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Do short-term changes in funding improve Vocational Rehabilitation outcomes? Evidence from the ARRA

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Abstract.
BACKGROUND: In response to the Great Recession, the American Recovery and Reinvestment Act was signed into law in 2009. The Vocational Rehabilitation program rather unexpectedly received $540 million in ARRA funding, which was primarily intended to serve more applicants and increase services to customers.
OBJECTIVES: We consider the impact of ARRA-influenced changes in VR funding levels on several outcomes, including VR service receipt status, employment status at program exit, and Supplemental Security Income and Social Security Disability Insurance receipt at program exit.
METHODS: We use ARRA VR funding as an instrument to capture the exogenous variation in state VR funding levels.
RESULTS: Our findings show that unexpected positive funding shocks may not be effective at improving short-term outcomes for VR. We find no evidence that a change in funding levels affected key VR outcomes such as employment at program exit. We also observe that some states used ARRA funds as a substitute for decreased state VR funding (usually maintaining VR funding around pre-recession levels) instead of to increase state VR funding above pre-recession levels.

Keywords: Vocational rehabilitation (VR), funding, American Recovery and Reinvestment Act (ARRA)

1. Introduction

The Great Recession and the ensuing recovery had a profound impact on the U.S. economy, including its labor markets. Similar to those without disabilities, workers with disabilities experienced difficult conditions during this time. Labor force participation among people with disabilities decreased from 5.4 million in October 2008 to 4.9 million in June 2010 (Kaye 2010). Livermore and Honeycutt (2015) found that from 2007 to 2012, labor force participation dropped from 24.4% to 21.1% among people with disabilities (relative to a decline from 82.4% to 81.0% for people without disabilities) and unemployment climbed from 12.0% to 20.0% (relative to an increase from 4.4% to 8.2% for people without disabilities).

In February 2009, President Barack Obama signed into law the American Recovery and Reinvestment Act (ARRA). Intended to help the U.S. economy recover from the Great Recession, the ARRA included a combination of tax cuts and government spending increases meant to stimulate economic growth. The ARRA also provided additional funding to various agencies and programs that assist people struggling with issues such as obtaining employment, finding affordable housing, and being food secure. The Vocational Rehabilitation (VR) program, which provides services and supports to people with disabilities who want to work, received $540 million in ARRA funding distributed across three years.

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In response to state fiscal pressures and the unexpected availability of additional VR funding from the ARRA, state elected officials and VR agency staff had to make some important decisions. During the Great Recession, and for years after, many states experienced revenue shortfalls that required elected officials to implement offsetting budget reductions. In contrast to typical VR funding, which requires each state to put up about $1 for every $4 in VR funding it receives from the federal government, the ARRA VR funding required no matching funds. Given these circumstances, elected officials had to decide whether to accept the ARRA VR funding as well as continue funding VR at pre-recession levels. If the officials decided to decrease state VR funding, they could improve the state budget situation without necessarily decreasing overall VR funding because the ARRA VR money could supplant the decrease in state VR funding. The state VR agencies that received an overall funding increase after the ARRA had to decide how to allocate the extra resources.

Our study uses the ARRA VR funding to examine how receiving additional program resources affects key VR outcomes. Our research questions included: (1) how did VR program outcomes respond to changes in funding levels, and (2) was there heterogeneity in how VR outcomes varied by state based on the elected officials' funding decisions? Unfortunately, because funding levels are determined through state-level budgeting processes, the relationship between VR agency funding and employment is likely to be confounded by current state-level macroeconomic conditions. To overcome this issue, in our analysis we use ARRA VR funding—which arrived rather unexpectedly to the states—as an instrument to capture the exogenous variation in state VR funding levels. Drawing on VR administrative data, we consider several different outcomes, including VR service receipt status, employment at program exit, and Supplemental Security Income (SSI)/Social Security Disability Insurance (SSDI) receipt at program exit. Some of the outcomes we examine are directly related to the policy priorities for ARRA VR funding whereas others reflect traditional VR outcomes of policy interest.

Our findings reveal that unexpected positive funding shocks may not be effective at improving short-term outcomes for VR, which suggests that the relationship between stimulus funding and short-term outcomes warrants more scrutiny. We find no evidence that funding increases cause an increase in the likelihood that a VR applicant leaves the program with a positive employment outcome. We also find no evidence of a relationship between funding and service receipt, SSI payments at closure, or SSDI benefits at program exit. These results are consistent with other evidence indicating that agencies used the ARRA funds in ways not necessarily designed to increase agency caseload size or improve client outcomes in the short term. However, VR agencies spent the ARRA funds in other ways that may influence long-term outcomes that we currently cannot measure. The findings also showed that some states used ARRA VR funds to supplement their agencies' budgets as states decreased their VR funding contributions to amounts less than pre-recession levels (Rehabilitation Services Administration 2009).

