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The American Recovery and Reinvestment Act of 2009: An Investigation into the Determinants of Funds Awarded to the States

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Executive Summary

The American Recovery and Reinvestment Act of 2009 is one of the largest government responses to an economic crisis in the history of the United States. The purpose of this paper is to examine the determinants of the total funds awarded to states by federal agencies in the Recovery Act. A review of budgetary theory, distributive politics, and electoral vote maximization theory provides context of historical determinants of resource allocation by the federal government.

Then from this literature I develop a model including economic and political variables. The dependent variable in my model is the total funds awarded to the fifty states expressed per capita for thirty-four federal agencies between February 17, 2009 and December 31, 2011. I organize the data into a panel for 1700 observations and use regression with agency fixed-effects to control for the average differences across agencies in observable and unobservable ways. I also cluster by state because the variances vary systematically based on unobserved, correlated state characteristics.

The analysis provides strong evidence that four of my chosen independent variables affected the funds awarded in the American Recovery and Reinvestment Act. Economically, the total revenue growth of a state between 2007 and 2008 and the amount of federal aid received per capita have positive and statistically significant relationships with the amount of funds awarded. Politically, the presidential election competitiveness of states and the number of Representatives serving on the House Full Committee on Appropriations have negative and statistically significant relationships with the dependent variable. The results suggest that the awarding of funds in the American Recovery and Reinvestment Act are consistent with the literature indicating that a combination of politics and economics matter in allocating scarce resources among alternative uses.

I. Background

The economic recession that originated in the United States in 2007 and quickly spread across the globe is now referred to as the 'Great Recession'. The unprecedented downturn and financial crisis prompted the United States government to act to unblock the credit markets, provide banks with more capital, and reduce the effects of the recession on its citizens.[1] These actions were formally adopted through the enactment of 1) the Economic Stimulus Act of 2008, 2) the Emergency Economic Stabilization Act of 2008, and finally 3) the American Recovery and Reinvestment Act of 2009.

The magnitude of the legislation was almost as unprecedented as the magnitude of the recession that preceded. The Congressional Budget Office estimates the total cost of the Economic Stimulus Act of 2008, the Emergency Economic Stabilization Act of 2008, and the American Recovery and Reinvestment Act of 2009 as $124 billion[2], $700 billion[3], and $787 billion[4] respectively for a total price tag of $1.6 trillion. Therefore, the size and significance of these laws calls for close examination of their implementation and effectiveness. The purpose of this paper is to examine the determinants of the total funds awarded to the states through the final—and perhaps most controversial—of the three pieces of legislation, the American Recovery and Reinvestment Act of 2009.

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[1] Saving the system. *Economist*. pp.15-16.
[2] CBOa report. H.R. 5140 The Economic Stimulus Act of 2008. p.1
[3] CBOb report. H.R. 1424 The Emergency Economic Stabilization Act of 2008. p.3
[4] CBOc report. H.R. 1 The American Recovery and Reinvestment Act of 2009. p.1

The American Recovery and Reinvestment Act

President Barack Obama signed the American Recovery and Reinvestment Act (ARRA, Recovery Act, or Stimulus) into law on February 17, 2009, just five weeks after he took the oath of office. It was the largest government response to an economic crisis in the history of the United States and quickly captured the attention of the American public because of its size, promise of improvement, and exacerbation of partisan politics.[5]

Although the legislation drew criticism, many Americans agreed the economy, the states, and the people needed help. In 2009, the economy was so bad that 43 states faced budget gaps totaling more than $60 billion.[6] The second quarter of 2009 represented the worst year to year decline in total tax revenue for the combined fifty states in the last 50 years at 16 percent.[7] Given these daunting digits, Nobel laureate Paul Krugman went so far as to say the bill was inadequate and that the Administration did not ask for enough money.[8]

Using $787 billion, the Recovery Act had three main goals: to create and save jobs, to spur economy activity and invest in long-term growth, and to foster unprecedented levels of accountability and transparency in Recovery spending.[9] These goals have been pursued through $288 billion in tax cuts and benefits, $224 billion of funding for entitlement programs, and $275 billion in contract, grant, and loan awards.[10]

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[5] Whatley, C. p.1
[6] Chodrow et al. ""Does State Fiscal Relief During Recessions Increase Employment? Evidence from the American Recovery and Reinvestment Act" p.20
[7] Bradbury, K. "State Government Budgets and the Recovery Act" p.29
[8] Krugman (Op-Ed)
[9] Goals of the Recovery Act, http://www.recovery.gov/About/GetStarted/Pages/WhatisRecoveryAct.aspx .
[10] Ibid.

The allocation of funds for tax cuts and benefits and entitlement programs was largely based on predetermined formulas. According to Whatley (2010), sixty percent of the Recovery Act will go through state governments, which includes $140 billion in budget relief, $100 billion in formula allocation, education funds, social safety net spending and infrastructure funds, and more than $60 billion in competitive grant opportunities.[11] Therefore, a majority of the Stimulus can be explained using formulas for budget relief, Medicaid, education funds, and other social programs.

My research focuses on the $275 billion that was awarded to the fifty states through contracts, grants, and loans because these funds were not prearranged, which provides an opportunity to analyze the awarding determinants. To be clear, the three types of awards are defined in ARRA as follows; a grant is "an award of financial assistance from a federal agency to a recipient to carry out a public project or service authorized by a law of the United States," a contract is "an agreement between a company and the Federal government for the provision of products or services," and a loan is "a temporary provision of funds from a federal agency to a recipient."[12]

Before analyzing the awards, it is important to understand how these funds are transferred to the states. First, Congress appropriates the stimulus funds to federal agencies. Then the federal agencies either make the funds available to state and local governments or send them directly to academia, businesses, or

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[11] Whatley,C. p. 386.
[12] ARRA Glossary. http://www.recovery.gov/FAQ/Pages/glossaryHome.aspx#ghi

organizations.[13] Within the states, state agencies then select projects for the

funding. In my analysis, I am only concerned with what determined the initial

amount awarded to the states by the federal agencies, measured as the sum of funds

awarded by a federal agency to a prime recipient in that state.[14] I do not to look at

the types of projects thereafter or even the final amount allocated because this is

either a function of state policy or bidding processes which I am not inquiring about.

