The Distributional Effects of Job Loss From Fiscal Consolidation: Evidence from The Budget Control Act of 2011*

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Abstract

The Budget Control Act of 2011 led to a period of reduced government spending. We leverage this quasi-natural experiment with detailed data on government procurement contracts with private-sector firms to estimate the effect of fiscal consolidation on commuting zone-level employment. The overall job losses between 2011 and 2015 were modest (less than 220,000) and well below most projections. Our estimates suggest the cost-per-job were in the range of $250,000 - $500,000. Unlike recent recessions, job losses were concentrated more heavily toward individuals with college educations.

Keywords: Federal Contracting, Local Labor Market, Job Displacement
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1 Introduction

The Budget Control Act of 2011 (BCA) was enacted as a result of the debt ceiling crisis in the same year. It imposed statutory limits on discretionary defense and non-defense federal spending for fiscal years (FY) 2012 through 2021. Originally, the BCA caps reduced discretionary spending by $54.5 billion in each category, totaling $1.2 trillion in spending cuts.[1] However, several budget deals tempered the magnitude of the spending reduction.[2] The BCA allowed a 2% reduction in reimbursements for Medicare and certain health care programs as a part of the non-defense spending cap, while military personnel pay was excluded from the discretionary defense spending limit. These institutional features produced differential spending reductions for the two categories. The Department of Defense reduced procurement spending to private-sector firms by over 16%, because of the inability in adjusting personnel. In contrast, non-defense agencies benefited from the reduction in health care reimbursements as well as the ability to adjust procurement, wages, and employment levels, yielding procurement declines of about 3% between FY 2011 and FY 2015. In general, the BCA was the largest reduction in discretionary federal spending in nearly three decades and some policy experts projected it would result in excess of two million job losses (**crs42763**).

We leverage this quasi-natural experiment to estimate the effect of fiscal austerity on employment by gender and education in local labor markets defined by commuting zones (CZ) (**tolbert˙1996**). This work draws upon and extends the growing local fiscal multiplier literature that has focused on estimating local responses to fiscal stimulus.[3] Given recent work by **barnichon˙2017**, **jorda˙2016**, and **auerbach˙2012** (among others) that finds evidence of asymmetric effects of government spending between periods of stimulus and slack, this study is the first (to our knowledge) to empirically investigate the effects of federal fiscal consolidation on local labor market outcomes in the U.S. during an economic expansion. This distinction is potentially important because, as **barnichon˙2017** note, there are more periods of unexpected increases in

[1] See CBO report "Estimated Impact of Automatic Budget Enforcement Procedures Specified in the Budget Control Act" from September 12, 2011.

[2] The American Taxpayer Relief Act of 2012, otherwise known as the "fiscal cliff deal", was a last-ditch effort to avoid an automatic sequester of budgetary authority. In the end, the fiscal cliff deal delayed the start of sequestration from January 2, 2013 to March 1, 2013 and reduced the size of the budgeted cuts in FY 2013 from $109 to $85 billion (to be split equally between defense and non-defense). The Bipartisan Budget Acts of 2013 and 2015 both increased the discretionary caps initially established by the BCA. The 2013 Act raised the FY 2014 and FY 2015 caps by $22 and $9 billion, respectively. The 2015 Act increased the FY 2016 and FY 2017 caps by $25 and $15 billion.

[3] See **chodorow˙2019** for a recent and excellent overview of this literature.

government spending than unexpected decreases and there are on-going debates about whether or not the impact of fiscal policy depends on the direction and state of economy. This work contributes to that debate.

Similar to **auerbach˙2018** and **gerritse˙jue˙2018**, we make use of contract-level procurement data from USASpending.gov to measure the change in federal spending to purchase goods and services at a local level. Since the BCA resulted in different spending reductions by agency (defense vs non-defense agencies), we exploit this information and identify our effects by using **bartik1991** or shift-share instruments that interact agency-level changes in aggregate federal spending with local procurement shares that were in place before the BCA was enacted. Because it is highly unlikely that pre-BCA commuting zone procurement spending affected the *agency-level* reductions imposed by the BCA, we have a high degree of confidence in the exogeneity of our instruments.

