues (e.g., property taxes) but these are likely to be second order amounts relative to the possible impact on income and sales tax collections. There has also been some discussion in the literature that programs like vocational rehabilitation can lead people with disabilities to go to work and stop collecting benefits from programs such as Social Security Disability Insurance and Supplemental Security Income programs (DI/SSI) (see, for example, Dean et al. (2014, 2017) and Stapleton & Martin (2012)). The effects of VR on participation in social welfare programs is an empirical question. If VR services improve labor market outcomes of potential DI/SSI beneficiaries, some clients may choose to fully

participate in the labor market rather than take up DI/SSI. Yet, for those with medical needs or limited abilities, VR programs may instead serve to help clients understand Federal Disability Insurance programs and rules and consequently lead to an increase in take-up (Dean et. al., 2017; Stapleton & Martin, 2012). In fact, Dean et al. (2017) estimate that VR programs increase the probability VR clients with mental illness take-up or continue receiving DI/SSI.

Intangible Effects of VR

While the traditional ROI framework is simple and appealing, it does not account for a number of factors that may be important for understanding the social and taxpayer rates of return. There may be many important benefits and costs that are not easy to observe or cannot be monetized easily and, as such, are difficult to value in the standard framework. That is, there are aspects of VR programs that may have true social value or cost but are much more difficult to measure. Because they are difficult to measure, these intangible effects are rarely assigned a value in evaluations of government job training programs and are not included in our analysis either.

At the most basic level, VR services may lead to other social benefits associated with attachment to the labor market and the resulting reduction in use of the social welfare system. For society, the increased attachment to the labor market may lead to reductions in criminal activity. For recipients, there may be nonpecuniary benefits associated with working. For example, working may have an intangible benefit of increasing a recipient's utility due to the satisfaction associated with working and reduced welfare dependence (LaLonde, 1995). Likewise, independent living skills may be valuable to VR recipients in ways that are not reflected in their earnings or result in increased earnings of other family members or other

caregivers. At the same time, losses in nonmarket time (e.g., leisure) that result if VR programs lead a recipient to work more hours may reduce the recipient's utility.

A more subtle issue is that the traditional ROI framework accounts for earnings, not well-being. VR clients have much lower incomes, on average, than do taxpayers/non-clients. Thus, the marginal utility of income may differ between the two groups. An extra dollar to a poor person may be worth more than an extra dollar to a wealthy taxpayer (Friedlander, 1997). Another problem is that the tax and transfer system distort behaviors. For example, income taxes and disability insurance programs (e.g., DI/SSI) may reduce the incentive to work. This creates behavioral distortions with economic cost that may not be directly reflected in earnings or taxes. Economists refer to these costs as deadweight losses.

Finally, some of the estimated earnings benefits may reflect the displacement of non-VR participants, particularly if services do not improve VR participant skills or the job-matching process. In this case, there would be partially offsetting costs to persons not enrolled in VR, and the earnings effect on taxpayers (see Table 1) might be negative. In general, however, training programs for low-skilled workers are not thought to cause notable labor market displacements (Lalonde, 1995).

DPSS Analysis of Impact of VR on Earnings

DPSS estimate the effect of VR on employment and log-quarterly earnings (conditional on employment) for people with cognitive impairments (2015), mental illness (2017), and physical impairments (2018). The administrative records of the Virginia DARS include information on the 10,323 individuals who applied for VR services in SFY 2000 (July 1, 1999 - June 30, 2000) including measures of VR services, impairments, years of schooling, and other

standard socioeconomics factors (e.g., gender, race, access to transportation). Using detailed service provision information, DPSS examine the impact of six types of services rather than just a single treatment indicator. In particular, they aggregate VR services into diagnosis and evaluation, training, education, restoration, maintenance, and other services and allow these six service types to have different labor market effects.

Importantly, these administrative data from the 2000 applicant cohort in Virginia are merged with UI data from the Virginia Employment Commission on quarterly employment and earnings from 1995 to 2008. By observing individual quarterly employment and earnings prior to, during, and after service receipt, DPSS examine both the short- and long-term effects of VR services.

To do this, they compare the differences in employment and conditional log earnings before and after VR service receipt within a structural model of VR service receipt decisions. In particular, DPSS formalize and estimate three jointly determined equations to reflect the mix of services provided, the client's choice to work, and the client's earnings conditional on working. Since the selection problem occurs because unobserved characteristics may affect both service and labor market outcomes, DPSS model all three relationships as a function of random, unobserved components or error terms. Using this model, they allow services to be assigned based in part on expected labor market outcomes through those unobserved components. The parameters of this model are identified using pre-program labor market outcomes that control for differences between those who do and do not receive services, and two instrumental variables for each service choice that are assumed to impact service receipt but not the latent labor market outcomes. The first is the proportion of other clients of the individual's counselor who were

provided with the service, and the second is the proportion of other clients of the individual's VR field office who were provided with the service.