2. Background

2.1. Vocational rehabilitation

The VR program provides services and supports to youth and adults with disabilities who want to obtain or maintain employment. Eligible applicants receive customized services to help them overcome barriers to work and achieve their employment goals. VR is administered at the state level by state VR agencies. Some states have separate agencies for serving blind and non-blind customers, while other states each have a single combined agency. Across states, VR application is voluntary. Nationally, in federal fiscal year 2014, VR had 578,488 program-eligible individuals, and it closed 183,432 cases with the customer being employed (Rehabilitation Services Administration [RSA] 2015). In federal fiscal year 2012, VR had a $3.08 billion federal funding allocation.

Although VR is administered at the state level, it is funded primarily by the federal government. Each state's VR allotment from the federal government is calculated according to a formula that considers three factors: the allotment for the state's VR program in 1978, the state's population, and the state's per capita income level. In the formula, a state's VR allotment grows with increases in state population and shrinks with increases in state per capita income. If a state's allotment, according to the formula, does not exceed $3 million or 0.33% of total federal VR funding that fiscal year, then that state's VR allotment will be the greater of those two amounts.

For every dollar of VR funding, the state contributes 21.3% and the federal government contributes the remaining 78.7%. Each state can pull

down VR funding from the federal government up to its allotment amount. A state can choose to fund its VR program above the allocation amount, but state funding greater than the allocation amount does not pull down any federal funding. However, if the federal government has unclaimed funds appropriated for VR after the states' initial VR funding decisions, fully funded agencies can apply to have these unclaimed funds reallocated to them, though the same rule regarding the 21.3% contribution applies (Government Accountability Office 2009). The U.S. Department of Education Rehabilitation Services Administration (RSA), which administers VR at the federal level, oversees the allocation of federal VR funding.

The Rehabilitation Act of 1973 includes a Maintenance of Effort requirement that protects VR agencies from large budget cuts. States must maintain a level of non-federal expenditures that is at least equal to non-federal expenditures from two years prior to the current fiscal year. Any state that does not meet the Maintenance of Effort requirement in a given fiscal year is penalized by the amount of the shortfall in the federal award in the next fiscal year (Rehabilitation Act of 1973).

2.2. ARRA funding

The ARRA allocated $540 million in additional funding to the VR program. The funding was distributed annually from 2009 to 2011. Unlike the standard VR funding scheme, the ARRA funding did not require states to make a matching contribution to access the funds—the amount of the ARRA VR funding allocation amount was given in full to state VR agencies (if the state accepted the funds from the federal government). ARRA VR funding was meant to be in addition to (not in replacement of) the standard VR appropriation and allocation process. State VR agencies could use the ARRA funding for any expenses allowed under the Rehabilitation Act of 1973 (as amended at that time) or VR program regulations. RSA encouraged state VR agencies to use the funding to serve more applicants and increase services to customers, especially traditionally underserved populations and transition-age youth (Rehabilitation Services Administration 2009).

Although state VR agencies are responsible for adjusting resource allocations as funding changes, state governments are responsible for setting state VR funding levels. Faced with substantive revenue shortfalls, during the Great Recession and the subsequent recovery, many states cut overall spending to balance their budgets. Although for every $1 a state saves in VR spending, it loses about $3.69 in additional VR funding from the federal government, and many state elected officials considered reducing VR spending during the Great Recession. However, the ARRA funding enabled states to decrease their VR funding while maintaining or exceeding pre-recession VR funding levels. As we show in the next section, states responded differently to this policy landscape, with some states increasing their overall VR funding relative to pre-recession levels and others maintaining or decreasing their VR funding levels.

2.3. Prior research

Intended to stimulate the economy, the ARRA and its effectiveness have been widely studied. Several ARRA studies examined effects on employment and the gross domestic product. For instance, Feyrer and Sacerdote (2011) estimated that one new job created by the ARRA cost between $170,000 and $400,000. The ARRA's impact on the economy was expected to be substantial and it is difficult to estimate empirically, but the best estimates suggest that the ARRA had weaker effects than the government predicted. Some studies suggest that most of the ARRA's employment effects were concentrated in government jobs rather than the private sector (Conley & Dupor 2013).

There is evidence that ARRA funds that targeted specific programs or individuals had a positive impact on outcomes. For instance, ARRA funds intended to subsidize continuing employer-sponsored health coverage (COBRA) for laid-off workers led to an increase in employer-sponsored health insurance in that group (Moriya & Simon 2016), and funding made available to community health centers in high-need areas resulted in 3 million new patients receiving care at those health centers (Shin et al., 2010).

ARRA funding for VR was offered with few requirements and targeted to a specific, state-administered program. Therefore, we might expect its impact to be similar to the impact of ARRA funding for community health centers. However, because the VR-specific ARRA funds were distributed with no matching requirements, states could substitute ARRA funds for regular federal VR funds to reduce matching requirements for state funding. This aligns with the results of the survey described by Johnson (2009) in which state and local governments noted that extra funding was most needed to mitigate

revenue shortfalls and budget deficits caused by the Great Recession.

