Walking in the Shadow of Pressman and Wildavsky: Expanding Fiscal Federalism and Goal Congruence Theories to Single-Shot Games Utilizing a Bayesian Multivariate Frailty Model

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We advance and test a theory of goal congruence and compliance in single shot games building upon fiscal federalism and the study of grant management. We combine the insights from Pressman and Wildavsky's classic work with concepts of goal congruence from principal agent theory to examine single shot grant games. One time grants require local political institutions and administrative structures to foster credible commitments between federal and local authorities. The alignment of administrative institutions and goals is hypothesized to condition agent compliance with unwritten intentions.

Analyses of administrative records from the U.S. Department of Energy and a national survey of local government recipients of DOE grants predict goal congruence and compliance. Since the goal of the federal government is to rapidly stimulate the economy and produce gains in energy efficiency, we investigate goal displacement as evidenced by delay in expending grant funds. We employ a Bayesian multivariate survival model to estimate the time from receipt of a stimulus grant until the funds are expended. An additive gamma frailty term is used to decompose city effects. We find compelling evidence that effective grant management is a significant factor in limiting delays.

Expanding Fiscal Federalism and Goal Congruence Theories to Single-Shot Games Utilizing a Bayesian Multivariate Frailty Model

When PA scholars reflect on Jeffrey Pressman and Aaron Wildavsky's (1973) classic *Implementation*, often the first, and all too frequently the last, remembrance is that it is impossible to separate implementation from policy. This insight spurred research on how the management of public programs impacts performance, but has also overshadowed other contributions of their case study, such as the insight that program delay is a feature of policy failure, grant management plays an important role in producing successful policies, organizational design is critical to achieving desired policy outcomes, and technically competent personnel are necessary to implement policy. One contribution that has been almost completely overlooked is that this work provides the first detailed examination of single-shot grants. The Economic Development Administration (EDA) in Pressman and Wildavsky's study was intended to stimulate employment and rejuvenate the stagnant economy of Oakland and other communities through a onetime federal investment in economic development infrastructure. While governments have continued to employ single rounds of grant funding to stimulate economic conditions since the EDA, there is a dearth of theory and empirical investigation related to single-shot grants.

The recommendations that Pressman and Wildavsky derived from their analysis of implementation failures in the Oakland program provide our initial framework for developing a theory of single-shot grant games that delineates distinct factors that influence outcomes in single shot versus repeated play grant games. We expand and extend their insights to produce a more general theory of compliance in single-shot grant situations, with insights from fiscal federalism and principal agent theory. Following Pressman and Wildavsky, we submit that grant management with clear guidance from the principal is a key to achieving outcomes in single-shot

games because of the inability to rectify mistakes through repeated interactions. Fiscal federalism research argues that goal congruence is a major factor in achieving congruity. We build upon this insight and offer an improved measure of the construct, acknowledging that goal congruence is not a sufficient condition for achieving compliance in single shot games. Moreover, the current literature on fiscal federalism is silent on the role of local political institutions in determining spending outcomes. We propose that political institutions can play a moderating role in conforming spending priorities for situations without repeated interactions. Together, our study reignites the research on implementation delay in one-shot grants, contributing not only to the literatures on fiscal federalism and grant management, but also to the policy implementation literature in general.

One-shot grants such as the EDA are frequently employed by governments, but have received scant scholarly attention. We analyze a recent example of one-shot grants from the American Recovery and Reinvestment Act of 2009 (ARRA) named the Energy Efficiency and Conservation Block Grant (EECBG) program. As a central component of the ARRA, the EECBG program was intended to stimulate energy efficiency investment and innovation by local governments. It was one of the largest injections of federal funds into local governments since the Great Society. The U.S. Department of Energy (DOE) administered the EECBG program. The DOE had almost no direct interaction with local governments prior to the EECBG program as most of its funding passes through states. While the EECBG program has multiple components, almost sixty percent of the funding is block grants for the moderate to large size municipalities that are the focus of this study. Even though the block grants were allocated by formula, local governments had to complete applications including detailed plans on how they would spend the funds towards energy conservation and sustainability. The submitted projects

had to be approved by DOE as fitting into one of fourteen broad categories of spending that were permitted.

Following Pressman and Wildavsky, we concentrate on a particular implementation outcome—implementation delays. Like the earlier EDA program, the EECBG has been criticized as ineffective in part because of delays in spending funds. The federal government expected funds to be dispersed expeditiously in order to stimulate the economy and the clean energy sector. Despite federal expectations, some municipalities have held their funds and many others have torpidly dispensed them, indicating goal displacement and accountability problems. Therefore, the EECBG program provides a near optimal setting to test explanations for implementation delay in single shot grants. This focus itself is a contribution to the literature, which has largely studied fiscal outcom(Brooks, 2010; Dahlby, 2011; Brooks, 2011;Nicholson-Crotty, 2008; Baicker, 2005) (***).

The paper proceeds as follows. In the next section we provide a brief review of the literature--the Pressman and Wildavsky study and the fiscal federalism studies. We then advance a theory of grant compliance for single shot games. We describe the data and methods to empirically test the propositions derived from this theory. The analysis section estimates compliance based on the duration of delays in expending EECBG funds with a Bayesian multivariate survival model. A gamma distributed frailty term is used to decompose city effects. In conclusion we discuss the implications of our findings for research and program design.