Our results suggest that a decline in total procurement spending of between $237,000 and $480,000 results in 1 job loss in a CZ. Results from our preferred specification show that the BCA spending caps resulted in an aggregate loss of over 218,000 jobs. Moreover, their were important distributional consequences in the labor market impacts of the BCA. Both men and those with at least some college education each accounted for approximately 60% of the job losses.

2 Data and Identification Strategy

2.1 Data

To analyze the impact of the federal sequester on local labor market outcomes we use data from USAspending.gov and the U.S. Census Bureau. Our sample consists of all 722 commuting zones (CZs) in the lower 48 states for FY 2011 to 2015.[4] The USAspending.gov data captures all transactions for prime recipient contracts for all federal agencies of more than $3,000. The contracts cover purchases from firms in the private sector that range from lawn care services to nuclear-powered submarines. We follow **auerbach˙2018** and construct a spending path for each contract by allocating the obligation amount equally over the life of the contract. For example, a $120,000 annual contract is assumed to result in $10,000 worth of spending in each of the 12 months of the contract. Our commuting zone-level federal spending series is formed by aggregating

[4] If one includes Alaska and Hawaii, there are a total of 741 commuting zones in the U.S. Commuting zones are designed to provide a measure of local labor markets (**tolbert˙1996**) and, unlike core base statistical areas, every county in the U.S. is part of a commuting zone.

contracts based upon their *place of performance* zip code which is the location where at least 51% of the work is expected to take place.

We combine our procurement spending measures with several employment outcomes at the CZ level using the Quarterly Workforce Indicators (QWI) data: total employment, employment by gender (male and female) and employment by education level (high school or less and at least some college).[5] The QWI track worker characteristics over time and provide local labor market statistics by industry and worker demographics. The underlying data source for the QWI is the Longitudinal Employer-Household Dynamics (LEHD) linked employer-employee micro-data, which covers over 95% of U.S. jobs.

Table **??** shows descriptive statistics for the average commuting zone by labor market outcomes and procurement spending for FY 2011 and FY 2015. Aggregate (real) federal procurement spending declined from $420 billion in FY 2011 to $368 billion in FY 2015, a reduction of more than 12%.[6] For a typical commuting zone, this amounted to a per capita reduction from $702 to $552 in just four years (a decline of more than 20%). The 10 CZs with the largest per capita reductions in spending all experienced reductions in excess of $2,000 per capita. Figure **??** shows the geographic heterogeneity in the change in federal procurement spending between FY 2011 and 2015. In contrast to procurement spending, Table **??** shows that (total) employment in the average commuting zone increased from 166,355 jobs in FY 2011 to 179,425 by 2015, an increase of nearly 8%. Employment also grew in the average CZ across every sub-category of employment during our sample.

[5] See https://www.census.gov/data/developers/data-sets/qwi.html for more information on the Quarterly Workforce Indicators