Although much of the existing research on the impact of the VR program is descriptive, there is evidence that VR programs might have a lasting impact on applicants' employment. A recent study linking data from RSA and the Social Security Administration indicates that applicants who leave VR with an employment outcome are more likely to be employed six years after exiting the program and are less likely to be receiving SSI or SSDI benefits (Mann et al., 2017). In addition, evidence exists on the differential effects of VR on employment outcomes and SSI and SSDI benefit receipt by type of services received and disabling condition (Dutta et al., 2008). VR outcomes also vary by state (Stapleton, Honeycutt, & Schechter 2010; Honeycutt et al., 2015). Our study is the first to estimate the direct impact of extra funding on VR outcomes. This work contributes to the literature by examining the effect of funding increases on a vulnerable population whose employment status has a direct impact on expenditures for programs that support people with disabilities (Livermore & Goodman 2009).

3. Data and methods

3.1. Data

Our analysis relies mostly on VR data from the Department of Education's RSA. Our primary data source is the RSA-911 files for federal fiscal years 2004 through 2014. Each RSA-911 file contains detailed applicant-level information for every VR case closed[1] during that federal fiscal year. The RSA-911 files include information on various applicant characteristics, VR services received, and status at program exit. We supplement the RSA-911 files with the RSA Annual Review Reports, which contain agency-level information compiled by RSA from the RSA-2, RSA-113, and RSA-911 files. The RSA-2 contains annual agency-level funding and expenditure information including state funding, and the RSA-113 includes annual caseload data including applicants, Order of Service applicants (if applicable), and the number of applicants receiving services. The Annual Review Report compiles all of this information into one report for each agency. In addition to the VR administrative data, we accessed state population and unemployment data from the Bureau of Labor Statistics Local Area Unemployment reports. The Department of Education provided us with the federal VR funding formula allotments from 2006 through 2012. Except for these formula allotments, all of the data used for the analysis are publicly available, with the public use versions of the RSA-911 files available upon request from RSA. An important limitation of our data is that we are unable to observe individuals who applied for VR services during the Great Recession or its subsequent recovery but exited the VR program after the 2014 federal fiscal year.

Our analysis sample contains more than five million case closures over 9 years. Table 1 presents summary statistics for the sample. Because the RSA-911 contains the universe of VR case closures in a given year, the proportions reported in Table 1 are population statistics. The average annual VR agency funding amount during the sample period was $140.9 million; the average ARRA allotment per agency was $18.77 million. Nearly 15% of the sample was employed at application to VR. The majority of the sample was white (72.2%) and the sample was relatively evenly distributed across age and education categories. Slightly less than half (44.2%) of the sample was female. The most common condition in the sample was a mental health condition (23.7%). 16.6% of applicants in the sample were SSI recipients at application, and the same proportion were SSI recipients at program exit. Nearly 15% of the sample were SSDI beneficiaries at application, and 15.8% were SSDI beneficiaries at program exit. The average number of days between application and program exit was 608.7. Approximately one-third of the sample (33.0%) was employed at program exit. 58% of the sample exited the program after receiving VR services, and the rest of the sample closed without having received VR services.

Between 2008 and 2012—a period that spanned the Great Recession, the subsequent recovery, and the distribution of ARRA VR funding—state VR budgets varied substantially. Table 2 presents changes in actual VR funding during this time. Not all agencies experienced actual funding increases due to the availability of ARRA funds. Actual funding is reported by each agency at the end of the fiscal year and reflects the total federal funds provided to each agency following state-level budget finalization. In fact, several agencies experienced a substantial decrease in funding levels over this period, despite the availability

[1] Here, case closure is synonymous with program exit. A closure is initiated for multiple reasons including successful employment. However, some applicants exit the VR program without receiving services.

Table 1
Summary Statistics

	(1) Pooled Sample Mean (SD)	(2) Sample of case closures from agencies that experienced increased funding during between 2009 and 2012
Covariates		
Total average funding (in millions of dollars)	$140.9	122.1
	($107.6)	(89.28)
ARRA allotment (in millions of dollars)	$18.77	16.15
	($14.91)	(13.13)
Funding category 1: large budget reductions	0.520	
	(0.500)	
Funding category 2: small budget reductions	0.134	
	(0.341)	
Funding category 3: budget increases	0.164	
	(0.370)	
Funding category 4: large budget increases	0.181	
	(0.385)	
Employed at application	0.148	0.148
	(0.355)	(0.355)
Less than high school education	0.366	0.370
	(0.482)	(0.483)
High school education	0.357	0.353
	(0.479)	(0.478)
At least some postsecondary education	0.277	0.277
	(0.448)	(0.447)
Age at application	34.81	34.50
	(14.32)	(14.20)
Female	0.442	0.449
	(0.497)	(0.497)
White	0.722	0.715
	(0.448)	(0.452)
Hispanic	0.0892	0.0943
	(0.285)	(0.292)
Type of impairment		
Systemic medical condition	0.136	0.130
	(0.342)	(0.336)
Mental health condition	0.237	0.238
	(0.425)	(0.426)
Developmental condition	0.140	0.138
	(0.347)	(0.345)
Learning disorder	0.148	0.158
	(0.355)	(0.365)
Neurological condition	0.0252	0.0255
	(0.157)	(0.158)
Substance abuse	0.0736	0.0738
	(0.261)	(0.261)
Trauma	0.114	0.120
	(0.318)	(0.325)
Unknown condition	0.126	0.116
	(0.331)	(0.320)
SSI recipient at application	0.166	0.161
	(0.372)	(0.368)
SSDI beneficiary at application	0.147	0.151
	(0.354)	(0.358)
Outcomes		
Received VR services	0.588	0.590
	(0.492)	(0.492)
Case closed with an employment outcome	0.330	0.338
	(0.470)	(0.473)
SSI recipient at closure	0.166	0.162
	(0.372)	(0.368)