Implementation Delay, Pressman and Wildavsky, and Fiscal Federalism

As indicated in the introduction, we intend to explain implementation delay as a form or dimension of grant compliance (or successful policy implementation). Recent studies focus on other forms or dimensions such as fiscal outcomes or budgetary compliance {Baicker, 2005

#747;Brooks, 2010 #741;Gordon, 2004 #748;Fisher, 1982 #749;Rodden, 2002 #750} (***). These fiscal outcomes are important but do not tell the whole story without capturing the salience of timeliness in implementation. One of the greatest failures of the Economic Development Administration documented in *Implementation* was how deliberate it was in executing the program's mandates. The torpid actions of the administrators doomed the program before any outcomes could be evaluated. Single-shot grants such as the EDA and the ARRA are structured to address a specific problem in an immediate fashion, thus expedience is an important program goal. In such cases, public perception is a key component in performance evaluation of government programs, so if the implementation is sluggish then citizens assume the program is ineffective, even if the anticipated results are fully realized further down the road.

Pressman and Wildavsky

A frequently underappreciated aspect of Pressman and Wildavsky's work is the focus on how delay contributes to program failure. Studies of grant effectiveness largely focus on funding levels (Bailey, 1998 ; Becker, 1996; Gramlich 1977; Hines & Thaler, 1995) and compliance with procurement, but Pressman and Wildavsky demonstrate how spending delays can hinder performance and accentuate the perception of failure. This is analogous to delays in the ARRA's "shovel ready" projects. Even though projects may ultimately produce desired benefits and be quite successful over a longer time frame, Pressman and Wildavsky found that those programs were deemed failures based on expenditure data because the program was designed to produce rapid economic stimulation. Thus, Pressman and Wildavsky's insights provide a basis for applying implementation delay to measures of grant effectiveness.

It is difficult to characterize the recommendations offered by Pressman and Wildavsky as a theory of implementation or grant management. They do provide a detailed case study and

prescriptions for practitioners including reducing the number of decision nodes in the system by creating simple approval processes, creating an organizational machinery for the execution policies, maintaining flexibility as program goals evolve, incorporating policy learning, and employing staff that can make systems work as opposed to simply having specific knowledge in a policy area. Pressman and Wildavsky also make the point that simple knowledge of a policy area is not sufficient and experienced personnel who can get the job accomplished are often required. Pressman and Wildavsky rebuffed the theories based on assumptions that an organization external to the bureaucracy could overcome implementation problems and delays.

In particular, Pressman and Wildavsky's case analysis focused on an issue often neglected in the current policy literature - the impact of management. The public management literature has produced volumes on procurement and proper management of grants from accountability and fiduciary perspectives, but relatively few studies indicate how quality grant management and administration impact performance. Studies that include monitoring and oversight typically do so only as a minor component of the grant management process. Providing assistance and guidance during the application phase, having a transparent approval process, and orderly fund disbursement policies are important elements of grant management that are necessary for monitoring to occur.

Pressman and Wildavsky recommend structuring the decision-making/grant process to be as simple as possible in order to streamline the administration. From a transaction cost perspective, a simplified grant process reduces ambiguity for all parties and lowers administrative costs. Simple processes are easier to implement for well understood policy problems, but single shot grants are frequently employed in situations where a complex, new and temporary problem has arisen. Grants are often conceptualized merely as a transfer of resources,

but grants serve as mechanisms for transmission of knowledge as well. Requests for grant funds almost always require plans for addressing a policy problem that are reviewed by subject matter experts. The grant approval process therefore serves as a quasi-peer review for practitioners and allows their plans to be evaluated. Principals can use this process not only to command compliance, but also to share best practices and knowledge.

Pressman and Wildavsky's classic research produced numerous prescriptions for public managers, but did not go as far as to provide a general theoretical foundation for grant administration. Their study was limited by the study of a single city and the lack of variation in the institutional setting creates problems for generalizability. Their prescriptions were not validated with large scale data. But more generally, Pressman and Wildavsky offer no model of behavior based on economic incentives, sociological influences, or political motivations which could be used to predict grant outcomes or even incorporate their own recommendations. We theorize below that a modified approach to principle agent theory can be used to encompass both Pressman and Wildavsky's prescriptions and more recent findings on the impact of federal grants.

Fiscal Federalism:

One of the classic rationales for employing grants is to overcome externalities and achieve Pareto optimal outcomes (Mueller 2003). Intergovernmental grants have traditionally been one of the chief policy tools used by the federal government to increase production of public goods at the local level, particularly when information asymmetries or other externalities prevent optimal levels of output. An early contribution in the study of fiscal federalism and grant effectiveness is Gramlich's (1977) typology of grants which predicts that grants that impose more restrictions on agents spending will be more effective at achieving their goals. Numerous

studies over the following decades produced only modest support for this prediction, until Chubb (1985) applied a principle agent framework to model the performance of various forms of intergovernmental grants. Principle agent models allow for the inherent information asymmetries between the grantor and the recipient to be formally modeled and provide prescriptions to overcome moral hazard and conflicts of interest. Chubb assumed that recipient governments and the grantor agency disagreed over program goals, asymmetric information existed, and subordinates shirk their responsibilities given the opportunity. Chubb demonstrated how monitoring and oversight influence grant effectiveness.