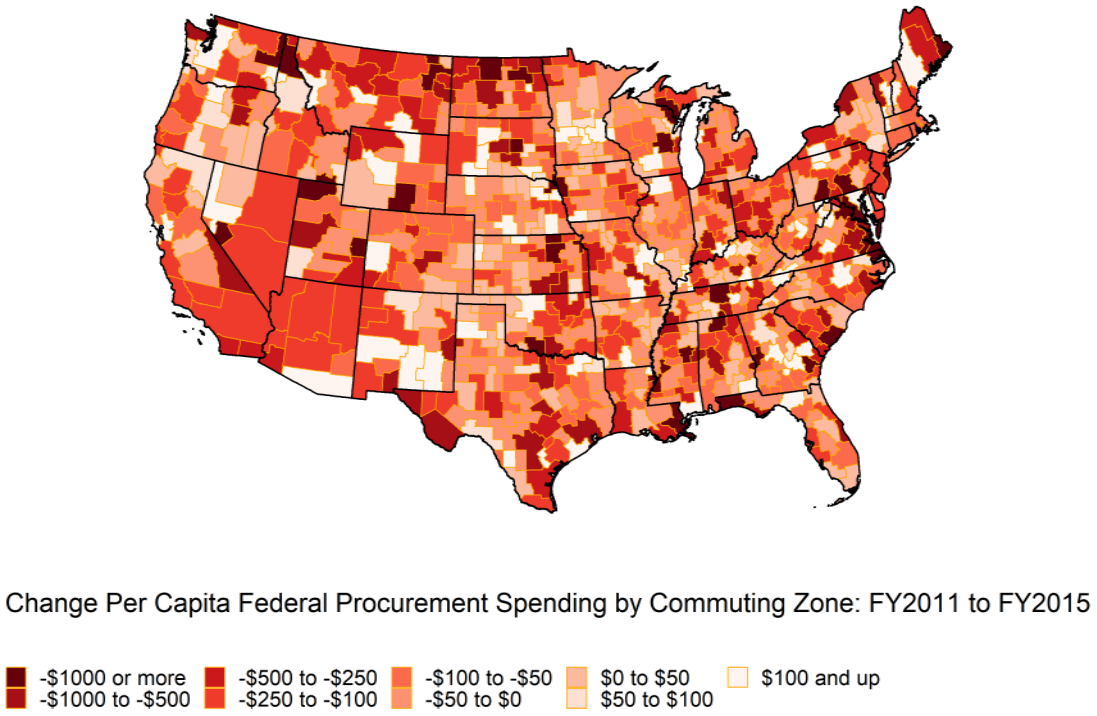
[6] Procurement spending was deflated using the Bureau of Labor Statics Urban Consumer Price Index to 2010 levels.

Table 1: Descriptive Statistics by Commuting Zone

	Mean 2011	StdDev 2011	Mean 2015	StdDev 2015	ΔMean 2011-2015	ΔStdDev 2011-2015
Total Spending Per Capita	$702	$1386	$552	$1163	-$150	$534
Total Employment	166,355	470,628	179,425	515,750	13070	47930
Non-College Employment	56,741	150,737	63,600	174,643	6,859	24,668
College Employment	89,224	268,093	93,183	282,819	3,959	16,468
Employment, unclassified	20,390	53,367	22,642	59944	2,252	7,339
Female Employment	83,246	233,221	88,850	253,557	5,604	21,674
Male Employment	83,108	237,477	90,571	262,416	7,463	26,496

Note: Employment data are from the U.S. Census Bureau's Quarterly Workforce Indicators. Federal procurement spending statistics are based on the authors' calculations using data from USASpending.gov. StdDev is the standard deviation. Aggregate real federal procurement spending was $420 million in FY 2011 and $368 million in FY 2015, a decline of more than 12%.

Figure 1: Change in Per Capita Federal Procurement Spending: FY2011 - FY2015



Note: Authors' calculations using data from the USAspending.gov.

2.2 Empirical Strategy

We exploit the exposure of CZs to changes in federal procurement spending by using a panel 'difference-in-differences' approach using the following empirical model:

$$outcome_{cst} = \beta spending_{cst} + \alpha_c + W_{st} + \varepsilon_{cst}, \tag{1}$$

where $outcome_{cst}$ and $spending_{cst}$ are labor market outcomes and total federal procurement spending in millions of dollars scaled by population for CZ c in state s and FY t. We use panel data techniques to control for two forms of unobserved heterogeneity. First, α_c are CZ fixed effects which control for long-run (time-invariant) economic history of a region. Second, W_{st} denote either FY or state-by-FY fixed effects that account for time varying factors that affect all CZs or CZs within a state. The state-by-FY fixed effects account for state-level factors, such as political representation, that might effect both the labor market and procurement spending. The results using state-by-FY fixed effects produce estimates where other CZs in a state act as the "control group" for CZs exposed to procurement changes from the BCA. The key parameter of interest β, is the change in a labor market outcome due to federal spending in a CZ. ε_{cst} is the random disturbance term. We estimate the model using weighted (instrumental) variables regression and, like **gerritse˙jue˙2018**, we use population weights to recover nationally applicable estimates. Standard errors are clustered at the CZ level.