Table 2: Parameter Estimates from DPSS for Long-Run Labor Market Effects

Services	Cognitive Impairment		Mental Illness		Physical Impairment	
	Employment Probability	Conditional Quarterly Earnings	Employment Probability	Conditional Quarterly Earnings	Employment Probability	Conditional Quarterly Earnings
Diagnosis & Evaluation	0.108 **	0.307 **	-0.154 **	0.032 *	0.044 **	0.318 **
Training	0.160 **	0.285 **	0.181 **	0.136 **	0.140 **	0.172 **
Education	0.188 **	0.555 **	-0.038 **	0.146 **	0.194 **	0.364 **
Restoration	-0.160 **	-0.241 **	-0.042 **	0.206 **	0.123 **	0.442 **
Maintenance	-0.021 **	-0.069 **	-0.025 **	0.217 **	-0.005	0.029
Other Services	0.146 **	0.224 **	0.016 **	0.146 **	0.092 **	0.148 **

Notes:

1) Employment Probability estimates are the change in employment probability evaluated at the mean employment probability. This is approximated as the difference in the long-run employment propensity minus the prior employment propensity reported in the first estimates table of each paper in DPSS, then multiplied by the standard normal density evaluated at the inverse standard distribution evaluated at the mean probability. The mean probabilities are all approximately 0.29.

2) Conditional Quarterly Earnings estimates are the percentage change in quarterly earnings conditional on being employed.

3) Double-starred items are statistically significant at the 5% level, and single-starred items are statistically significant at the 10% level. Standard errors are available from the authors.

Long-run effects of service receipt, defined as effects from 2 years after to 10 years after service application, on the employment probability and conditional log quarterly earnings can be derived from estimates reported in DPSS and are summarized in Table 2. Vocational rehabilitation services have two labor market effects estimated in DPSS: a) they change the employment probability, and b) they change quarterly earnings conditional on being employed. For example, the estimated labor market effects of training services on people with cognitive

impairments increase the probability of being employed in a particular quarter by 16% and increase quarterly earnings conditional on being employed by 28.5%.

These results are then combined to determine the total unconditional earnings effect for each service. For people with cognitive impairments, the only VR services that have negative effects on unconditional earnings are restoration services and maintenance services. For people with mental illness, all services except diagnosis and evaluation services have a positive total effect, and, for people with physical impairments, all services have positive effects. The composition of total effects between employment and conditional earnings effects vary across disability groups, VR services, and interactions. For example, education services have small employment effects and large conditional earnings effects, while training effects are more evenly distributed between the two; and restoration services have negative effects for people with cognitive impairments but large positive effects for people with physical impairments.

Finally, to measure the social rate of return, DPSS approximate cost as the sum of the purchased services for each client and the cost of administrative services, similar benefits and agency provided services. DARS data include direct measures of purchased service costs for each client. The average costs for purchased services is $2,418 for clients with cognitive impairments, $1,500 for clients with mental illness, and $1,617 for clients with physical disabilities. The average costs of DARS-provided services, similar benefits, and administrative costs are not included in the DARS administrative records. Instead, using program cost data reported annually by DARS to the Rehabilitation Services Administration (RSA), DPSS provide lower and upper bounds on these costs. Non-purchased service costs are estimated to be between $2,000 to $4,200 for clients with cognitive impairments, $1,800 and $3,600 for clients with mental illness, and $2,000 to $3,000 for the clients with physical impairments.

Given these benefit and costs estimates, DPSS find impressive distributions of the ROR across VR recipients. In particular, they estimate median annual rates of return of 20% for people with cognitive impairments (Dean et al., 2015), 30% for people with mental illness (Dean et al., 2017), and 174% for people with physical impairments (Dean et al., 2018).

Methods

Our first step in evaluating taxpayer ROI is to estimate the tax revenue benefits of Virginia's vocational rehabilitation program. To do this, we simulate lifetime annual income with and without VR services and estimate the costs of VR services. Then, we compute discounted lifetime changes in federal income, state income and state sales tax revenues for the full data set and for subsets of people with cognitive impairments, people with mental illness, and people with physical impairments.

Simulating Income

Using the estimates (see Table 2) and data from DPSS, for each client we simulate the income that would be realized in two states of the world – one with VR services and one without VR services.[2] All income numbers are simulated quarterly because temporal unit of observation used in DPSS is a quarter. Then simulated quarterly income is multiplied by 4 to turn it into an annual estimate because income taxes depend on annual income.