Nicholson-Crotty (2004) finds that goal conflict (or congruence) is a major factor in the effectiveness of grants. They use political ideology to measure goal conflict in law enforcement and health care. This measure is adequate for policies which have a clear ideological dimension, but works less well for issues like energy which cut across conventional ideological and partisan cleavages. Energy efficiency and alternative energy technologies have advocates on both the left and the right. Conservatives push for energy independence and energy security issues, liberals favor renewable energy and climate protection efforts and sometimes oppose certain alternative energy sources such as nuclear power and biomass. Thus, we extend this line of research by employing a more direct measure of goal agreement across multiple policy dimensions.

Several lacunas exist in the fiscal federalism literature. Previous studies have focused on states, thereby neglecting local political institutions. This is unfortunate because institutional differences such as forms of government and systems of representation have been consistently shown to moderate the influence of specific demands on urban policy outcomes (Clingermayer and Feiock 2001; Lubell et al. 2009; Sharp and Daley 2010). With the expectation of recent work on the flypaper effect (Bae and Feiock 2004; Brooks and Phillips 2010), local institutional

effects are conspicuously absent. Secondly, the literature employs measures of goal conflict that limit generalization to multiple policy areas, and the impact of grant management on outcomes is almost completely absent. Moreover, the nature of single-shot grants and dependence on already accessible resources is not addressed in the literature and few studies empirically investigate delay as a form of program failure. This research begins to fill these gaps through analysis of local implementation of the EECBG program.

A Theory of Grant Compliance in Single-Shot Games

Instead of focusing on reoccurring federal grants with repeated interactions around well developed policy arenas such as public safety and healthcare, we examine a one-shot game in which no previous interaction between the granting authority and the recipient has taken place and may not occur in the future. Although delay can be a concern in any intergovernmental program, single-shot grants are particularly sensitive because they are more likely to be stimulative in nature or employed to address a serious yet temporary public problem such as a natural disaster or oil spill. Single-shot games have a different dynamic from that of repeated play games because players can't punish unwelcomed behavior in future periods and therefore face higher risks of defection. In this situation, principals may need to focus on institutional arrangements that go beyond the carrot and stick approaches of the classical principal agent model. Our explanation of implementation compliance in single-shot games integrates several streams of literature. We employ fiscal federalism and principal agent theory to both encapsulate and expand Pressman and Wildavsky's recommendations into a more generalizable theory of implementation for single shot grants.

The Principal: Grant Management (Agent Perception of Support from the Principal)

The EECBG program is an exemplar of this phenomenon. Most municipal governments were not technically savvy in regards to energy policy and therefore needed direction from the

DOE on how to properly apply for and spend EECBG funds. Principals that provide clear guidelines and assistance throughout the entire process` are more likely to realize compliance and improved performance as a result of clear expectations and reduce the likelihood of errors in applications.

While grant management undoubtedly impacts both single and multiple period grants, we expect single-shot grants to be influenced more heavily by management because repeated interactions are not present to align goals. Developing simple application processes, providing assistance and feedback to agents, timely dispersal of resources, and many other factors which impact performance occur before monitoring can take place. Errors by the principal in managing any portion of the grant administration process can adversely impact the agent's performance, even though the causes were out of the agent's control. Agencies focus on monitoring in repeated games because there is always the option to correct any mistakes in the next round, however in single shot games monitoring is too little, too late and more resources must be focused on the front end of the process.

Comprehensively measuring grant management quality is a daunting task, but at least one component of quality is customer satisfaction or customer perception of the quality of support received from the grantor. Poor administration can lead to higher transaction costs and restrain local implementation efforts as Pressman and Wildavsky reported in their classic account of the EDA. We include several measures of grant recipient satisfaction for several stages of the application process. As Pressman and Wildavsky point out, there are numerous decision nodes from which implementation can be hindered. It is important to measure quality at each stage in the process including the application, technical assistance, dispersal of funds, as well as measuring the general satisfaction. The expectation is that recipients who experience higher

quality administration and assistance from the Department of Energy at each point in the grant process will be better prepared and more likely to start their projects on time.

H1: Municipalities with positive perceptions of DOE grant administration are expected to initiate implementation of EECBG projects more quickly.

The Agent: Grantee Capacity

Pressman and Wildavsky point out that policy implementation depends on experienced personnel at the local level who can get the job accomplished. This relates to a key issue for single-shot grants, mainly the resources and capabilities of the agent. For repeated, multi-year grants local governments will hire or contract with full time personnel and will retain a core competency. Local governments are less likely to hire a full time staff member to deal with a short term grant and therefore rely more on the resources currently at their disposal. Pressman and Wildavsky focused only on one of the resource limitations facing agents when dealing with single-shot grants, and we expand the scope to cover human, fiscal, and relational restraints not present in repeated play games. Grant programs are resource dependent, but without administrative capacity, technical knowledge, and political support, the injection of funds can only have a limited impact.

H2: Cities with higher administrative capacities are expected to initiate implementation of EECBG projects more quickly.

In addition to measuring internal administrative capacity, we also account for external information and capacity that communities can tap into through their networks of collaborative relationships. Collaborative efforts can include both cooperation with other cities and regional entities (horizontal collaboration) or coordination with universities, state agencies, and federal departments other than DOE (vertical collaboration). Local governments who collaborate with

partners in their community and at the higher levels of government are expected to spend funds more quickly than those who attempt to act independently.