Because political clout or the desire to limit spending reductions in economically depressed regions could introduce a source of endogeneity bias, we follow the standard approach in this literature of using a shift-share or **bartik1991** instrument. In most local fiscal multiplier studies, the shift-share instrument is created by interacting the national change in spending (the shift) with the local share of spending prior to the shock (the share). The instrument's exogeneity, as noted by **pinkham˙2018**, is based on the independence of the local spending share and the aggregate shock. In our application, we leverage the granular nature of our contract data and institutional features of the BCA to form Bartik instruments that have a stronger exoegenity claim than prior related studies. We accomplish this by forming two instruments for procurement spending that capitalize on the different spending caps imposed on defense and non-defense agencies. Let $\hat{g}_{act}$ denote the predicted spending in CZ c by federal agency a (defense and non-defense) imposed by

the BCA at time t. To form instruments for each agency, we multiply the national growth rate for each federal agency relative to FY 2010 ($g_{aUSt}/g_{aUS2010}$) by each commuting zone's share of aggregate (agency) procurement spending in 2010 (g_{act}). Thus, the shift-share instruments are the predicted change in spending if cuts in each CZ were made proportional to its federal spending presence at the agency-level prior to the BCA. Conceptually, the instruments are exogenous if a commuting zone's pre-BCA share of defense and non-defense procurement spending are unrelated to the aggregate changes in defense and non-defense spending imposed by the BCA.

3 Results and Discussion

In Table 2 we show estimates for the effect of total procurement spending on aggregate employment along with several diagnostic tests on the validity of our empirical strategy. Columns 1 and 2 show results the basic results using FY and state-by-FY fixed effects, respectively.[7] The results in column 1 show that a reduction in $1 million of procurement spending results in 4.2 job losses, or alternatively, it takes $237,000 in reduced spending to decrease local jobs by 1. The estimated effect is smaller (2.1 jobs for each $1 million) when using state-by-FY fixed effects in column 2. Thus, our cost-per-job estimates range between $237,000 and $478,000.

In terms of diagnostics, since we use two procurement spending instruments for total spending formed at the agency level (defense and non-defense), we also show Hansen J-statistic for overidentification. In both instances we fail to reject the null of exogeneity for at least one of the instruments. In columns 3 - 6 we show evidence that our estimates are not due to pre-existing trends in spending. Finally, in columns 7 and 8 we show results from a test suggested by **pinkham˙2018** that leads in the Bartik instrument do not predict the second-stage residuals. In total, the specification tests support our identification strategy.

In the general local fiscal multiplier literature, **chodorow˙2019** notes that stimulus spending in the range of $25,000 to $125,000 is sufficient to generate one job, with $50,000 being his preferred number. These studies are based on state-level estimates that primarily exploit changes from the American Reinvestment and Recovery Act or build-ups in national defense spending. Of the studies most closely related to ours that focus on procurement spending at a sub-state level, our cost-per-job estimates are directly inline with those from **gerritse˙jue˙2018** and roughly double

[7] Regressions with state-by-FY fixed effects have 10 fewer observations because both Connecticut and Rhode Island only have one commuting zone in the state.

the estimates from **auerbach˙2018**. Both of these studies use longer sample periods (2005-2014) and (1997-2016) when the overall change in procurement spending was one of growth. However, our cost-per-job estimates are very similar to the $247,200 - $518,300 range found by **gerritse˙jue˙2018** despite the fact that we focus only on a period of fiscal consolidation and rely on a different identification strategy. One potential factor driving the differences from **auerbach˙2018**'s cost-per-job figure of $120,000 is that they only examine the effect of defense spending on local outcomes, whereas this study and **gerritse˙jue˙2018** use procurement spending from all federal agencies. Defense procurement accounts for roughly 70% of total federal procurement and also tends to be more product- rather than service-intensive which could explain the larger effects found by **auerbach˙2018**.