Since the enactment of ARRA, several analyses have been completed

examining national and county level fund distributions. I aim to perform a more

targeted analysis of the determinants of ARRA funding by including up-to-date data

for funds awarded by agency to see if the results differ from prior findings.

The paper is organized as follows. Section II reviews literature on budgetary

theory, congressional dominance theory, electoral vote maximization theory and

looks at applied empirical analyses of federal fund allocation. Section III presents

the research design used for my analysis. Section IV provides the results of the

analysis and Section V draws conclusions, concedes the caveats and limitations, and

suggests opportunities for future research.

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[13] How the Money Moves Overview. http://www.recovery.gov/About/RecoveryInAction/Pages/HowMoneyMoves.aspx
[14] ARRA Glossary.

II. Literature Review

Given the amount of scholarship on budgeting theory and distributive politics, I cannot do justice here to the entire literature. Therefore, I limit this review to studies that summarize the basic concepts most relevant to studying the determinants of fund allocation by the federal government.

Summary of Budgetary Theory

V.O. Key (1940) writes the basic budgeting problem; "On what basis shall it be decided to allocate *x* dollars to activity A instead of activity B?" This means that budget makers must decide how to allocate scarce means among alternative uses because they will never have enough revenue to meet everyone's requests. Since 1940 many competing theories in political, economic, and financial literature have attempted to answer his question. In fact, my research question can be restated as, "On what basis was it decided to award ARRA contract, grant, and loan dollars to state A instead of state B?"

Aaron Wildavksy's answer to Key's question is that funds are allocated as increases or decreases from last year's allocation because of the political process. Jones and McCaffery (1994) summarize the work of Wildavsky, who developed the concept known as incrementalism which means budget makers rarely start a budget completely from scratch. Instead, they look at last year's budget and then focus on small ranges of increases or decreases. From an agency perspective, Wildavsky (1966) says these ranges are small because if agencies ask for too much money compared to last year it may harm their credibility, and if they ask for too little they

will not receive adequate funds. From the legislative perspective, he says budgeting is incremental because Congress works under time constraints and has limited knowledge of agency operations. I imagine that Wildavsky would begin an analysis of ARRA fund determinants by examining last year's allocation of federal contracts, grants, and loans to the states.

Congressional Dominance Theory

Including politics in decisions regarding the distribution of government resources is known as distributive politics. Hamman (1997) defines distributive politics as administrators deciding "who will be assisted, when they will be assisted, and how much assistance they will receive from distributive types of programs," (Hamman 56). This administrative power of Congress and the Executive underlies the discussion of the congressional dominance and electoral vote maximization theories, two possible explanations of ARRA award distributions.

The congressional dominance theory describes Congress's dominant relationship with the bureaucracy and defines decision-making in Congress as self-interested and specialized. According to Weingast (1984) and Moe (1987) the *congressional dominance theory* is that Congress controls the bureaucracy. This control comes from several sources. First, Weingast (1984) says that agencies depend on Congress because Congress has the power to create new agencies and appropriate funds. The theory also reflects politicians' desires to be reelected. Weingast elaborates that in order to increase their chances of reelection, politicians gain influence over a set of issues that are relevant to their constituency. The best

way to increase this chance is through committee assignments in the relevant policy areas. In turn, the committees enjoy oversight over specific agencies. Moe (1987) points out that these committees have jurisdiction over agency budgets and enjoy close relationships with agency personnel. Fiorina (1977) says this causes 'symbiotic (or interdependent) relationships' to develop between federal agencies and congressional committees and subcommittees because the bureaucrats acknowledge that their success depends upon satisfying congressional interests, so they provide benefits to Congress.

The theory has been elaborated to say that Congress also dominates because of institutionalized exchanges of influence and agenda management. Weingast (1988) argues that the committee system has institutionalized exchanges of influence so that members do not need to trade votes per se. Holcombe (1991) contends that the institutionalization is effective. He says the committees and the seniority system of assignments subdivide property rights causing the agenda to be better managed. While effective, the committee system intensifies electoral incentives, because the theory is still based on the legislators' motivation to be reelected.

Finally, public discourse often uses partisan politics in Congress to explain the distribution of funds because the party that holds the majority in Congress controls the power of the purse. However, this is not always the case. To see if this was true, Balla (2002) analyzed the politics of appropriations earmarks to institutions of higher education between 1995 and 2000. He claimed there is a collective action problem in appropriating funds because members of the majority

and minority parties would like to secure money for their constituencies but would like to avoid being blamed for wastefulness. Balla confirmed his claim and found that the majority party gave the minority party some money; this finding supports his blame avoidance explanation. Another factor that mitigates partisan politics is spillover effects between congressional districts. Levitt and Snyder (1997) point out that because the benefits of grants are not restricted within district lines, state delegations or members from the same region work together, across party lines, to advocate for grant awards. Therefore, spillover effects and blame avoidance leave party politics as a poor explanation for why funds are awarded by Congress. In sum, the congressional dominance theory contends that the incentive to be reelected, the exchange of influence, agenda management, and the symbiotic relationship with agencies cause Congress to control federal agencies and ultimately resource distribution.