Simulated annual income without VR services is denoted as base annual income. Figure 1 shows the distribution of the simulated base annual income conditional on employment for

[2] Following Dean et al. (2017), we exclude diagnosis and evaluation services for the disability group with mental illness. Also, we exclude the quarter immediately prior to VR application (i.e., the Ashenfelter dip, Ashenfelter, 1978).

each of the three disability groups. The median base annual incomes of the three groups are $2,560 for people with cognitive impairments, $2,246 for people with mental illness, and $6,194 for people with physical impairments. The highest decile earns $11,600 or more for people with cognitive impairments, $7,067 or more for people with mental illness, and $14,160 for people with physical impairments. One can see that almost all individuals have base annual incomes, conditional on employment, less than $20,000 for each of the three disability groups.

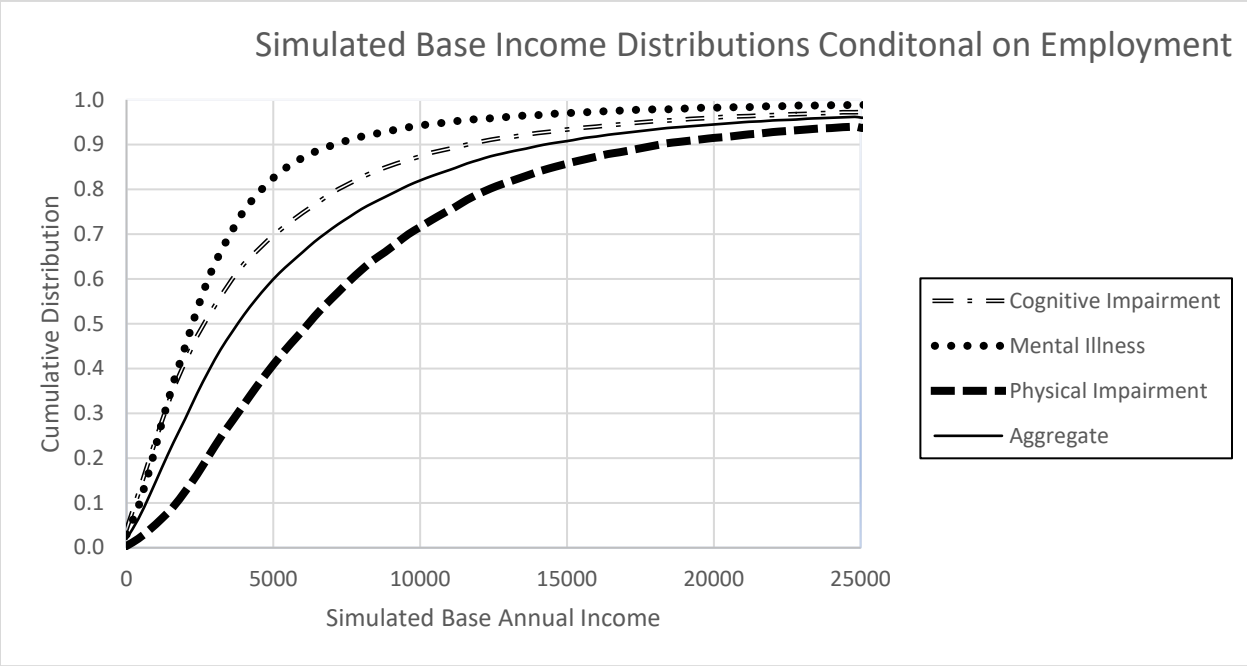


Figure 1

The moments of the income distributions shown in Figure 1 are reported in the "Without" column of Table 3. The probability of being employed varies from 0.327 for people with mental illness to 0.910 for people with physical impairments. As discussed in Dean et al. (2018), the high employment probability for people with physical impairments is, to some degree, due to the fact that many of the people with physical impairments at the time of application had only recently become physically impaired. The means of the unconditional quarterly income

distributions vary from $369 for people with mental illness to $2,265 for people with physical impairments.

Table 3: Simulated Employment Probability and Average Quarterly Income with and Without Service Delivery

Variable	Without	With	Difference
Cognitive Impairment			
Employment Probability	0.486	0.605	0.119
Conditional Income ($1K)	1.418	2.161	0.743
Unconditional Income ($1K)	0.946	1.692	0.746
Mental Illness			
Employment Probability	0.327	0.386	0.059
Conditional Income ($1K)	0.991	1.388	0.398
Unconditional Income ($1K)	0.369	0.588	0.220
Physical Impairment			
Employment Probability	0.910	0.965	0.054
Conditional Income ($1K)	2.483	4.520	2.037
Unconditional Income ($1K)	2.265	4.363	2.098
Aggregate			
Employment Probability	0.640	0.710	0.071
Conditional Income ($1K)	1.796	3.050	1.254
Unconditional Income ($1K)	1.400	2.630	1.231

Notes:

1) Conditional income is conditional on employment.