Table 2: Total Federal Procurement Spending and Total Employment in CZs 2011–2015 (2SLS Estimates)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Total Employment	Total Employment	Total Employment	Total Employment	Total Employment	Total Employment	Residuals
Total Spending t+2 (millions $)					0.034	-0.561	
					(1.334)	(1.254)	
Total Spending t+1 (millions $)			0.076	-0.269	0.058	0.040	
			(1.324)	(0.789)	(1.046)	(0.688)	
Total Spending t (millions $)	4.212**	2.092**	4.166**	2.259**	4.178**	2.213**	
	(1.805)	(0.864)	(1.883)	(0.927)	(1.865)	(0.908)	
Total Spending Instrument t+1 (millions $)							0.032
							(1.608)
Implied Total Spending $ per job	$237,416	$478,011	$240,038	$442,673	$239,348	$451,875	
Observations	3,610	3,600	3,610	3,600	3,610	3,600	3,610
Time FE	FY	State-FY	FY	State-FY	FY	State-FY	FY
Kleibergen-Paap LM	10.0	13.9	13.8	17.0	38.2	33.9	
Kleibergen-Paap LM P-value	0.006	0.000	0.003	0.0006	0.000	0.000	
Kleibergen-Paap Wald F-stat	224.9	1273.1	222.1	814.0	268.7	430.7	
Hansen J-statistic	0.000	0.825					
Hansen J-statistic P-value	0.99	0.36					
Wu-Hausman P-value	0.042	0.118	0.048	0.300	0.061	0.407	

Note: All models include commuting zone fixed effects. Clustered standard errors in parentheses. Kleibergen-Paap LM is the Lagrange multiplier test, and the Wu-Hausman p-value is heteroskedasticity-robust test for exogeneity. The null hypothesis is exogeneity. Models use shift-share style instruments for defense and non-defense contract spending. *** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

Next, in Panel A of Table **??** we display estimates for total employment and employment by gender, while Panel B shows employment by education level. Columns 1, 3, and 5 use FY fixed effects, while columns 2, 4, and 6 use state-by-FY fixed effects. Comparing the results for each demographic group to total employment (Panel A columns 1 and 2) show the distributional impacts of the BCA spending reduction. Notably, the demographic groups that were impacted the most by the BCA are males and those with a college education. Each group saw employment decline

between 1.2 - 2.5 jobs per $1 million in spending. Table **??** shows the (estimated) aggregate decline in employment for each demographic group due to the BCAs $51.9 billion reduction in spending between FY 2011 and FY 2015.

Consistent with the results in Table **??** and point to a very modest effect for the sequester. Depending on whether one uses FY fixed effects or state-by-FY fixed effects, we find that aggregate employment declined between 108,000 and 218,000 due to the BCAs procurement spending shock. This is substantially lower than the range of projected job losses made in 2012 (**crs42763**). In addition, we know from the general literature that job losses in recessions tend to be most strongly linked to an individual's occupation and that minorities and women are often employed in industries more susceptible to economic cycles (**hoynes˙2012**). In the case of the sequester, which had a disproportionate effect on defense procurement, our estimates show that job losses were more heavily concentrated among men or those with a college education. This differs somewhat from the experiences of recent downturns that have disproportionately affected the employment opportunities of workers with lower formal education levels (**hoynes˙2012**). Furthermore, our results suggest the importance of the state of the economy and its ability to absorb negative labor demands shocks for different segments of the workforce.