(*Continued*)

Table 1
(*Continued*)

	(1) Pooled Sample Mean (SD)	(2) Sample of case closures from agencies that experienced increased funding during between 2009 and 2012
SSDI beneficiary at closure	0.158	0.161
	(0.365)	(0.367)
Time to closure in days	608.7	616.5
	(658.7)	(651.8)
N	5,826,645	2,863,053

Source: RSA-911 files from 2004–2014, which contain the universe of individual VR case closures over that period.

of ARRA funds with no matching requirement. In addition, through reallocation, several agencies experienced large increases in actual funding that were well beyond the funds made available through the ARRA.

We grouped states into five categories based on how their VR funding levels changed during the Great Recession: (1) states that decreased VR funding between 2008 and 2012; (2) states whose VR budgets were relatively stable between 2008 and 2012; (3) states whose actual VR budgets were about equal to their allotment plus their ARRA funds; (4) states whose actual VR budgets were greater than their allotment plus their ARRA funds; and (5) states whose actual VR budgets were greater than their allotment plus two times their ARRA funds.

Figure 1 presents final actual funding levels from 2008 through 2012 as a percentage of the fiscal year formula allotment. The final federal funding amount is reflective of final state matching funds and includes ARRA funds. Prior to the ARRA's enactment—that is, in 2008—most agencies' actual funding was very close to the formula allotment. However, between 2009 and 2012, the actual funding amounts diverged substantially from the formula allotments. This is especially true for states in group 1, whose VR funding was substantially below the formula allotment from 2009 through 2012. Agencies in group 5 experienced funding increases well above the allotment. Although the ARRA VR funding was intended to increase VR funding relative to pre-recession levels, the data reveal that this was not the case for all agencies.

3.2. Outcomes

We examine the effect of the additional VR funding on four short-term applicant outcomes. The outcomes are short term in that they are measured either while a VR case is open or at program exit. The first outcome relates to one of RSA's suggested uses for the ARRA VR funding. The other three outcomes are more traditional VR outcomes of policy interest. The outcomes are:

1. Received services. We examine what percentage of those who applied for VR services received them because one of RSA's suggested uses for ARRA VR funding was to increase the number of those who received services (Rehabilitation Services Administration 2009). We do not examine whether VR agencies used their ARRA money to better assist traditionally underserved populations, which was RSA's other suggested use for the funding.
2. Employment status at program exit. VR applicants who receive services and are employed for at least 90 days (for any number of hours and with or without pay) are considered to have exited the program employed. We explore whether the portion of VR clients who exit the program employed changed due to the funding increase.
3. SSI receipt at program exit. We examine the percentage of VR applicants who received SSI payments at exit.
4. SSDI benefits at program exit. We examine the percentage of VR applicants who exited the program and received SSDI benefit payments at exit.

3.3. Methods

Our variable of interest is average agency-level funding in millions of dollars (averaged over the years between an individual's application and program exit for closures in the RSA-911). Because there is sub-