Electoral Vote Maximization Theory

In contrast to the theory that Congress has influence over the allocation of government expenditures and the bureaucracy, the electoral vote maximization theory assigns significant influence to the president and the executive branch. Wright (1974) and Bertelli and Grose (2009) agree that the president influences allocations. Wright argues that "interstate inequalities in per capita federal spending can be explained in large part as a result of a process of (the president) maximizing expected electoral votes," (Wright 30). To test the theory, Wright examined the allocation of jobs by state by the Works Progress Administration in

the New Deal. His analysis included variables reflecting economic distress (fall in income, per capita relief, and unemployment) as well as political factors (electoral votes per capita, standard deviation of Democratic share, and an index of political productivity) of 48 states. He found that jobs were allocated as a result of the interaction between political and economic forces because political productivity, the standard deviation of Democratic share, unemployment rate, and relief cases shared statistically significant relationships with work-relief jobs in either the 1936 or the 1940 model.

Similarly, Bertelli and Grose (2009) find that the president plays an important role. One of three hypotheses tested in the study was "as the electoral competitiveness of a state in the presidential election increases (decreases), the amount of grant dollars allocated to that state likewise increases (decreases). If grants are allocated to safe constituencies, this relationship will be reversed," (Bertelli 932). Bertelli and Grose use Department of Labor (DOL) discretionary grant outlays and Department of Defense (DOD) procurement contracts from 1992-2002 as dependent variables in two models to determine what influenced the allocation to states. The results found that the presidential election competitiveness of a state (measured by the number of electoral votes in that state divided by the absolute margin between the two major party presidential candidates in the previous election) shared a negative and statistically significant relationship with grant outlays from the DOL. The negative relationship signifies that the DOL grants rewarded the president's supporters and not competitive electoral states. However,

the same was not true for DOD contracts so generalizability across all federal agencies was not achieved in the study.

In contrast, Hamman (1997) assessed the processing time for Urban Mass Transit Administration discretionary capital assistance grants during the Nixon-Ford, Carter, and Reagan administrations to analyze whether presidents influence bureaucrats to distribute funds to enhance their reelection chances. They analyzed political variables (election year, presidential support, grant size, and congressional committee membership and seniority,) and found Congress and bureaucrats better explain distributive politics. They concluded by saying that while presidents do not explain the amount of allocations, they may influence bureaucrats with regard to the timing of assistance grants.

Applied Analyses

Finally, three studies on stimulus fund allocation, one from the New Deal and two from the American Recovery and Reinvestment Act, are relevant to my research. First, Anderson (1991) applied the aforementioned theories to examine what determined the allocation of resources in the New Deal. Anderson analyzed the determinants of the $27.4 billion dollars of federal spending in the New Deal between 1933 and 1939, which were largely supposed to be allocated according to economic need. Unlike other studies, he controlled for the number of highway miles, the amount of federal land, and the farm value of the states in addition to the usual unemployment, state income, committee assignments, and congressional tenure variables to test his hypotheses. The results of six models found that political

factors played a role. In particular, the tenure of the senators and representatives on the appropriations committee and the electoral votes per capita in the states were important. Also, the economic situation in the states had a weak relationship with the New Deal program allocations. Anderson's analysis suggests that New Deal spending was partially motivated by need and partly by political influence.

More recently, Gimpel et al. (2010) reviewed similar literature to examine the geographic distribution of the American Recovery and Reinvestment Act spending. The analysis was done at the county level across all fifty states and tested two explanations of why the government fails to distribute resources according to need. First, they believe that political and institutional factors such as legislative leadership, presidential influence, and majority parties can explain why funds are allocated. Second, Gimpel cites John Kingdon's policy process theory that problems, policy solutions, and politics come together—at times haphazardly—to form policy when windows of opportunity present themselves to policymakers. They claim that legislators used the economic crisis as a policy window and took the opportunity to seek funding for their constituencies. They found that funds were poorly targeted to economic need. There is potential bias in their analysis because 1) they left out the state capital counties and 2) they fail to distinguish if the allocations to counties were distributed at the federal or state level. This distinction is important because it could be that state governments failed to distribute funds by need, not the Federal government.

Young and Sobel (2010) examine what factors affect the ARRA allocations at the state level for both agency-reported data (funds announced, funds made

available, funds paid out) and recipient-reported data (funds awarded and funds received) between February 2009 and April 2010. They accounted for demographic, economic, and political variables but with 17 predictors and only 50 observations they ran separate models based on these categories. In the main regression that incorporated variables from each, Young and Sobel found population, federal aid from 2008, the average tenure of members serving in the House of Representatives and Senate, and whether Obama won in 2008 to be statistically significant. However, only population was statistically significant across all five types of fund measures and the Senate tenure had a negative effect. In all, they conclude that it was a poorly designed countercyclical policy because the gross domestic product and unemployment variables were not significant. However, this analysis can be improved upon because only a portion of the funds were awarded at the time it was written and the significance of the variables vary among the five types of allocations, so the results lack explanatory power.

In sum, the literature shows that federal fund allocation determinants vary across time just as stakeholders, public opinion, and economic conditions change over time. The literature and previous models direct my statistical inquiry on the determinants of the funds awarded by agency for the American Recovery and Reinvestment Act.

IV. Research Design

My null hypothesis (H_0) is that unemployment, income, tax effort, and congressional and presidential political variables have no effect on ARRA funds awarded by agency per capita. Funds are defined per capita because a neutral allocation would not be equal across states, rather it would be equal across people. The alternative hypothesis (H_1) is that these variables have an effect on how ARRA funds were awarded by agency per capita. The federal source agencies of the awards to the fifty states serve as the primary units of analysis in my model. Prior to my analysis, I expected to reject the null hypothesis, as the literature suggests that federal fund allocation is not only determined by need because other political and economic differences matter.