2) Unconditional income is conditional income multiplied by employment probability.

The effect of VR service receipt is reported in the "Difference" column in Table 3. For example, for people with cognitive impairment, the mean probability of employment increases from 0.486 (without) to 0.605 (with), an increase of 0.119 (difference). The effect of VR receipt is positive for each of the three disability groups for each of the three reported outcomes. The one that matters most for tax revenue is unconditional income. Mean income increases by $746 for people with cognitive impairments, $220 for people with mental illness, and $2,098 for people with physical impairments.

Estimating Cost of Services

A key component for an ROI analysis is the costs of services. With data on service choices and the average cost of purchased services, we compute the expected cost of services for each VR client. Assuming fixed costs are $4,200 for people with cognitive impairments, $1,800 for people with mental illness, and $2,000 for people with physical impairments, mean cost estimates associated with providing VR services are reported in Table 4.

Table 4: Cost Moments

Disability Group	# Obs	Mean	Std Dev
Cognitive Impairment	1156	6.595	1.597
Mental Illness	1492	3.934	1.250
Physical Impairment	2384	5.556	2.255
Aggregate	5031	5.314	2.104

Note: Cost moments are report in $1k.

There are three features of the estimated costs worth highlighting. First, the mean cost of VR services for mental illness is notably less than the mean costs for those with other

impairments. Second, fixed costs are important. Third, consistent with DPSS, our main analysis uses the upper-bound fixed costs estimate for people with cognitive impairments, and the lower bound for those with other disabilities. However, the overall return on investment results are not particularly sensitive to whether we use the upper or lower bound of fixed cost estimates in DPSS.

Relative to cost of services, the accumulated unconditional income increases are large. For example, for clients with physical impairments, the total average cost of VR is $5,556, and the average annual increase in unconditional earnings is $2,098. Thus, the present discounted increase in lifetime earnings will exceed costs, on average. However, the resulting extra tax revenue, which will only be a fraction of the increase in earnings, may not be large enough to offset the costs of VR services.

Modeling State and Federal Taxes

Income Tax

To measure the impact of VR on income tax revenues, we need to model the Federal and Virginia income tax schedules. To simplify this exercise, we assume all VR clients are single (rather than married) filers without children, and do not allow for non-standard credits and deductions including itemized deductions and the earned income tax credit.[3] In addition, we

[3] Approximately 20% of the VR recipients are married. If the VR recipient's spouse earns a significant salary, then that could affect the income taxes one pays. Unfortunately, we have no information on the income of the spouses in our data. We assume it is zero. However, we also performed an exercise where we assumed that the annual income of the other spouse for those who were married was $40,000. Because simulated increases in income due to VR are

account for only earnings, not other sources of taxable income. These simplifications may lead to biased estimates of income tax collections. However, given our focus on the change in tax collections that occurs with and without VR services, biases on the difference are likely small and unsystematic (i.e., not always positive or always negative).

Table 5: Virginia Marginal Tax Rates

Lower Bound	Upper Bound	Marginal Rate
$0	$3,000	2.00%
$3,000	$5,000	3.00%
$5,000	$17,000	5.00%
$17,000	up	5.75%

For the 2000 Federal income tax, there is a standard deduction of $4,400, an exemption of $2,800, and progressive tax rate schedule where the lowest rate is 15% for taxable income less than $26,250, and the highest rate is 39.6% for taxable income over $288,350 (Wilson, 2002). For the 2000 Viginia income tax, there is a standard deduction of $3,000, an exemption of $800, a gross income filing threshold of $7,000, and a tax rate schedule shown in Table 5 (Tax Policy Center, 2003a). These simplified tax schedules are illustrated in Figure 2. For both the state and federal income tax, one can have gross earnings as high $7,000 before paying income tax. As noted above and illustrated in Figure 1, median base annual income is substantially less than $7,000; in 2000, most VR recipients did not pay income taxes.

small, the results of the exercise showed very small effects; for people with a cognitive impairment, the median increase in state income taxes was $4, and for people with mental illness or a physical impairment, it was $9.