Table 2
State Funding Levels from 2008 to 2012

Agency	ARRA Allotment ($)	2008 Actual Funding ($)	2009 Actual Funding ($)	2011 Actual Funding ($)	Total Net Change in Funding from 2009 to 2011 ($)	% Difference Between Three-Year Funding Increase and ARRA Allotment
Louisiana	9,895,321	43,077,993	33,085,896	33,432,451	(31,233,458)	–416%
Georgia	18,686,184	91,919,444	76,490,231	64,749,034	(58,008,104)	–410%
Iowa	5,715,709	32,052,273	32,073,576	26,235,678	(10,518,715)	–284%
Ohio	21,589,801	118,727,629	121,443,769	105,641,313	(30,570,796)	–242%
Kentucky	9,318,274	51,743,094	53,469,261	46,185,590	(8,419,659)	–190%
Pennsylvania	20,925,941	123,532,053	124,249,697	99,130,376	(18,521,393)	–189%
Nevada	4,217,502	16,280,179	10,236,604	18,616,938	(2,622,471)	–162%
Indiana	12,335,350	66,660,094	68,785,415	64,145,199	(4,501,071)	–136%
Wyoming	1,800,000	9,058,438	8,832,163	8,920,659	(510,483)	–128%
Idaho	3,299,632	15,903,623	16,037,375	15,481,337	(375,934)	–111%
Florida	32,158,840	156,442,912	158,864,413	155,697,699	4,387,355	–86%
Wisconsin	10,000,997	55,648,242	57,088,852	57,088,852	2,881,221	–71%
New Mexico	4,426,362	22,734,126	23,994,920	22,020,044	1,799,688	–59%
Oklahoma	7,583,851	41,092,320	42,098,298	43,404,870	3,318,438	–56%
Michigan	18,126,329	97,537,485	99,951,580	98,698,679	8,523,916	–53%
Missouri	11,375,265	62,158,573	64,783,567	65,177,150	6,000,684	–47%
Washington	10,437,937	51,125,448	53,176,641	53,688,910	5,620,495	–46%
California	56,470,213	276,152,015	284,801,269	289,165,617	35,654,596	–37%
South Carolina	9,686,547	50,840,519	53,953,306	49,971,590	6,793,938	–30%
Alabama	9,790,731	57,286,047	61,049,994	59,101,952	8,039,828	–18%
Texas	44,810,968	218,216,581	227,487,659	234,145,010	42,777,741	–5%
North Dakota	1,800,000	9,463,837	9,795,073	10,157,490	1,718,542	–5%
Kansas	5,108,753	26,929,144	27,795,281	29,103,545	5,299,647	4%
Mississippi	7,214,520	41,647,036	43,469,871	44,457,037	7,500,176	4%
South Dakota	1,800,000	9,479,199	10,020,073	10,157,490	1,897,456	5%
New Jersey	9,455,472	55,267,043	59,067,925	57,620,257	10,278,441	9%
Montana	2,059,043	11,071,300	11,750,000	11,750,000	2,373,892	15%
Arizona	13,086,333	57,950,200	61,333,265	64,736,995	16,685,470	28%
Minnesota	7,737,672	43,124,084	44,744,290	47,461,786	10,053,146	30%
Colorado	7,307,044	36,083,923	37,762,655	40,186,308	9,649,295	32%
Tennessee	12,177,598	65,575,720	68,343,348	72,682,343	16,807,584	38%
Maine	2,587,757	15,106,639	15,802,368	16,496,411	3,668,480	42%
Illinois	20,079,289	105,461,896	113,449,013	114,847,171	29,854,161	49%
North Carolina	18,029,008	92,812,979	97,149,937	103,489,985	29,117,354	62%
Nebraska	3,189,315	17,800,971	19,012,225	19,982,695	5,464,503	71%
District of Columbia	1,879,421	12,641,236	12,989,280	14,872,642	3,284,059	75%
New Hampshire	1,923,884	10,754,717	12,157,592	11,973,927	3,517,407	83%
Virginia	11,601,624	63,381,530	67,262,735	73,421,635	22,018,874	90%
Delaware	1,800,000	9,476,746	11,083,213	10,457,490	3,917,955	118%
New York	25,694,844	148,275,309	156,038,494	169,121,277	57,178,288	123%
Oregon	7,064,114	35,382,650	43,983,351	39,058,861	15,966,053	126%
Alaska	1,800,000	9,474,966	10,195,073	11,657,490	4,585,155	155%
Hawaii	2,249,150	11,052,823	12,882,243	12,899,816	5,855,670	160%
Maryland	6,879,192	39,639,603	45,611,435	47,116,848	20,839,255	203%
Arkansas	6,589,832	36,246,470	39,532,216	45,995,973	20,826,517	216%
Utah	6,006,642	28,030,439	31,788,834	37,874,343	23,244,807	287%
Rhode Island	1,734,860	10,427,658	10,704,195	15,953,474	8,382,126	383%
Connecticut	3,334,533	20,156,212	23,337,633	24,053,270	18,043,972	441%
Vermont	1,800,000	9,475,824	10,345,073	14,815,490	9,980,581	454%
Massachusetts	7,068,629	45,812,921	53,182,289	68,679,732	51,498,578	629%
West Virginia	4,312,919	25,312,666	25,912,097	47,955,763	52,509,031	1117%

Source: RSA Annual Review Report, 2008–2012. Notes: This table presents ARRA allotments for each state and the total net change in VR funding in each state over the ARRA funding window. We compare this amount with the ARRA allotment in order to categorize states into subgroups based on use of ARRA funds. The percentage difference between the three-year funding increase and the ARRA allotment in a state that used all of the ARRA funding to increase its VR budget would be close to zero.