Data Collection

The total funds awarded by agency per capita at the state level will serve as the dependent variable in my model because it is the outcome of interest. I collected these data from recovery.gov in cumulative amounts by state between February 17, 2009 and December 31, 2011 and disaggregated them by agency. When I accessed the data, they were current as of February 29, 2012. Recovery information is reported in agency and recipient formats and I use recipient reported data because it includes the dollar amounts collected from recipients of federal contract, grant, and loan awards. The agency reported data includes the entitlements and tax benefits, which are not the focus of my research. The data were collected and organized into a panel dataset with an observation being a state and an agency.

Thirty-four federal agencies allocated money to the states in ARRA; therefore my sample size has 1700 observations (50 states by 34 agencies).

My model also controls for a common series of economic and political variables. The majority of this model replicates the design that Dr. Andrew T. Young used in his 2010 paper "Recovery and Reinvestment Act Spending at the State Level: Keynesian Stimulus or Distributive Politics?"[15] However, my model disaggregates the total funds to analyze total funds by agency and instead of including population as an independent variable, I account for it by using funds per capita. I do this because larger states clearly received more money, but the question is whether they received more per person.

First, the January 2009 seasonally adjusted unemployment rate, determined by the Bureau of Labor Statistics http://www.bls.gov/,[16] is included in the model to determine if the level of unemployment affected the amount of awards a state received. I predict the unemployment rate will share a positive relationship with funds awarded because the goal of the Stimulus was to reduce the effects of the recession on the population. Then, the state tax revenue growth as a percentage increase or decrease between FY2007 and FY2008 cited from the U.S. Census Bureau's 2007 and 2008 Annual Survey of State Government Tax Collections is included to account for the condition of tax revenue in the states. I expect this will share a negative relationship with funds awarded because higher revenue growth

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[15] Dr. Andrew Young of the University of West Virginia was kind enough to share his dataset 'Public Choice' used for his 2010 publication "Recovery and Reinvestment Act Spending at the State Level: Keynesian Stimulus or Distributive Politics?" for use on my Capstone. All sources listed are where they originally came from.
[16] See Appendix A for BLS definitions of seasonally adjusted unemployment rate.

may indicate that the state was less affected by the recession, had strong tax collection efforts, or maintained a strong tax base.

Then, the per capita gross domestic product for 2008 measured in real dollars—which adjusts for inflation based on national prices for goods and services within each state—is included in the model. The average change in state gross domestic product between 2006 and 2008, measured as a percent increase or decrease is also included. Data were collected using the Bureau of Economic Analysis Gross Domestic Product by State Interactive Map application.[17]

Finally, the total amount of grants and payments that the states received from the federal government in 2008 is also controlled for because incremental budgeting theory suggests that aid received last year affects how much is allocated this year. It also gives a better indication of the relationship between the severity of the earlier part of the recession and the relief the states received prior to ARRA. This measure can also be interpreted as the state's previous ability to capture federal aid, so including it in the model is important. The measure was provided by the Census Bureau.

The economic variables must be controlled for in the model because they may explain the amount of funds awarded by agency. If the Stimulus was based on need, states experiencing slower growth would receive more funds.

Then, congressional and presidential variables are included in the model to test the theories of congressional dominance and electoral vote maximization. To control for the effect of seniority and experience, the average tenure by state of

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[17] Gross Domestic Product by State (GDP by State) Interactive Map. http://www.bea.gov/regional/gdpmap/.

members of the U.S. House of Representatives and Senate serving in the 111th

Congress is included from the data provided by Young (2010). Level of tenure can

correlate with important committee assignments and lack of party competition in

the home district or state. Hence, I predict that a state with a higher average tenure

would be better off competing for funds in ARRA. Then, variables for the number of

Representatives and Senators who serve on the appropriations committees by state

was accessed from www.nationaljournal.com and included in the model. The

congressional dominance theory suggests that membership on an appropriations

committee influences the allocation of federal outlays so I predict these will have

positive relationships with the amount of funds awarded. Initial testing of the

appropriations subcommittee memberships found no relationship with the

dependent variable and collinearity with other political and economic factors and

therefore they were not included in the final model.

Political variables associated with the president are included because

according to the electoral vote maximization theory and Young (2010), a president

may allocate resources to either reward states for their support in past elections or

to influence them for future elections. A dummy variable is included for whether

President Obama won the state in the 2008 presidential election. Then, I used a

measure called the 'presidential election competitiveness' using Bertelli's (2009)

formula. The measure is the number of electoral votes in the state divided by the

absolute margin—measured as a percentage—between the two major party

candidates in the 2008 presidential election (Obama and McCain). Large values

indicate significant battleground states and smaller values indicate uncompetitive states or states with few electoral votes.

For example, Missouri has 11 electoral votes, and Obama won 49.3% of the popular vote while McCain won 49.4%, allowing for a very small margin and a total PEC equal to 8725. Then, California has 55 electoral votes, but Obama won 61% of the popular vote and McCain won 37%. Therefore, the PEC for California is 228, much smaller than Missouri's, even though there are a lot more electoral votes at stake there. According to Bertelli, this effect should be positive if grants are allocated to important, electoral battleground states (like Missouri), but negative if the President's electoral goals are met by rewarding states having offered strong previous support (like California). I expect the administration used spending to reward the states that voted for Obama in 2008 and were strongly supportive, like California. Hence, I anticipate a positive and negative relationship for these presidential predictors respectively. The presidential election information was provided by the Federal Election Commission at www.fec.gov.