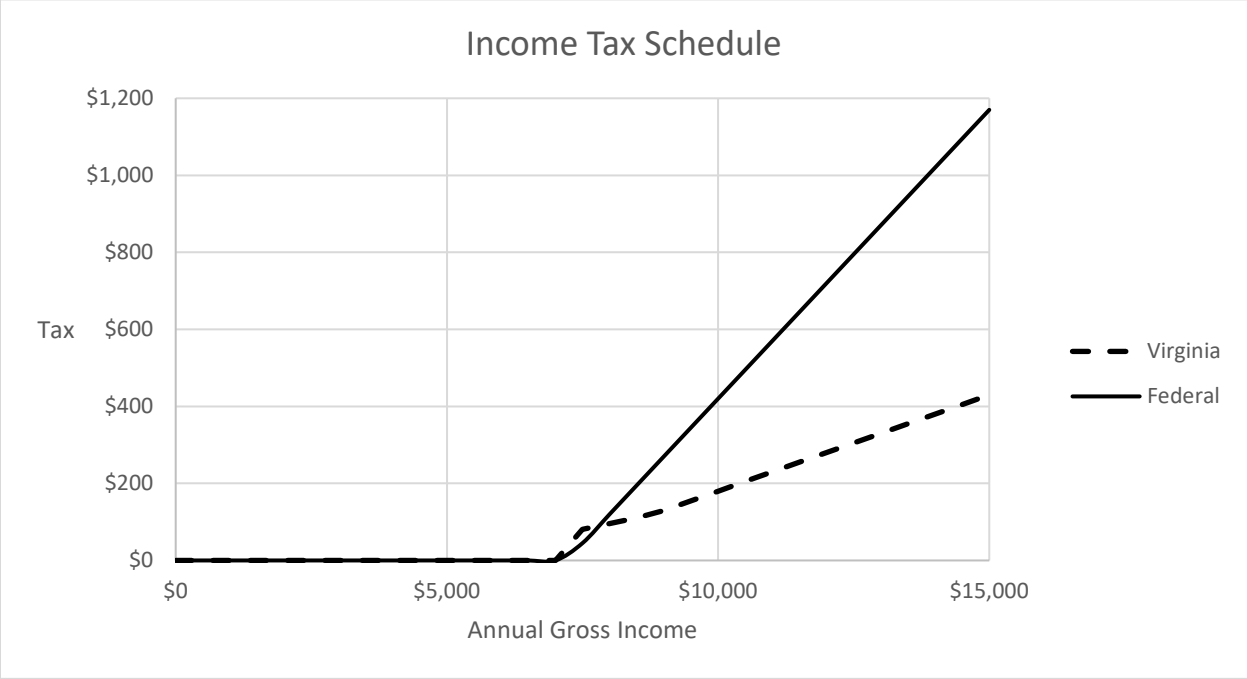


Figure 2

Sales Tax

To measure the impact of VR on state sales tax revenues, we model both the sales tax rate on different goods and services and the effect of changes in income on consumption of those goods and services. In 2000, the Virginia tax code had a 4.5% sales tax rate on most goods and services but a slightly lower 4.0% rate on food meant for eating at home. Medical expenses and housing were exempt. To model the effect of the change in income on the consumption of different goods, we use data from the 2000 Consumer Expenditure Survey to estimate the fraction of income expended on different goods in low-income households (U.S. DOL, 2002).[4]

[4] To model sales taxes, we first need to know the fraction of income spent on food, housing, medical care and other goods. We estimate these fractions using data average expenditures of different goods reported for household with income between $15K and $20K using data from the 2000 Consumer Expenditure Survey (U.S. DOL, 2002). In

Results

Using the simulated income and tax revenue models, we compute changes in income tax and sales tax revenue caused by VR. Formally, for each client, we compute the difference in tax revenues with and without VR service receipt, and then adjust for the cost of VR using a standard return on investment analysis.