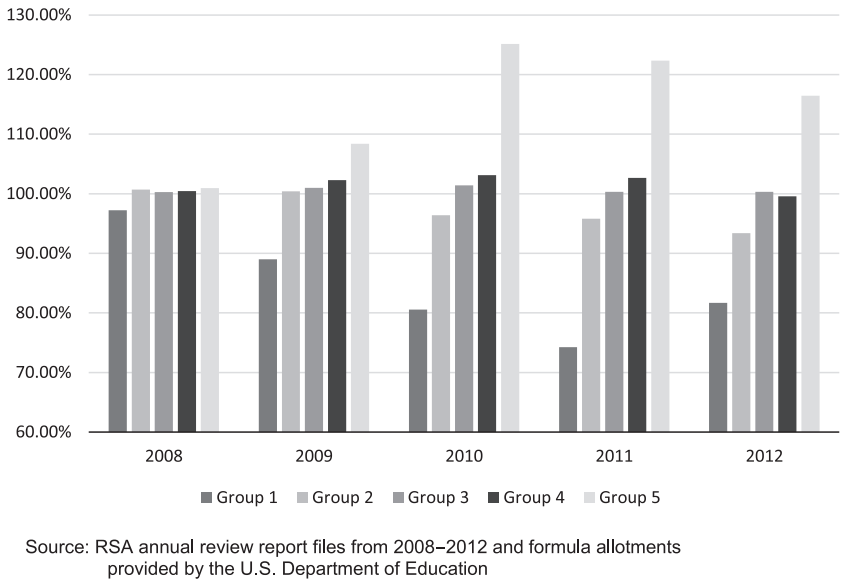

Fig. 1. Actual FY Federal Funding as a Percentage of VR Formula Allotments. Source: RSA annual review report files from 2008–2012 and formula allotments provided by the U.S. Department of Education.

stantial variation in agency size, using a measure of total funding could result in a misleading estimate of the impact of funding changes on VR client outcomes. Instead, we normalize total agency-level funding using each state's number of congressional seats (based on the 2000 census). We do not normalize total agency-level funding using a more direct measure of agency size, such as state population, because it is part of the VR funding formula. We do not normalize by any caseload statistics because they are endogenous—it is possible that the recession and/or the availability of ARRA funding affected application volume and service receipt.

The relationship between the average funding level normalized by state size and outcomes provides evidence about the impact of an unexpected, temporary funding increase on short-term VR outcomes. Most of the variation in the funding level, which fluctuates by state and over time within state, is due to the Great Recession, the subsequent recovery, and the ARRA. Year-over-year changes were relatively modest in years before these events because the formula allotments are relatively stable over time.

We model each outcome as an additive linear function of our variable of interest and other key factors:

$$Y_i = \alpha + \beta\,(Fund_i) + x_i'\gamma + \mu_i \qquad (1)$$

where Y is the outcome for applicant i receiving services from agency j; *Fund* is average agency-level funding; x is a vector of exogenous applicant-level variables including: age, sex, a white race indicator, education level at application, type of impairment, employment status at application, year of application, indicators for SSI and SSDI payment receipt at application, state-level unemployment rate at year of application, and state per capita income averaged over the years between application and program exit. Because state per capita income is used in the VR funding formula, and is likely to impact outcomes as well, we take the average per capita income to align with the way we measure the funding level experienced by each individual in our sample.

Though the RSA-911 files include information on date of and various characteristics at time of program exit, we restrict our model covariates to those observed at application. We do this for two reasons. First, individual characteristics at closure are likely to be affected by our explanatory variable of interest and therefore would be inappropriate to include as control variables. Second, we control for year of application in particular because we want to hold constant the characteristics of the agency at the beginning of each customer's service period. We hypothesize that agency conditions at application are likely to be deterministic of customers' experiences and outcomes.

In order for Equation (1) to produce an unbiased causal estimate of the effect of a change in funding per applicant on outcomes, we must assume that no unob-

served contemporaneous state or local area factors affect both funding and outcomes. This assumption is not reasonable because VR funding levels are determined by lawmakers through the state budgeting process. Moreover, the Great Recession and its recovery are likely to confound our estimates. The factors that affect states' ability to meet the VR matching requirements—and therefore actual agency funding levels—are also likely to affect VR employment outcomes.

We use an instrumental variables (IV) strategy to isolate the exogenous variation in VR funding. We instrument for normalized total agency-level funding using each agency's ARRA award. Similar to total agency-level funding, we normalize ARRA funding levels by the number of congressional seats in each state (based on the 2000 census). The ARRA award was an unexpected influx of money distributed using similar rules as regular VR funding. However, because the ARRA VR funds were distributed with no state matching requirements, the ARRA funding available to VR agencies is uncorrelated with contemporaneous state-level economic constraints (for example, the extent to which the recession affected a given state) and therefore a plausible source of exogenous variation in funding.

The first stage of the IV model regresses the variable of interest (normalized total funding) on the instrument and all exogenous variables in Equation (1), with the addition of an indicator for whether the VR client lived in a state that expanded Unemployment Insurance eligibility in response to the ARRA:

$$FUND_i = \alpha_{FS} + \beta_{FS} ARRA_i + x_i'\gamma + \varepsilon_i \qquad (2)$$

In Equation (2), *ARRA* is the one-time state-level ARRA funding allotment in millions of dollars to be spent over 3 years (2009 through 2011). We estimate two-stage ordinary least squares (OLS) models by first estimating the parameters of the first stage Equation (2) and then using these parameter estimates to predicted values of the variable of interest: average funding. We estimate the second stage (Equation 3) by regressing our outcome on the predicted value of average funding $\left(\widehat{Fund}_{ij}\right)$, isolating the variation in the treatment variable caused by the instrument:

$$Y_{ij} = \alpha + \beta_{IV}\left(\widehat{Fund}_{ij}\right) + x_i'\gamma + \mu_i. \qquad (3)$$