I believe that these variables are all reliable measures (not subject to any significant measurement error) of the phenomena I wish to control for in the model because they are not based on random components and they come from government sources. *All definitions and links to data sources can be found in the References section.*

Table 1 provides the descriptions of all the variables included in the final model with their abbreviations, descriptions, expected signs, and sources.

Table 1. Variable Descriptions

Name	Description	Ex. Sign	Source
Dependent Variable			
Y	Total funds awarded by agency per capita (dollars per capita)	N/A	www.recovery.gov
Independent Variables			
SAUR09b	January 2009 Seasonally Adjusted Unemployment Rate (percentage)	(+)	www.bls.gov
TRG0708	Tax revenue growth from 2007 to 2008 (percentage)	(-)	www.census.gov
RPCGDP08	Real per capita gross domestic product in 2008 (dollars per capita)	(-)	www.bea.gov
A0608GDP	Average GDP growth in the states between 2006 to 2008 (percentage)	(-)	www.bea.gov
FedAid_pc	Per capita federal aid to state and local governments in 2008 (dollars per capita)	(+)	www.census.gov
AvHouseT	Average House tenure (years)	(+)	Young (2010)
ASenateT	Average Senate tenure (years)	(+)	Young (2010)
SCAT	Number of Senators on the Full Committee on Appropriations	(+)	Young (2010)
HRCAT	Number of Representatives on the Full Committee on Appropriations	(+)	Young (2010)
PEC	Presidential election competitiveness	(-)	www.fec.gov
Obama08	Voted for Obama in 2008 (dummy variable either 0 or 1)	(+)	www.fec.gov

Ex. Sign = expected sign
(+) = positive effect
(-) = negative effect
N/A= not applicable

Research Model

Instead of using ordinary least squares (OLS) regression models for each of the thirty-four agencies to observe the effects, I created a panel dataset. Panel data observe the dependent variables across time for a set of units, here states, more than once. In my case, the states are observed repeatedly for various federal agencies. The sample size of my analysis is the number of agencies, 34, times the number of states, 50, so the total number of observations is 1700. The dependent variable, *y*, is now funds awarded by a particular agency in a particular state, expressed per capita.

Organizing the data as a panel allowed me to use a fixed-effects regression model, which holds constant (or fixes) the average effects for each agency. By doing this, I controlled for the average differences across agencies in observable and unobservable ways, most importantly the large size differences, therefore leaving behind the within-agency differences. This helps to reduce the threat of omitted variable bias and prevent large agencies from dominating the estimation. So, if the

funds awarded were equal across all states then the dependent variable would not vary across states but it would across agencies because they vary in size.

The model is specified as:

$$Y_{ia} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \alpha_a + \varepsilon$$

Where Y_{ia} denotes the funds awarded to a particular state i for agency a, $X_1 - X_{11}$ represent the eleven independent variables, α is the fixed effect of the agency, representing size, purpose, and other fixed characteristics, and ε denotes the random error in the model. Table 2 provides the summary statistics for all of the independent variables in the model.

Table 2. Summary Statistics

Variable	Obs	Mean	St. Dev.	Min	Max
Total funds awarded by agency per capita (dollars per capita)	50	$21.37	$26.26	$0.00	$126.74
January 2009 Seasonally Adjusted Unemployment Rate (percentage)	50	7.16%	1.80%	3.70%	11.60%
Tax revenue growth from 2007 to 2008 (percentage)	50	4.31%	9.10%	-6.80%	59.13%
Real per capita gross domestic product in 2008 (dollars per capita)	50	$ 36,408.00	$ 6,520.95	$ 24,403.65	$ 56,401.84
Average GDP growth in the states between 2006 to 2008 (percentage)	50	0.70%	1.59%	-2.27%	6.77%
Per capita federal aid to state and local governments in 2008 (dollars per capita)	50	$ 1.69	$ 0.65	$ 0.99	$ 4.38
Average House tenure (years)	50	8.00	5.71	0	36.00
Average Senate tenure (years)	50	12.09	8.61	0	37.00
Number of Senators on the Full Committee on Appropriations	50	0.5800	0.4985	0	1
Number of Representatives on the Full Committee on Appropriations	50	1.3200	1.5964	0	7
Presidential election competitiveness	50	348.46	1286.96	8.84	8725.00
Voted for Obama in 2008 (dummy variable either 0 or 1)	50	0.5800	0.4985	0	1

Obs= Number of Observations
St. Dev= Standard Deviation

IV. Results

Based on the results presented in Table 3, the model shows that four variables have a significant influence on the funds awarded by agency per capita. First, if the awards are equal per person across all states, 'y' would not vary across states. But it would vary across agencies, because they vary in size from small to large. In my analysis, I find that the allocation is not equal across states.

Table 3. Results

Variables	Total funds awarded by agency per capita (dollars per capita)	
	Coefficient	Standard Error
January 2009 Seasonally Adjusted Unemployment Rate (percentage)	1.002	-71.99
Tax revenue growth from 2007 to 2008 (percentage)	0.7655***	-15.23
Real per capita gross domestic product in 2008 (dollars per capita)	0.000026	-0.000183
Average GDP growth in the states between 2006 to 2008 (percentage)	0.9459	-82.71
Per capita federal aid to state and local governments in 2008 (dollars per capita)	5.596***	-2.086
Average House tenure (years)	0.287	-0.253
Average Senate tenure (years)	-0.041	-0.106
Number of Senators on the Full Committee on Appropriations	0.651	-2.334
Number of Representatives on the Full Committee on Appropriations	-2.132***	-0.636
Presidential election competitiveness	-0.000741***	-0.000242
Voted for Obama in 2008 (dummy variable either 0 or 1)	0.371	-2.47
Constant	-4.319	10.11

Observations = 1700
R-Squared = 0.749
Standard Errors are Robust
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

First, the state tax revenue growth as a percentage increase or decrease between FY2007 and FY2008 shares a positive and statistically significant

relationship with agency funds awarded at the 0.01 level. For every one percent increase in state tax revenue growth between 2007 and 2008, the total funds awarded by agency per capita increased by $0.76. I expected the relationship to be negative, or at least statistically insignificant, and this is not the case. The results indicate that states that were in better conditions as far as tax collection efforts received more money from ARRA than states that experienced poor tax collection efforts.