Pressman and Wildavsky argue that limiting the number of decision nodes and inter-relationships can reduce delays in implementation and view collaborative efforts as a possible hindrance that increases decision making costs. The decision nodes which Pressman and Wildavsky cover are almost all hierarchical or veto players, which may act differently than network and collaborative relationships. Collaboration among agents and other actors can be seen as a method for decreasing both administrative and information costs through the elimination of redundant positions and the sharing of best practices. Additionally, if the public and external organizations and interests are permitted to participate in the grant proposal process, then the collaborative efforts are initiated with clear understandings up front and commonly accepted expectations for the program. In these cases, we would expect collaboration to have a net positive effect.

Collaboration often requires reaching beyond actors in the community and surrounding communities to identify expertise, but technical knowledge and abilities which are unavailable locally. Single-shot grants can be directed to almost any type of public problem, but they are often targeted to issues which result from unique or transient events and therefore may require specialized experience or expertise. New or rare events make horizontal diffusion and learning from neighbors difficult because they are usually struggling with the same shock. In these situations, linking to actors such as research universities, state agencies, or federal departments with skills absent from the local community may be necessary. These collaborative relationships are not regulatory, they instead are voluntary mechanisms to obtain information and therefore should help increase the capacity of the local government to achieve goal compliance (Feiock

and Scholz 2010). In summary, we expect agents to learn from each other on issues which similar units have shared experience, however we expect agents to look outside their peer circles on complex or radical new problems such as energy policy.

H3: Cities which collaborate more with other governmental entities are expected to initiate implementation of EECBG projects more quickly.

Other Decision Nodes

Collaboration is helpful when it involves voluntary information exchange, but as Pressman and Wildavsky suggest, collaboration is a hindrance when it increases the decision-making costs. We therefore separate collaboration from interference and include several measures of obstruction to implementation. The first is a measure of DOE impediments concerning the grant process. Second, we include a measure of interference from other federal agencies, particularly the EPA and Department of Interior since they play a large regulatory role in energy policy. Third, we include a measure of support from local interest groups who might try to influence energy policy.

H4: Cities experiencing interference from DOE, other federal agencies, and local interest groups will initiate implementation of EECBG projects less quickly.

Between the Principal and the Agent: Goal Congruence

Intergovernmental grants are contractual relationships. Therefore increased monitoring is the conventional solution for deterring defection. However, monitoring is expensive and is complicated when agents are contracting out work to sub-contractors. Thus, lines of accountability become blurred. It is not difficult to imagine a situation where the monitoring costs would become prohibitive so as to exceed the amount of grant funds. Moreover, monitoring is almost always hindsight. Single-shot grants only give the agent one chance to achieve the

principal's goals, and if the funds are misallocated then project failure may be inevitable. Single shot games therefore require a forward looking mechanism to achieve compliance.

The need to monitor can be overcome by decreasing transaction costs through increased trust. Goal agreement is one of the most dominant factors in grant effectiveness in repeated games involving multiple time periods for the simple reason that it enhances trust among participants (Nicholson-Crotty 2004). The same logic works in single-shot games. Goal agreement acts as a proxy for common knowledge and allows the principal and the agent to more accurately predict each other's moves. Goal agreement takes on additional importance when the parties have not interacted before, as is the case with EECBG grants, because they have no prior experience to base their expectations on. Additionally, lack of previous interaction increases information costs because of the need to open new lines of communication. Research has established that when goal agreement is present among groups in a network, they are more likely to share information and work together (Lubell 2007). Goal agreement therefore serves a more critical role in single shot games.

Previous studies have found goal agreement to be positively associated with spending compliance, but have not addressed how it impacts timeliness. These studies focus primarily on programs with unitary goals, such as crime reduction. The EECBG enabling legislation states four goals: 1) reduce fossil fuel emissions; 2) reduce the total energy use of the eligible entities; 3) improve energy efficiency in the transportation, building, and other appropriate sectors; and 4) create and retain jobs. For each of these issues, we measure the level of agreement with the local community's energy policy goals and we combine them using a factor score to produce a measure of common goal agreement. We expect communities with higher levels of common goal agreement to initiate projects in a more timely fashion.

H5: Cities with lower levels of goal agreement are expected to initiate implementation of EECBG projects less quickly.

In a single play policy interaction trust might also be produced by observation or knowledge of past behavior. Cities which have previously enacted similar or corresponding green policies may be presumed by the grantor agency as more likely to implement policies consistent with the principal's energy efficiency and conservation goals. Reliance on observation of previous related actions are the best indication of future behavior is based in the logic of behavioral path dependency (Arthur, 1990).

Absent repeated interactions, one of the best gauges of future behavior is policies previously adopted by the agent. We divide these into two groups with the first being a previous policy identical to the grant funding request. Cities that already sponsor sustainable energy programs have the option of continuing or expanding their efforts through EECBG funds. Cities that lack resources to implement large scale projects may have had numerous sustainability efforts in place prior to the grants being awarded. Green practices, conservation efforts, or green planning initiatives are often components of pre-existing smart growth or environmental or growth management efforts. We anticipate that cities which have previously adopted green policies will be more likely to comply with EECBG goals and will expend their grant funds more expeditiously.