Change in Tax Revenues

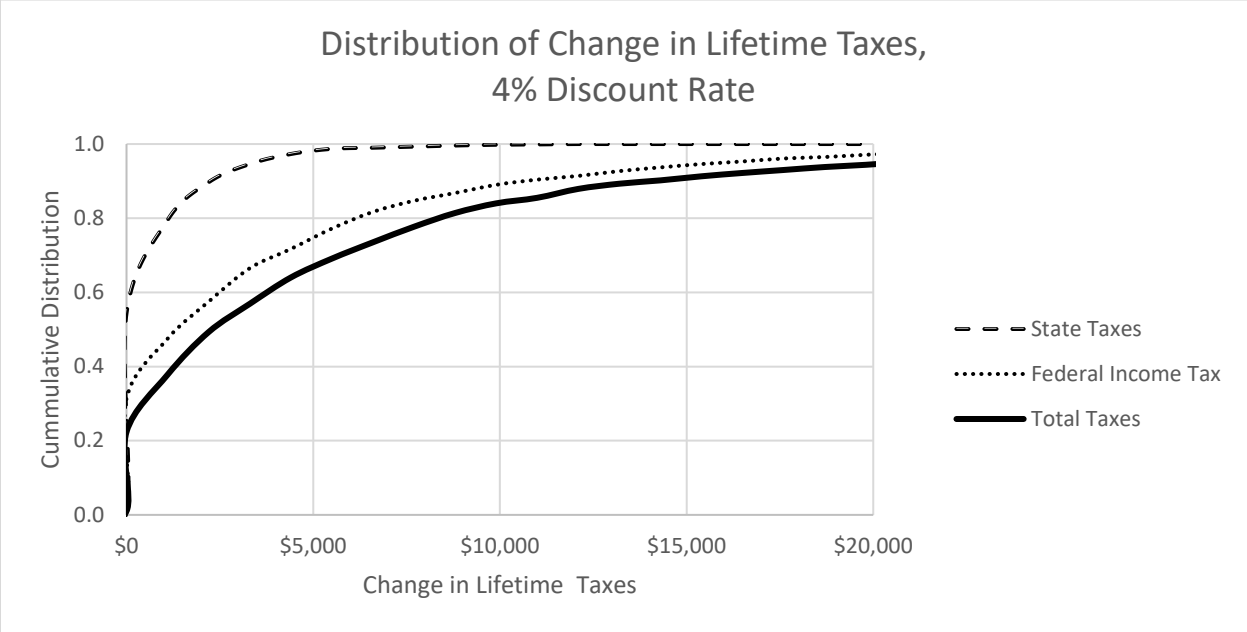


Figure 3

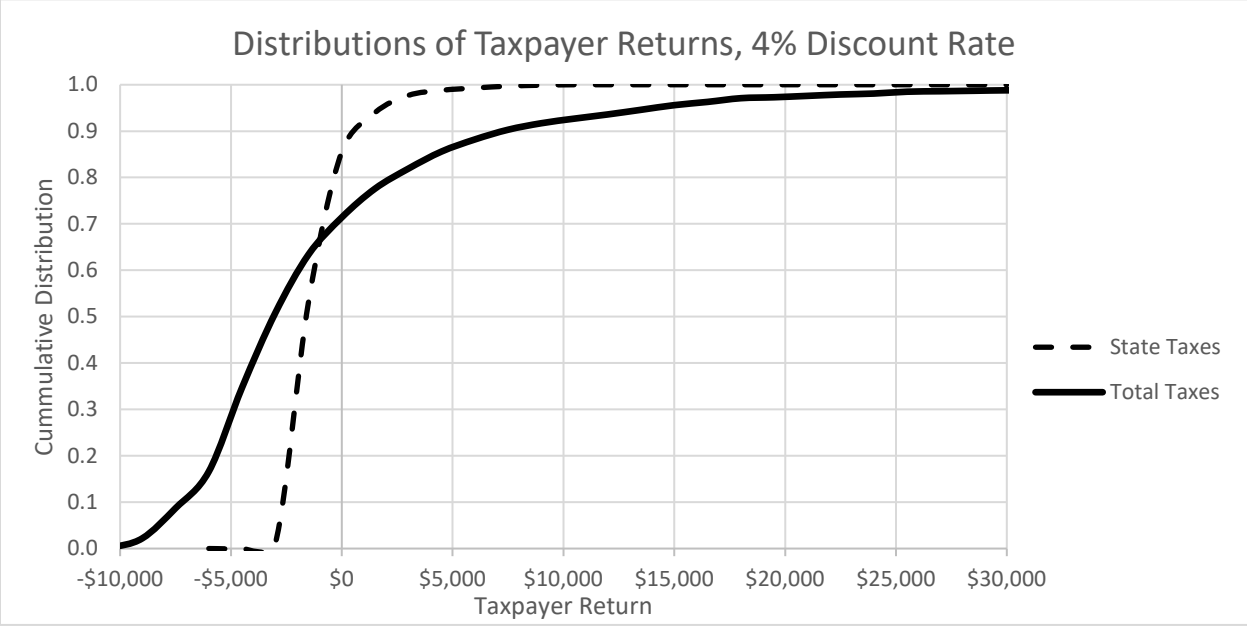
particular, the fraction spent on food is estimated to be 0.015, the fraction on housing is 0.460, and the fraction on medical expenses is 0.110. Then, we model the change in state sales taxes

$$[(1.00\times0.15\times0.040)+((1-(1.00\times(0.15+0.46+0.11)))\times0.045)]\Delta\text{Income}.$$

The 0. 15 represents the estimated fraction of home food consumption per dollar of income, and the 0.040 is the sales tax rate for such food. Thus, the first term in parentheses is the change in food sales taxes. The 0.045 is the tax rate on other goods. Thus, the second term in parentheses (starting with 1-) is the change in sales taxes collected on other goods and services. Housing and medical expenses are not subject to the Virginia sales tax.

Figure 3 displays the simulated distribution of changes in the present discounted value of lifetime tax collections due to VR receipt using a 4% annual discount rate. VR receipt has little impact on state tax collections and modest impact on federal income tax collections. In particular, over half (54%) of VR recipients have no change in state tax revenue and nearly all pay less than an additional $5,000. For the federal income tax, nearly a third of VR clients have no change and three-fourths pay less than an additional $5,000. When combining federal and state taxes, one-fifth of VR clients have no change in total tax payments and two-thirds pay less than an additional $5,000. However, the highest decile pays an additional $14,000 or more.