Next, the total amount of grants and payments that the states received from the federal government in 2008 also shares a positive and statistically significant relationship with stimulus funds at the 0.01 level. The results show that for every one dollar increase in federal aid per capita in 2008, funds awarded by agency per capita increased by $5.60. This was not surprising as I expected that states who had previously received substantial federal aid, due to need or from previous political extraction ability, would also receive awards in ARRA.

The results also indicate that the number of representatives on the House full committee on appropriations shares a negative and statistically significant relationship with the total funds awarded by agency per capita at the 0.01 level. For every one member increase in the number of representatives on the committee, funds awarded by agency per capita decreased by $2.13. This is opposite of the congressional dominance theory prediction, that appropriations committee assignments help politicians distribute resources to their constituencies.

Finally, the presidential election competitiveness shares a negative and statistically significant relationship with the total funds awarded by agency per

capita. The standard deviation for this measure (1286), multiplied by the coefficient (-0.000741), indicates that for every one standard deviation change in the PEC, funds awarded by agency per capita decreases by $0.95. This measure is significant at the 0.01 level. I expected this variable to share a negative relationship because Bertelli says a negative relationship means that the president's electoral goals were met by rewarding the states that had the least pay off electorally, previously offered strong support, or were small states. It is logical that he rewarded recent supporters because the ARRA fund awards were given just months after the election and years away from the next presidential election.

Some of the variables that I expected to have a significant influence on the funds awarded did not.   For example, the seasonally adjusted unemployment rate and the real per capita gross domestic product were insignificant in determining where the money was awarded. The major goals of the ARRA were to create and save jobs and spur economic activity, so I expected funds to be targeted towards the hardest hit states, and this is not what the results show. Also, the average tenure of the Representatives and Senators in states were insignificant which I thought would have a significant impact on where money was awarded because I thought seniority would enhance a state's ability to compete for funds.

Discussion

To answer my question, if politics or economics mattered in determining ARRA awards, I must consider the substance of the results. But this is a matter of interpretation because the significance of the coefficients has different meanings to

different audiences. For example, a predicted $2.13 decrease in awards by agency

per capita given one more representative on the appropriations committee by state

may appear to be insignificant. But if the state has a population of 5 million people,

this translates into $10.65 million less than a state with one less representative and

the same population. To me, these results are substantively insignificant and

counterintuitive because congressional dominance theory suggests that

representatives request appropriations committee assignments due to the power of

the purse. Yet, I can also interpret this result as possible validation of the blame

avoidance theory. In this light, representatives on the appropriations committee

might have (although unlikely) diverted funds from their districts to avoid

accusations that they allocated funds unfairly.

Overall, the political variables of whether Obama won in 2008 and the tenure

in the House and Senate did not matter. What did matter was the representation on

the House appropriations committee, but it had a negative effect on funds awarded

as mentioned. The negative relationship between funds and competitiveness of the

state has several interpretations so the substantive significance is harder to

determine. It can be interpreted that Obama's electoral goals were met as a result of

1) rewarding states that strongly supported him in 2008, 2) rewarding small states,

or 3) rewarding states with the least pay off electorally. No matter the explanation,

a decrease of $0.95 per capita lacks substance when you compare it to the billions

awarded in the Stimulus.

Economically, the gross domestic product measures for states and

individuals and unemployment rates were not statistically significant so ARRA

awards do not seem to have been a response to need. The tax revenue growth result can be interpreted in this way.

To illustrate, for every one percent increase in a state's tax revenue growth between 2007 and 2008, the total funds awarded by agency per capita increased by $0.76. Using a similar metric, if a state with a population of 5 million people grew its tax revenues by one percent between 2007 and 2008, it received $3.83 million more than a state with one less percent growth in revenue with the same population. This indicates that the rich states, relative in terms of marginal tax revenue growth in that year, got richer. This may be a result of 1) a state's strong ability to collect taxes from their constituency, 2) a state's relative tax base growth, or 3) a state's capacity to absorb or collect federal grants, loans, and contracts and carry out projects. The results do not distinguish between these explanations, but regardless, the Stimulus rewarded states for their tax effort.

Because of the variation of explanations, some may argue that the economic measures included do not correlate with a state's capacity to save or create jobs and to spur economic activity. Given that these were the goals of the Recovery Act, the states that were worse off may not have been the policymakers' perceived best place to award scarce funds. Nonetheless, the economic variables that did matter were the federal aid per capita and tax revenue growth. The federal aid per capita is consistent with Wildavsky's theory of incrementalism because agency awards are partly explained by last year's allocation. While $5.56 more per capita is the largest magnitude among the statistically significant variables, it is also not a controversial finding and was expected.

In sum, four economic and political variables are statistically significant in the model but they lack substantive significance in dollar terms. The majority of the variation in funds awarded is explained by agencies. The fixed-effects analysis gave a rho value of 0.749, indicating that 74.9% of the variance is due to, or explained by, the differences across agencies. This is not surprising, as agencies vary in size. Therefore, economics and politics did not matter in practical terms but should not be discounted given the strength of the analysis. Regardless of interpretation, I hope that the findings have added to the literature on the legislation and encourage future research.