H6: Cities which have previously adopted green policies are expected to initiate implementation of EECBG projects more quickly.

Agents' Institutional Environment

A final issue which impacts single-shot grant compliance is political institutions. Governments that structure the incentives of leaders to pursue long–term over short-term interests are more likely to comply with grant requirements to avoid any negative impacts to

their professional reputations. Political institutions which produce short term horizons or lead to representation of narrow constituencies are more likely to pursue short term gains from noncompliance.

Federal principals face an array of agent types because local political institutions are more diverse than state and federal authorities. These institutions shape the incentives and motivations of local actors (Clingermayer and Feiock 2001). Manager-council government cities managed by a professional administrator are expected to operate under longer time horizons than mayor-council government cities in which an elected mayor directs the administrative branch. The high power electoral incentives present in mayor council systems mean short–term political considerations carry more weight. The trade-off between long-term and short-term benefits is particularly salient in energy policy where quick and painless gains can be made by switching light bulbs or risky investments in sustainable energy can take years to produce financial gains. Even in the case of switching to energy efficient light bulbs, there is still an upfront cost which is recouped with energy savings. Professional managers are expected to be more willing to make the investment in cost saving technologies more expeditiously than mayors who may feel that gaining interest off the public coffers better suits their political goals.

H7: Council-manager government cities are expected to initiate implementation of EECBG projects more quickly than mayor-council government cities.

City council members are elected either at-large on a city-wide basis or by districts. District representation is associated with neighborhood and constituency politics, thus district representatives are seen as less willing to engage collective action problems that face the region or the entire city if it might impose costs on their constituents. Energy infrastructure projects such as new power plants have to be sited in a specific location and thus have geographically centered costs. On the other hand the benefits such as energy efficiency, reduced energy fuel

costs, or greenhouse gas reductions are collected and not easily differentiated at a district level. Since district representation is generally less supportive of collective policies, we expect greater reliance on district representation systems to reduce support for implementation of at least some EECBG energy policy initiatives.

H8: Cities with a higher proportion of district representation are expected to initiate implementation of EECBG projects less quickly.

In addition to operationalizing the hypotheses above, we include a range of control variables. EECBG grants were given in 14 different categories, and we include a set of dummies to account for any structural differences among them. The value of the grant per capita is included to account for any scaling effects. Political ideology of the city council is included to account for any partisan effects. An indicator measuring if the community copied the legislation from another governmental entity is included to measure any isomorphic impact. Local political dynamics are covered by including the level of citizen support for green energy policies along with the amount of civic participation in the application process and media reporting. Demographics for city size, unemployment, education, and population density are all included but are currently measured at the county level. Finally, the localities are clustered by municipality since one city can have multiple grants.

Data

The data for this project are collected from a number of sources. The two primary data sources are administrative records from Department of Energy, which provide disbursement records for each grant, and a national survey conducted by Feiock (2010) that was administered to all EECBG recipients. Our units of analysis are the EECBG programs of each grant recipient city government. While each city receives only one grant, they may fund several projects with

different implementation timetables. Therefore, the grant data are clustered by city in the analysis that follows.

The national survey was directed to all grantees and has thus far yielded over a 55% response rate. The survey was sent to the DOE contact for each city, thus respondents are expected to be well informed and knowledgeable of all grant activities. Data coding and entry is in progress, so a subset of 2026 observations on 537 cities are used for this paper. Missing data were found on 443 observations and MCMC based multiple imputation was used to correct for this missing information. All additional demographic data was taken from the U.S. Census Bureau online American Factfinder database. Table 2 provides the summary statistics for all variables included in the analysis.

The dependent variable is program initiation delay measured as the time between the proposed EECBG project start date and the actual date funds were dispersed measured in days. This information is taken directly from DOE administrative records. While many cities delayed EECBG projects, others actually started before their approval dates and refunded their public coffers once the money was dispersed. These cities therefore had a negative delay value. Since the statistical software will not consider negative times, a constant of 500 days was added to all delays. The addition of a constant does not change the analysis in any way other than a need to adjust any estimates. (In fact, since time is treated semi-parametrically only the ranks matter and not the actual distance between time points.)

The grant award amounts and project types were also taken directly from DOE archival records. The grant amount was divided by the 2009 Census population estimate to produce a per capita estimate for each individual project. The frequency of grant types is presented in Table 1.

We collapse the categories of grants with under thirty observations into the "Other" category in the analysis for statistical reasons related to convergence.

Table 1 here

The majority of independent variables are derived from the survey instrument. Citizen advocacy is measured using a 4 point scale of "Not Important" to "Very important". The previous sustainability energy policy variable is a count of up to 7 programs that cities had implemented before grant funding was available. A binary variable representing if the city copied the policy from another government is included. All three satisfaction measures are measured on a 10 point scale with higher values indicating higher satisfaction with grant management by DOE. The percentage of at-large representation was calculated from the survey which asked for both council size and the division of seats by election type. Council-manager form of government is a dummy variable and is compared to all other forms of government, which are almost entirely mayor-council form. City council ideology is measured on an 10 point scale ranging from "Very Conservative" to Very Liberal".