Return on Investment



Note: For the state tax figure, costs are discounted by 0.8 to reflect the state share of the expenses.

Figure 4

The distribution of the taxpayer return on investment displayed in Figure 4 is the present value of the increase in lifetime tax receipts minus the cost of the VR service. For the state tax

analysis, cost estimates are discounted to account for the fact that the federal government pays 78.7% and VA covers 21.3% of the cost of VR. Thus, the direct cost to Virginia taxpayers is only a fraction (0.213) of the total cost estimates in Table 4.

Because costs (see Table 4) are large relative to the lifetime changes in tax receipt displayed in Figure 3, the distribution of taxpayer returns is mostly to the left of zero. For state taxes, only 15% of clients have positive returns (i.e., additional state taxes exceeding the cost of VR services in Virginia). For total taxes, 29% of clients have positive returns, 9% have returns less than -$7,500 and 10% have returns in excess of $7,500.

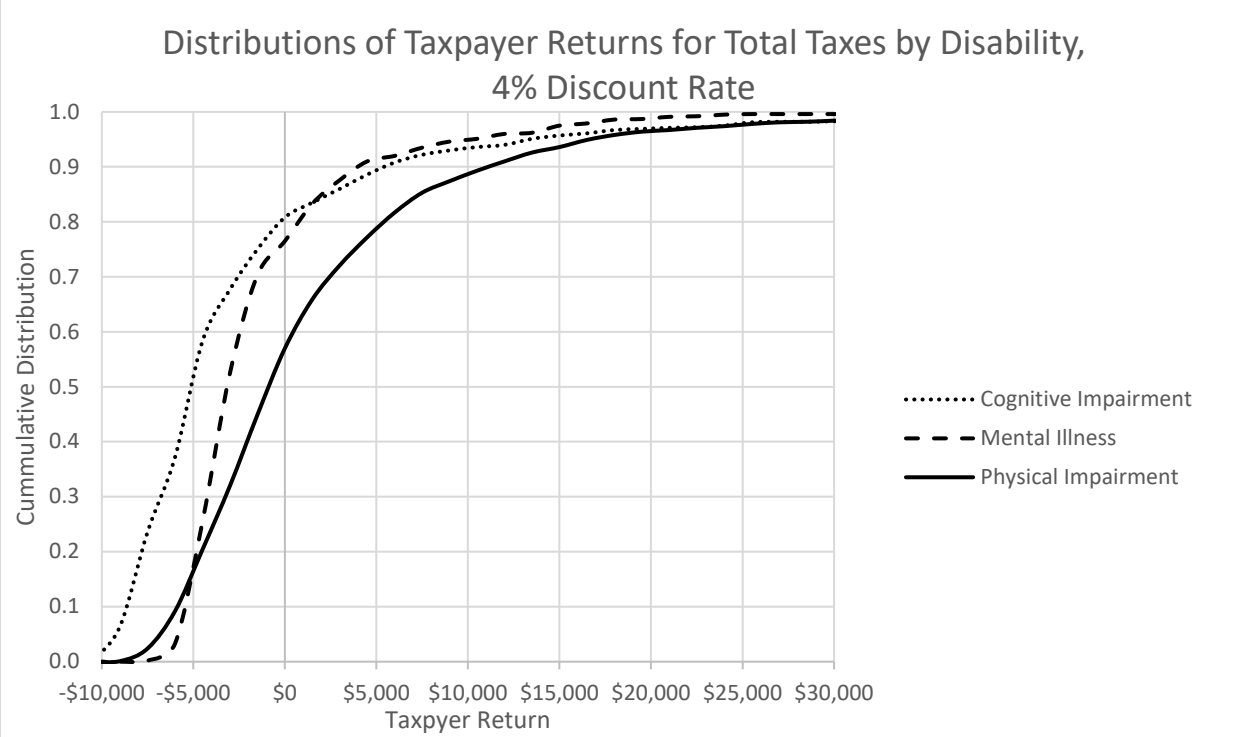


Figure 5

There is significant heterogeneity across the different disability groups. Figure 5 shows the total taxpayer return for people with mental illness, people with cognitive impairments, and

people with physical impairments. For VR recipients with physical impairments, the disability group with the most potential for increased tax payments (implied by the very high rates of return), 43% have positive returns, 2.4% have returns less than -$7,500, and 15% have returns more than $7,500. For those with cognitive impairments, the disability group with the highest average costs of VR services, 19% have positive returns, 24% have returns less than -$7,500, and 8% have returns in excess of $7,500.