Defense of Results

The empirical results have descriptive power because the methodology I use preserves internal validity so I am confident that I have uncovered causal effects of the variables. The F value is <0.001, which shows that some of the coefficients in the model are statistically significantly different from zero and things unique to each agency are quite important.

My results are generalizable within the United States because I included all fifty states and their characteristics in my analysis. However, the results are not generalizable to other times and settings because the stakeholders involved in policymaking are always changing and this analysis only regards the ARRA as of February 29, 2012.

The fixed-effects model yields lower standard errors than would otherwise be observed in ordinary least squares because it is only using the within-agency

variation. In my model I clustered by state. This corrects for the shared variance

arising from repeated observation of states, i.e. non-independent observations.

The fixed-effects of the agencies allow for interpretation that the remaining

coefficients and p-values have descriptive power. The methodology and

characteristics of the model allow me to say with confidence that it is unlikely that I

got these p-values and t-statistics with the means, null effects, and standard errors

in a world where the null hypothesis is true. Therefore, I reject the null hypothesis

that unemployment, income, tax effort, and congressional and presidential political

variables have no effect on ARRA funds awarded by agency per capita. *The complete*

regression results with agency descriptive statistics can be found in Appendix A.

V. Conclusion

The results of my analysis show that state tax revenue growth between 2007

and 2008, federal aid per capita in 2008, number of representatives on the full

Committee on Appropriations, and the presidential election competitiveness predict

the total funds awarded to states by agency per capita in the American Recovery and

Reinvestment Act of 2009. However, these findings lack substantive significance in

dollar terms and the majority of the variation in awards is explained by differences

in agencies.

Caveats and Limitations

Like any analysis, there are limitations and caveats. A limitation of my

analysis is the selection of measures and variables included in my model. I collected

data on levels and year to year changes for most of the economic variables and ran

correlation tests on them. The correlation tests measured the strength and direction of the linear relationships between variables. For example, the correlation between the seasonally adjusted unemployment rate in 2009 and the change in unemployment rates between 2008 and 2009 was 0.8895. Based on this high correlation, I only included the seasonally adjusted measure in the final model. Different combinations of measures on unemployment, income, and tax revenue growth might produce different results.

There are likely other variables that were not included in the model that could explain the total awards by agency, namely agency characteristics and the job creation ability of states. I did not include agency characteristics as predictors because the congressional dominance theory says Congress controls agencies, therefore I only included Congressional predictors. I also controlled for observable and unobservable agency characteristics using the fixed effects model but this does not account for all agency factors. Then, an ideal variable to include in my model would be a measure of a state's capacity to save or create jobs and to spur economic activity. Such measures do not exist at a state aggregated level. If they did, they may explain if the distribution of funds was based on the stated goals of the Act better than the other economic independent variables.

Finally, a dataset that disaggregates the funds awarded by year and agency between 2009 and 2011, not just the overall total, would have created a better panel data set. This would also require using data and predictors that match the funds awarded year to year such as committee assignment changes and House and Senate seat changes from the 2010 midterm elections.

Opportunities for Future Research

        There are many opportunities for future research. One would be to create the disaggregated (by year) panel dataset mentioned and use models similar to those used here.

        Another avenue for research would be to study state legislatures in relation to ARRA. I only focused on the legislative and executive branch of the Federal government. The dynamics between state governors and Federal agencies, state government and the president, or internal state determinants of ARRA awards would be interesting to investigate.

        Using the number of awards, total funds received, or job creation as dependent variables would be another possibility to explore in the future. Ultimately, the third goal of the Recovery Act, 'to foster unprecedented levels of accountability and transparency in Recovery spending' was accomplished and will make future research possible because of the amount and detail of the data publically disclosed on recovery.gov.

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Data Sources and Definitions

Total Funds Awarded by Agency:
> State/Territory Totals by Agency. Recovery.gov. http://www.recovery.gov/Transparency/RecipientReportedData/Pages/StateTotalsByAgency.aspx. Accessed February 29, 2012.

January 2009 Seasonally Adjusted Unemployment Rate:
> Bureau of Labor Statistics. (2009, March 11). United States Department of Labor. http://www.bls.gov/news.release/archives/laus_03112009.pdf

> Definitions from bls.gov: Unemployed persons are those who were not employed during the reference week (based on the definition above), had actively looked for a job sometime in the 4-week period ending with the reference week, and were currently available for work; persons on layoff expecting recall need not be looking for work to be counted as unemployed. The labor force is the sum of employed and unemployed persons. The unemployment rate is the number of unemployed as a percent of the labor force. *Seasonal adjustment.* Seasonal adjustment of modeled estimates of employment and unemployment levels is performed within the modeling procedure. Series are decomposed into trend, seasonal, and irregular components and survey error. This directly yields seasonally adjusted estimates for employment and unemployment levels with reliability measures. Labor force levels and unemployment rates are calculated from these two estimates.

Tax revenue growth from 2007 to 2008:
> United States Census Bureau. The 2008 Annual Survey of State Government Tax Collections and the 2007 Annual Survey of State Government Tax Collections. http://www.census.gov/govs/statetax/.
> U.S. Census Bureau definition of taxes: In this survey, "taxes" are defined as all compulsory contributions exacted by a government for public purposes, except employer and employee assessments for retirement and social insurance purposes, which are classified as insurance trust revenue. Calculation: A percent change calculation was performed for the growth.:

Real per capita gross domestic product in 2008 and Average GDP growth in the states between 2006 to 2008:

Bureau of Labor Statistics Interactive Map. Gross Domestic Product by State (GDP by State) Interactive Map. http://www.bea.gov/regional/gdpmap/. To compute real GDP by state BLS applies national chain-weighted price deflators to current-dollar GDP by state estimates. Methodologies found at: http://www.bea.gov/regional/docs/GDPState/methods.cfm.