Factor analysis was conducted on several variables for data reduction purposes and the factor scores were included in the actual analysis. Appendix A has a complete list of the items included in each factor along with each item's factor pattern. Both scree plots and eigenvalues were used to determine the appropriateness of each factor, but only the eigenvalues are reported here in parentheses by the name of each scale. The eigenvalues can be roughly interpreted as the amount of shared variance explained by the factor. Goal agreement (.69) was measured as a factor with questions related to the four EECBG goals. The role of sustainability in economic development (.60) and planning (.75) are both factors produced using three questions with five

point scales. Obstacles from the DOE (.62), from other federal agencies (.72), from local organizations (.74), and from lacking administrative capacity (.62) are all based on 5 point scales ranging from no obstacle to substantial obstacle. It should be noted that these variables are "reverse coded," meaning that higher values indicate a greater expected delay. Collaboration with surrounding entities (.78), collaboration with state and federal agencies other than DOE (.66), support from local interest groups (.64), and support from governmental agencies (.62) are also included.

Examining the eigenvalues for these factors shows that many do not reach the common psychometric threshold of 70%. Additionally, the questions were measured on a five point scale which means ordinality might be a concern. However, the distribution of the scores for the variables was quasi-normal and the residual correlation matrix diagnostics indicated no problems for any of the variables/factors with the exception of collaboration. University collaboration was skewed and the diagnostics could be improved. However, given the relatively normal distributions and the large sample size, using standard orthogonal factor analysis is justified. All survey questions and factor analytic output are available from the authors upon request.

Model

The dependent variable is the time duration between approved start dates and actual start dates. Some localities have yet to begin their EECBG projects, so they are right censored. Since we are measuring time until an event with right censored data, a survival model is the appropriate statistical tool to employ.

The choice of a survival model is not solely based on the fact that the dependent variable is the time to adoption. Hazard models also provide simple mechanisms for dealing with

truncation and censoring. Censoring is a form of missing data and occurs when there is incomplete information for a given observation. In survival analysis, the most common form of this is observations that have not had an event at the end of the study, which is the case in this study.

The vast majority of political science literature, particularly in policy adoption, uses simple event history analysis and, most frequently, with a probit link function. For both statistical and theoretical reasons, we employ a frailty term in our survival model in order to adjust for unobserved heterogeneity and clustering in our analysis (Vaupel, Manton, & Stallard, 1979). Standard event history analysis considers the hazard rate of adoption to be independent and constant across all individuals in the study (Cox, 1984; Hougaard, 1999; Kalbfleisch & Prentice, 2002). Frailty terms are used to adjust the hazard for grouped data in the form of repeated observations or clustered data such as people in the same family getting a particular disease. Failure to adjust for these differences can result in inaccurate standard errors and coefficient estimates may be understated. Frailty terms included in a hazard model are analogous to random intercepts on a mixed model because they operate under the same underlying theoretical purpose.

The key difference between a frailty term and a random intercept is that frailty terms are multiplicative while intercepts are additive. A Gamma prior distribution for the frailty term is most frequently used because of the wide diversity of shapes it can take on with different parameterizations, although Gaussian is another common and more restrictive choice. The difference between models is clear in the equations below which use a proportional hazards model to demonstrate the differences. The frailty model must estimate two additional parameters and is conditional on group j, which may be repeated measures or clustering.

Standard model: $h0(t|X,\theta,\beta) = h0(t) + e^{(X*\beta)}$

Frailty model: $h0(t|X,\theta,\beta,\eta,\omega j) = h0(t|\theta) + e^{(X*\beta)} * \omega j$

where: $\omega j \sim \text{Gamma}(1/\eta, 1/\eta)$

Finally, the frailty model is estimated using Bayesian techniques. There are theoretical advantages of Bayesian theory in terms of providing a more realistic view of probability and the ability to include prior knowledge in the analysis (Gill 2002; Gelman 2004). In addition, Bayesian survival analysis has some practical advantages. It allows for features of censoring to be estimated by considering them as extra unknown parameters and updating the other parameters as if all observations were observed (Klein, Goel, & North Atlantic Treaty Organization. Scientific Affairs Division, 1992), whereas in classical frequentist statistics the nature of the censoring mechanism is largely ignored. Our analysis is most concerned with the censored data points as they are the most delayed in spending stimulus funds from the EECBG program.

Almost all parametric and semi-parametric can be extended to include a frailty term. (Parametric models such as accelerated failure time (AFT) regression assume a distribution for the hazard function, wheresemi-parametric and non-parametric forms do not.) The most common frailty model builds on the Cox proportional hazard model (Cox, 1972), which has a natural Bayesian extension to a frailty model (Sinha & Dey, 1997; Sinha, Ibrahim, & Chen, 2003). The literature on Bayesian Frailty model has moved beyond the Cox regression model in both repeated events (Sinha, Maiti, Ibrahim, & Ouyang, 2008) and also grouped frailty terms (Yin & Ibrahim, 2005a, b), but the Cox model remains the benchmark to which other models are compared in survival analysis. An important point is that the inclusion of a frailty term or time varying coefficients by definition violates the standard proportionality assumption in the original

Cox regression. The altered specifications of the Cox model are more accurately described as a semi-parametric relative risk model, which fails to imply any assumptions. We use a relative risk model in this analysis.

Results

We estimate a standard relative risk model with a gamma distributed frailty term clustering on city for this analysis. The model had a burn-in of 10,000 iterations and ran for an additional 50,000 before convergence was diagnosed. The Gelman-Rubin diagnostic along with trace plots indicated no signs of non-convergence. The results from the frailty survival model are presented in Table 3.