We also wanted to control in the model for other types of ARRA funding that may have affected VR applicants because it could also confound our estimates. After reviewing what other programs VR applicants participated in, we added to the vector x in Equations (2) and (3) an indicator for whether at VR application Unemployment Insurance (UI) was providing more generous benefits due to the ARRA.[2]

In addition to estimating impacts using case closures from agencies in all 50 states and the District of Columbia, we also conducted a sensitivity analysis that estimates impacts using only states that increased their VR budgets to equal or exceed their full regular allocation plus their ARRA funds. We did this to address the concern that if the all-state estimates showed no impacts, it was because of the states that responded to the Great Recession and ARRA VR funds by decreasing their contributions to VR funding.

4. Results

4.1. Strength of instrument

Table 3 presents first-stage estimates in the pooled sample as well as in the sample stratified by ARRA use. ARRA funding is strongly correlated with actual funding levels (conditional on the model covariates). This is unsurprising for two reasons: the ARRA funds led to increases in actual funding for many states and the ARRA allotments were determined using the annual VR funding allotment formula. We find a sufficiently powerful first stage in the pooled sample,[3] with estimates indicating that $1 million of ARRA funding is associated with an average increase of $9.615 million in total funding. The coefficient on the instrument is slightly larger in the sample from agencies that used ARRA funds than it is in the whole pooled sample of closures.

[2] The ARRA included several provisions incentivizing states to makes changes to their UI programs. Prior to the ARRA, UI extended benefits were jointly funded by states and the federal government. The ARRA provided for 100% federal funding of extended UI benefits, and led many states to adopt policies that made extended benefits easier to obtain (Mastri et al., 2016).

[3] Generally, an IV is considered sufficiently powerful if the joint significance of all of the estimated parameters from the first-stage regression is sufficiently high. An F statistic of 10 is the minimum level of significance that researchers use to determine whether an instrument is sufficiently powerful (Staiger and Stock 1997). Our first stage F statistic is over 200, indicating that ARRA funding amounts are sufficiently correlated with overall funding levels for a powerful instrumental variable.

Table 3
First-Stage Regression Results

	(1) Pooled- Unadjusted Association Between ARRA Allotment and Total Average Funding per Congressional Seat (se)	(2) Total Average Funding – Pooled Sample (se)	(3) Total Average Funding – States in Categories 3 and 4 (se)
ARRA allotment per congressional seat	7.973***	9.615***	9.895***
	(1.251)	(1.416)	(1.433)
N	6,162,943	5,961,021	2,863,053

Source: We estimated all models using data from the RSA-911 files from 2004–2014, which contain the universe of VR case closures over that period. Notes: Results in columns 2 and 3 include controls for education level at application, age, gender, race, type of impairment, SSI receipt at application, SSDI benefit receipt at application, year of application, state unemployment rate at year of applications, and average state per capita income. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

Table 4
Regression Results

	(1) Received VR Services (se)	(2) Case Closed with an Employment Outcome (se)	(3) SSI Recipient at Closure (se)	(4) SSDI Beneficiary at Closure (se)	(5) Time to Closure, in Days (se)
Total average funding per congressional seat - IV	0.0234	0.0115*	–0.000832	–0.000564	52.74
	(0.0120)	(0.00461)	(0.00153)	(0.00156)	(27.79)
N	5,961,021	5,961,021	5,839,981	5,833,905	5,961,021

Source: We estimated all models using data from the RSA-911 files from 2004–2014, which contain the universe of VR case closures over that period. Notes: All models include controls for education level at application, age, gender, race, type of impairment, SSI receipt at application, SSDI benefit receipt at application, year of application, state unemployment rate at year of applications, and average state per capita income. Binary outcome models (columns 1 through 4) are estimated as linear probability models. Standard errors are clustered at the state level.

4.2. Pooled regression results

Table 4 presents IV estimates from the pooled sample of case closures. We find a statistically significant, positive coefficient on total funding (column 2), indicating that a $1 million increase in average annual funding leads to a 1.15 percentage-point increase in the probability of exiting VR with an employment outcome. The relationship between total agency-level funding and the probability of closing after receiving VR services (column 1) is positive, but does not provide any meaningful information about the relationship between funding and service receipt. This is because the coefficient is both small and not statistically different from zero. We find no statistically significant evidence of a causal relationship between total agency-level funding and the probability of receiving SSDI benefits at program exit, the probability of receiving SSI payments at program exit, and time to case closure.

When we restrict our sample to case closures from agencies that saw substantive budget increases relative to pre-recession levels, we find no evidence of a relationship between agency-level funding and VR outcomes. Table 5 presents IV results, and they are consistent with the pooled estimates and generally slightly smaller in magnitude. One coefficient is statistically different from zero (column 2) and given the lack of significant and meaningful results in the analyses described above, it is unlikely that it provides evidence of a meaningful relationship between funding and time to closure and service receipt.