Per capita federal aid to state and local governments in 2008:
The Census Bureau. Table 1. Federal Government Grants and Other Payments to State and Local Governments, by Agency and for Selected Programs, by State and Outlying Area: Fiscal Year 2008. http://www.census.gov/prod/2009pubs/fas-08.pdf

Presidential election competitiveness:
The measure is the number of electoral votes in the state divided by the absolute margin between the two major party candidates in the 2008 election (Obama and McCain). Statistics provided by the Federal Election Commission, Office of Communications, Public Disclosure Division, "2008 Presidential Electoral and Popular Vote" http://www.fec.gov/pubrec/fe2008/tables2008.pdf pp.1-11.

Voted for Obama in 2008:
This variable assigned a 0 for states that Obama lost in the 2008 presidential election and a 1 for states that Obama won. The information was provided by the same source as the presidential election competitiveness measure.

Appendix

A.   Descriptive Statistics for Independent Variables and Fixed Agencies

Y	Coef.	Err.	T-stat	P-value	95% Conf. Int.	
January 2009 Seasonally Adjusted Unemployment Rate	100.16	71.99	1.39	0.17	-44.51	244.83
Tax revenue growth from 2007 to 2008	76.55	15.23	5.03	0.00	45.95	107.15
Real per capita gross domestic product in 2008	0.00	0.00	0.14	0.89	0.00	0.00
Average GDP growth in the states between 2006 to 2008	94.59	82.71	1.14	0.26	-71.62	260.80
Per capita federal aid to state and local governments in 2008	5.60	2.09	2.68	0.01	1.40	9.79
Average House tenure	0.29	0.25	1.14	0.26	-0.22	0.80
Average Senate tenure	-0.04	0.11	-0.39	0.70	-0.25	0.17
Presidential election competitiveness	0.00	0.00	-3.06	0.00	0.00	0.00
Voted for Obama in 2008	0.37	2.47	0.15	0.88	-4.59	5.33
Number of Senators on the Full Committee on Appropriations	0.65	2.33	0.28	0.78	-4.04	5.34
Number of Representatives on the Full Committee on Appropriations	-2.13	0.64	-3.35	0.00	-3.41	-0.85
Totall ARRA Funds Awarded by:						
Corps of Engineers	4.86	3.71	1.31	0.20	-2.59	12.32
Department of Agriculture	50.98	10.08	5.06	0.00	30.73	71.23
Department of Commerce	12.39	3.90	3.18	0.00	4.56	20.23
Department of Defense (except military departments)	-13.18	1.40	-9.44	0.00	-15.98	-10.37
Department of Education	259.25	8.53	30.39	0.00	242.11	276.40
Department of Energy	128.52	15.37	8.36	0.00	97.64	159.40
Department of Health and Human Services	75.32	10.69	7.05	0.00	53.85	96.80
Department of Homeland Security	-5.77	2.21	-2.61	0.01	-10.22	-1.32
Department of Housing and Urban Development	21.58	2.68	8.05	0.00	16.19	26.97
Department of Labor	-0.48	1.33	-0.36	0.72	-3.16	2.19
Department of State	-14.59	1.73	-8.42	0.00	-18.07	-11.10
Department of the Air Force	-3.56	3.95	-0.90	0.37	-11.50	4.39
Department of the Army	-3.51	3.90	-0.90	0.37	-11.35	4.32
Department of the Interior	7.75	6.07	1.28	0.21	-4.46	19.95
Department of the Navy	-11.73	2.13	-5.52	0.00	-16.00	-7.46
Department of the Treasury	-9.55	5.64	-1.69	0.10	-20.88	1.78
Department of Transportation	159.53	11.82	13.50	0.00	135.78	183.29
Department of Veterans Affairs	-10.21	1.39	-7.34	0.00	-13.01	-7.42
Environmental Protection Agency	18.06	2.62	6.90	0.00	12.80	23.32
Executive Office of the President	-16.51	1.38	-11.93	0.00	-19.29	-13.73
Federal Communications Commission	-16.31	1.40	-11.62	0.00	-19.13	-13.49
General Services Administration	1.52	3.05	0.50	0.62	-4.61	7.64
Government Accountability Office	-16.48	1.38	-11.90	0.00	-19.26	-13.70
National Aeronautics and Space Administration	-13.83	1.94	-7.14	0.00	-17.72	-9.93
National Foundation on the Appropriations Arts and the Humanities	-16.27	1.37	-11.88	0.00	-19.03	-13.52
National Science Foundation	-2.08	4.82	-0.43	0.67	-11.76	7.59
Other Independent Agencies	-16.02	1.39	-11.52	0.00	-18.82	-13.23
Small Business Administration	-16.14	1.39	-11.59	0.00	-18.94	-13.34
Smithsonian Institution	-16.49	1.38	-11.91	0.00	-19.27	-13.71
Social Security Administration	-16.33	1.39	-11.75	0.00	-19.13	-13.54
The Legislative Branch	-16.48	1.39	-11.90	0.00	-19.26	-13.70
U.S. Agency for International Development	-16.40	1.40	-11.70	0.00	-19.21	-13.58
U.S. Tax Court	-16.51	1.38	-11.93	0.00	-19.29	-13.73
Constant	-4.32	10.11	-0.43	0.67	-24.63	15.99

Coef = coefficient

Err = Robust Standard Error

T-stat = t-statistic

95% Conf. Int. = 95% Confidence Interval