These results are preliminary since some of the data has not been coded as of the writing of this paper. The variables that are significant at the .05 significance level are highlighted. In interpreting the results negative signs indicate shorter delays.

Table 3 here

The results provide strong support for the hypothesized influence of grant management on delay. Satisfaction with the application process and technical assistance are also significant and in the hypothesized direction. Inconclusive results were found for satisfaction with the approval process.

District versus at-large representation was the only political institution to achieve significance in the model. Collaboration with universities, states, and federal agencies other than DOE was found to significantly shorten delays in implementation. All of the additional hypotheses have inconclusive findings.

Several control variables are also significant. Cities which promote sustainability for economic development purposes were more likely to spend funds expeditiously. Additionally, cities which actively promote sustainability efforts in the media are more likely to spend funds on time. Finally, the type of EECBG program for five of the ten dummy variables is significant. (The coefficients are all in comparison to 'Building Retrofits' which is the excluded group.)

Discussion and Conclusion

This research advances and tests a theory of compliance in single-shot games. By building on previous theories of fiscal federalism which focus on repeated games we develop a framework more appropriate for single-shot games. Carrying over the importance of goal agreement and political institutions from previous studies, we add insights from Pressman and Wildavsky's (1973) classic work to suggest that grant administration and resource dependency have strong effects on the ability of single shot- programs to achieve compliance. The EECBG program provides an ideal laboratory for testing explanations for implementation of one shot grant programs since it was a large, one-time investment by a principal to agents with which they had no previous working relationship. We test our theory using a relative risk model with a frailty term and find that grant management, political institutions, and collaboration all have significant impacts on predicting implementation delay.

The use of delay as a dependent variable in itself is a theoretical as well as methodological contribution. While Pressman and Wildavsky (1973) stressed the importance of timeliness in implementation, scholars have largely neglected the impact of delay on actual and perceived performance. The critical attention and rewiews of the Obama administration for a "failed stimulus" dramatically reinforces the importance of this insight. Single-shot grants are

more likely to be stimulative and in some cases quickly spending the money can be as important as where the money is spent. Even when speed is less of a priority, the timely dispersal of funds is necessary to accomplish program goals. This research provides the groundwork for further exploration of program implementation delay and its policy implications. Such work might assist policymakers in program design decisions in which they seek the quickest bang-for-the-buck.

Perhaps the most robust set of findings are from our analysis of the grant management variables. Namely, recipients who are most satisfied with DOE's administration of the application process and technical assistance are less likely to have implementation delays. Previous research demonstrates that monitoring enhances compliance, but overlooks other aspects of grant management. Achieving compliance through monitoring in single-shot grants is not an optimal solution, so increased preparation and involvement on the front end of the principal-agent relationship is needed to overcome this limitation. While agent assessments of satisfaction with performance is a useful proxy for the quality of grant management by principals, there is room for improved conceptualization and measurement. The link between effective grant management and performance represents a lacuna which public management scholarship has yet to fill.

A second lacuna this analysis begins to fill is the lack of theory on local level political institutions in fiscal federalism research. The finding that at-large representation is associated with goal compliance fits with previous urban politics studies which report district representation favoring policies with geographically limited benefits. Future work can extend this by categorizing the different energy policy choices based on their distributional outcomes and examining district representation effects at a disaggregated level. Future work can also examine the non-additive moderating effects of institutions.

A third potentially important contribution from this work is the evidence that collaboration with universities, states, and federal agencies other than the DOE are important to decreased delay in EECBG grant implementation. The literature has focused more on horizontal collaboration among local entities (Andrew 2009). We find that collaboration with surrounding entities had no distinguishable effect. Cities gather information from vertical rather than horizontal relationships. The importance of vertical network relationship suggest that these entities have unique expertise and that the information they provide may be less redundant than that information collected from relationships with other local governments. For programs of a technical nature like energy policy where there is a lack of previous experience on the part of local governments vertical networks may be essential. Many local governments did not have sustainability plans in place before the ARRA and even fewer had the technical expertise to handle complex energy policy decisions. To the extent that expertise was housed in research institutions and higher levels of government, local governments look upward and not outward in seeking partners.

Several hypotheses resulted in inconclusive findings. Of these, the most unexpected was the failure of goal agreement to achieve significance. Goal agreement has been found to be a robust predictor of grant compliance in several studies on repeated games and was theorized to have greater importance in single shot-games. This was the first time goal agreement's impact was measured in single-shot grants, in predicting delay, and using a more direct measure. Further study will be needed to disentangle the reasons why goal agreement has been a consistent predictor in previous studies of grants, but the findings reported here suggest that one shot grants are fundamentally different. The theoretical framework also suggests that the impacts of goal agreement may be interactive rather than additive.