5. Discussion

We do not find evidence that the ARRA VR funding affected the short-term outcomes we examined. This result was consistent whether we examined the percentage of applicants who received services—one of RSA's suggested priorities for the funding—or more traditional VR outcomes of policy interest. In addition, the analysis result was the same regardless whether we examined all states or just states whose

Table 5
Robustness Check – States that Used ARRA Funds

	(1) Received VR Services (se)	(2) Case Closed with an Employment Outcome (se)	(3) SSI Recipient at Closure (se)	(4) SSDI Beneficiary at Closure (se)	(5) Time to Closure in Days (se)
Total average funding per congressional seat - IV	0.0138	0.00764*	–0.000465	0.000430	34.52
	(0.00931)	(0.00359)	(0.00167)	(0.00222)	(23.82)
N	2,863,053	2,863,053	2,801,315	2,796,275	2,863,053

Source: We estimated all models using data from the RSA-911 files from 2004–2014, which contain the universe of VR case closures over that period. Notes: All models include controls for education level at application, age, gender, race, type of impairment, SSI receipt at application, SSDI benefit receipt at application, year of application, state unemployment rate at year of applications, and average state per capita income. Binary outcome models (columns 1 through 4) are estimated as linear probability models. Standard errors are clustered at the state level.

VR budgets exceeded pre-recession levels by at least its ARRA award.

There are at least a couple factors that could have contributed to this result. First, it may have been difficult for state VR agencies to quickly build the infrastructure necessary to serve more applicants or serve applicants in different ways. It takes time to conduct capacity building activities such as recruiting qualified new staff or identifying and vetting additional community rehabilitation partners. In addition, because the funding increase was known to be temporary, some agencies may have avoided hiring staff that they would need to lay off a few years later when resources decreased. Second, the agencies may have invested the money in ways that did improve employment outcomes, just not over the short term. As stated above, we only observed applicants who exited the program during or before the 2014 federal fiscal year and only observed outcomes during service receipt and at case closure. Consequently, our analysis excludes longer-term case closures and long-term follow up periods. If impacts from the ARRA VR funding emerged well past 2014, we are unable to measure them in this analysis. Anecdotal evidence suggests that this may be the case. For example, Vermont's Division of Vocational Rehabilitation used ARRA funding to develop and financially support a new intervention model called progressive employment, which is designed to assist applicants with major barriers to employment. A quasi-experimental impact analysis suggests that progressive employment may have positive impacts on employment and earnings (Mann et al., 2018). One possible extension to this study would be to interview VR agency leaders from when the ARRA funding was released and learn about how their agencies spent the additional funds.

It is important to emphasize for policy makers that our study's findings do not imply that providing additional funding to VR is unhelpful to the agencies or their customers. Instead, our findings suggest that there may be benefits to providing advanced, detailed information about VR funding changes. If an agency is given sufficient notice about how its funding will change (and for how long), then the agency would likely factor the funding change into its future service provision planning, perhaps even in a way that could affect applicant outcomes in the short term. However, the evidence suggests that VR agencies seem less able to take rather unexpected, temporary funding increases and use them to directly affect large numbers of applicant outcomes quickly.

Another takeaway from our analysis helpful to policy makers is that incentives and tradeoffs matter when giving states additional funding. Despite the ARRA VR funds, not every state VR agency experienced an overall increase in funding. The Great Recession created revenue shortfalls for many states that persisted into the subsequent economic recovery. Consequently, when the ARRA funding was announced, many state elected officials were looking for ways to decrease state spending. In a 2009 survey, local governments indicated that they would have found the ARRA stimulus more useful if they could have simply obtained funds to mitigate budget shortfalls caused by the recession (Johnson 2009). Instead, much of the ARRA funding made available was allocated to specific projects and programs, such as VR. Because the ARRA VR money did not require any state funds in order to be drawn down, the ARRA VR money provided state governments with an opportunity to substitute ARRA VR funds for regular state VR funding. Although this approach decreased the

total amount of federal dollars a state received for VR (because there were fewer state VR dollars to pull down federal VR dollars), it did help the states with addressing their immediate budget shortfalls. In contrast, if ARRA VR funding was conditional on maintaining pre-recession state VR funding levels or required a state contribution as standard VR funding does, then state governments would have had no incentive to decrease state VR funding and replace it with ARRA VR funding.

Our study does have some limitations. Although the results of our study in some ways align with expectations, it is important to note that they were likely influenced by the macroeconomic conditions created by the Great Recession. We also only examined the impact of funding changes on contemporaneous VR outcomes. We are unable to directly observe how the ARRA funding was spent, and it is plausible that agencies used the funds in ways intended to improve employment outcomes in the future. Finally, the RSA-911 files, which were our primary data source for the analysis, do have some limitations. For example, several of the measures included in RSA-911 files are self-reported by VR applicants and therefore may contain measurement error. Future studies on this topic should (if possible) link the RSA-911 files with other administrative data sources to get better measures of certain variables and outcomes. That said, we would expect any measurement error in outcomes to be distributed randomly across the VR customer population, making it unlikely that it would affect our results.

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Conflict of interest

None to report.

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