Table 3: Total Federal Procurement Spending and Employment by Sex and Education Levels in CZs, 2011–2015: 2SLS Estimates

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Employment by Gender						
	Total Employment	Total Employment	Female Employment	Female Employment	Male Employment	Male Employment
Total Spending t (millions $)	4.212**	2.092**	1.587**	0.675*	2.492**	1.273**
	(1.805)	(0.864)	(0.685)	(0.396)	(1.166)	(0.537)
Implied $ per job	$237,416	$478,011	$630,119	$1,481,481	$401,284	$785,545
Observations	3,610	3,600	3,610	3,600	3,610	3,600
Time FE	FY	State-FY	FY	State-FY	FY	State-FY
Kleibergen-Paap LM	10.1	13.9	10.1	13.9	10.1	13.9
Kleibergen-Paap LM P-value	0.000	0.000	0.000	0.000	0.000	0.000
Kleibergen-Paap Wald F-stat	224.9	1273.1	224.9	1273.1	224.9	1273.1
Hansen J-statistic	0.000	0.825	0.203	2.261	0.007	0.252
Hansen J-statistic P-value	0.997	0.363	0.652	0.132	0.786	0.615
Wu-Hausman P-value	0.042	0.111	0.066	0.335	0.047	0.065
Panel B: Employment by Education						
	Non-College Employment	Non-College Employment	College Employment	College Employment	Unclassified Employment	Unclassified Employment
Total Spending (millions $)	1.229***	0.584*	2.422**	1.274**	0.561	0.234**
	(0.454)	(0.312)	(1.073)	(0.537)	(0.391)	(0.116)
Implied $ per job	$813,669	1,712,328	412,881	784,929	1,782,531	4,273,504
Observations	3,610	3,600	3,610	3,600	3,610	3,600
Time FE	FY	State-FY	FY	State-FY	FY	State-FY
Kleibergen-Paap LM	10.1	13.9	10.1	13.9	10.1	13.9
Kleibergen-Paap LM P-value	0.006	0.000	0.006	0.000	0.006	0.000
Kleibergen-Paap Wald F-stat	224.9	1273.1	224.9	1273.1	224.9	1273.1
Hansen J-statistic	0.005	0.023	0.430	2.646	0.905	0.000
Hansen J-statistic P-value	0.942	0.878	0.511	0.103	0.341	0.990
Wu-Hausman P-value	0.273	0.914	0.036	0.038	0.021	0.002

Note: All models include commuting zone fixed effects. Clustered standard errors in parentheses. Kleibergen-Paap LM is the Lagrange multiplier test, and the Wu-Hausman p-value is heteroskedasticity-robust test for exogeneity. The null hypothesis is exogeneity. Models use shift-share style instruments for defense and non-defense contract spending. *** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

Table 4: Estimated Impact Employment Loss by Total Employment, Gender, and Education

Outcome Variable	(1) Estimates Using FY	(2) Estimates Using State-by FY	(3) Share of Total Job Losses, FY	(4) Share of Total Job Losses, State-by FY
Total Employment	-218,782	-108,664		
Female Employment	-82,433	-35,061	37.6%	32.3%
Male Employment	-129,441	-66,123	59.1%	60.8%
Non-College Employment	-63,837	-30,334	29.2%	27.9%
College Employment	-125,805	-66,174	57.5%	60.9%
Unclassified Education	-29,139	-12,154	13.3%	11.1%

4 Conclusion

The paper exploits spending limits imposed by the Budget Control Act of 2011 to estimate the effect of federal spending on local employment. Using agency-level variation in spending cuts required by the BCA for identification, we find the cost-per-job estimate at the commuting zone level to be in the range of $237,000 - $478,000. This is considerably higher than the local fiscal multiplier literature in general that typically finds cost-per-job estimates of $125,000 or less. Our estimates are, however, directly inline with those of **gerritse˙jue˙2018**, which is the only other study to estimate the effect of federal contract data from every agency on local outcomes.

Overall, our estimates imply that the BCA reduced total employment in the U.S. in the range of 108,000 - 218,000. This is far less than estimates produced in 2012 suggesting that we would lose more than 2 million jobs. In addition, unlike recent downturns that have disproportionately affected the job prospects of individuals with lower levels of formal education, we find that the majority of job losses due to the sequester were focused on those with college educations. This suggests that shocks to government procurement spending may differ in important and meaningful ways from general shocks to economic activity.