Finally, Figure 6 shows how the aggregate return to taxpayers varies with the discount rate. At a lower discount rate of 2%, less than half (46%) of clients have positive taxpayer returns. At a higher discount rate of 8%, only 12% of clients are estimated to have a positive taxpayer return.

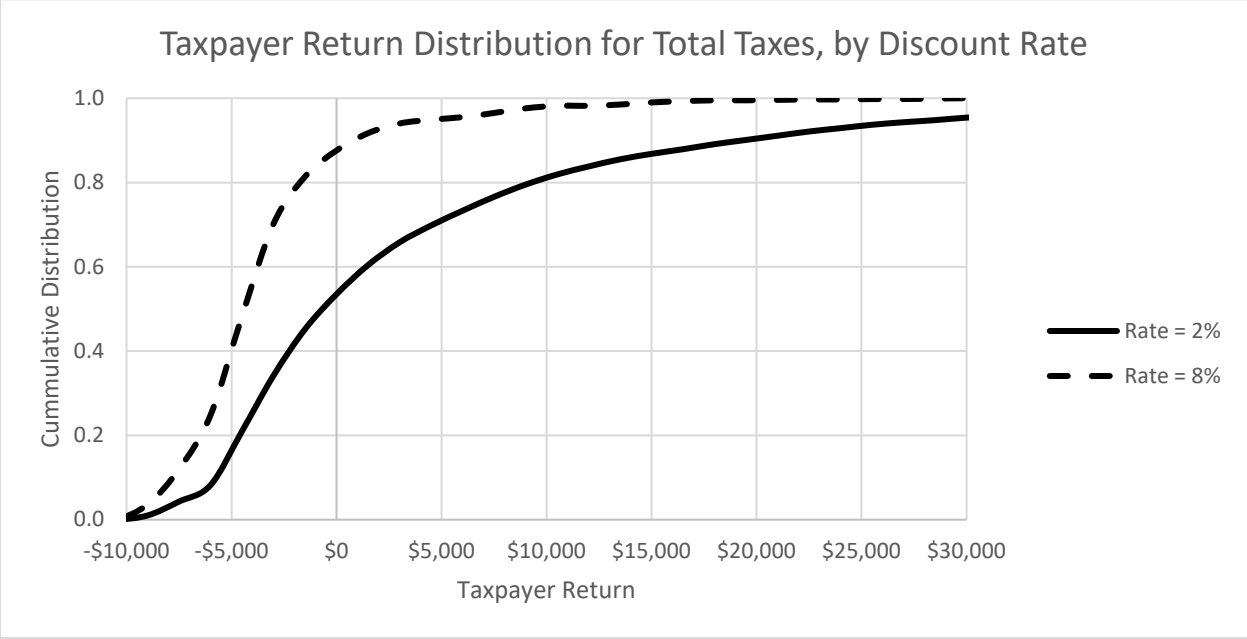


Figure 6

Discussion and Conclusions

Extending the DPSS analyses, we estimate the taxpayer ROI of VR programs in Virginia. DPSS find that VR programs have substantial labor market effects on VR clients that translate into large social returns. Yet, at the same time, VR clients have weak attachments to the labor market (i.e., relatively low employment rates and low annual earnings, Houtenville & Rafal, 2020 and U.S. Census Bureau, 2019). Thus, the large labor market effects do not translate into notable changes in income and sales tax revenues, and the simulated changes in tax revenues do not generally exceed the cost of VR services. At 4% discount rate, 71% of VR clients have a nonpositive taxpayer return on investment.

While administrators and policymakers are often interested in taxpayer returns, VR programs have a modest impact on tax revenues and, for most clients, the cost of VR services far exceeds any change in tax revenues. As a result, the median taxpayer ROI is negative. For the vast majority of clients, the cost of VR is not fully offset by increases in tax revenue. Instead, the impressive benefits of VR come from substantially improving the economic (and probably emotional) well-being of VR clients at a relatively minimal cost to taxpayers. In particular, DPSS estimate median annual rates of return for people with cognitive impairments of 20%, for people with mental illness of 30%, and for people with physical impairments of 174%.

Although this analysis provides valuable insights into the taxpayer returns of VR services, we do not account for the potential impact on federal programs such as DI/SSI or other assistance programs like the Supplemental Nutrition Assistance Program (SNAP). Additionally, non-pecuniary benefits, such as improved mental health, social inclusion, and increased independence, are also not captured in our analysis. These areas represent possible directions for future research that could lead to more complete and accurate estimates of ROI. However, the basic conclusion about the contrast between taxpayer and social ROI is unlikely to change

significantly, as VR programs primarily deliver their value through improvements in clients' well-being rather than through increases in tax revenues.

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