This research marks the initial steps in advancing a broad research agenda investigating intergovernmental relationships in the EECBG program We begin this journey with a study of delay because it is one of the most publicized criticisms of the stimulus and yet it has received scant scholarly attention. The next steps will be to test the non-additive relationships we posit and to extend this analysis to more classical measures of goal compliance to assess if effective grant management also impacts implementation expenditure patterns. All of the EECBG funded projects are to be started by the end of 2011. At that point we can measure the performance of these programs using objective performance outcomes, such as green jobs, to supplement and expand these efforts

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Table 1
Frequency of Grant Type

Grant Type	Frequency
Building Codes and Standards	24
Building Energy Audits	115
Building Retrofits	675
Clean Energy Policy	166
Energy Efficiency Rating and Labeling	17
Financial Incentives for Energy Efficiency and Other Covered Investments	61
Government, School, Institutional Procurement	157
Industrial Process Efficiency	18
Loans and Grants	83
Other	97
Renewable Energy Capacity and Generation	3
Renewable Energy Market Development	122
Technical Assistance	151
Transportation	254
Workshops, Training, and Education	86

Table 2:
Descriptive Statistics

Variable	Mean	Std Dev	Min	Max
Delay (in days)	97.88	171.89	-408.00	690.00
Censored	0.79	0.41	0.00	1.00
Satisfaction with Approval Process	5.65	2.38	1.00	10.00
Satisfaction with Disbursement Process	5.81	2.48	1.00	10.00
Satisfaction with Overall Process	6.64	2.22	1.00	10.00
Obstacles from Administrative Capacity	0.11	0.98	-1.56	2.70
Collaboration within Region	0.09	0.99	-1.41	2.12
Collaboration with State/Federal	0.08	0.99	-1.46	2.60
Obstacles from DOE	0.11	1.01	-1.48	2.33
Obstacles from Other Federal Agencies	0.03	0.99	-1.18	2.72
Obstacles from Local Organizations	0.00	0.99	-0.83	3.87
Goal Agreement	0.08	0.93	-2.59	1.67
Number of Prior Sustainable Policies	2.04	1.96	0.00	7.00
Percent At-Large Representation	0.65	0.40	0.00	1.00
City Manager Form of Government	0.74	0.44	0.00	1.00
External Assistance in Application	1.95	2.55	0.00	17.00
Citizen Participation in Application	0.89	1.05	0.00	4.00
Copied Policies from Other Government	0.89	1.09	0.00	3.00
Media Involvement	1.85	1.60	0.00	5.00
Innovative (New) Policies to Implement	0.25	0.43	0.00	1.00
Citizen Advocacy Level	2.96	0.75	1.00	4.00
Count of Green Practices	2.16	1.27	1.00	5.00
Green Development as Economic Development Tool	6.73	2.13	1.00	10.00
Ideology of City Council	5.81	2.29	1.00	11.00
Green Development as Economic Development Tool	0.14	1.01	-2.96	1.78
Green Development in Planning	0.05	0.97	-2.19	2.40
Unemployment	9.12	2.22	2.70	17.00
2009 Population	1370162	2111982	11380	9848011
Education	27.25	8.47	9.10	54.60
Population Density	1317.09	1706.65	0.40	11691.60
Grant Size Per Capita	0.56	1.04	0.00	17.92

Table 3: Frailty Survival Model Results for Predicting EECBG Implementation Delay

Variable	Estimate	SE	Lower	Upper
Independent Variables				
Satisfaction with DOE Application Process	-0.055	0.022	-0.099	-0.011
Satisfaction with DOE Approval Process	0.017	0.021	-0.024	0.058
Satisfaction with DOE Technical Support	-0.083	0.023	-0.128	-0.037
Obstacles from Administrative Capacity	-0.008	0.050	-0.108	0.091
Collaboration within Region	0.016	0.054	-0.092	0.124
Collaboration with State/Federal	-0.097	0.050	-0.195	0.000
Goal Agreement	0.004	0.052	-0.097	0.105
Number of Prior Sustainable Policies	-0.022	0.025	-0.070	0.026
Percent At-Large Representation	-0.190	0.094	-0.374	-0.006
City Manager Form of Government	0.082	0.081	-0.077	0.242
Control Variables				
External Assistance in Application	0.024	0.018	-0.012	0.060
Citizen Participation in Application	-0.070	0.050	-0.169	0.029
Copied Policies from Other Government	0.066	0.042	-0.016	0.147
Media Involvement	-0.060	0.030	-0.118	-0.002
Innovative (New) Policies to Implement	0.054	0.091	-0.124	0.233
Citizen Advocacy Level	-0.008	0.057	-0.120	0.105
Count of Green Practices	0.043	0.039	-0.033	0.119
Ideology of City Council	0.005	0.019	-0.033	0.043
Green Development as Economic Development Tool	0.134	0.053	0.030	0.239
Green Development in Planning	-0.039	0.048	-0.134	0.055
Goal Agreement	0.004	0.052	-0.097	0.105
Unemployment	0.026	0.017	-0.008	0.060
2009 Population	0.000	0.000	0.000	0.000
Education	0.004	0.006	-0.008	0.015
Population Density	0.000	0.000	0.000	0.000
Grant Size Per Capita	0.006	0.033	-0.058	0.070
Clean Energy Policy	0.279	0.117	0.050	0.509
Financial Incentives for Energy Efficiency and Other Covered Investments	0.094	0.154	-0.209	0.396
Government, School, Institutional Procurement	-0.019	0.125	-0.263	0.225
Loans and Grants	-0.010	0.146	-0.296	0.277
Renewable Energy Market Development	-0.098	0.134	-0.361	0.164
Technical Assistance	0.269	0.097	0.079	0.459
Transportation	-0.177	0.092	-0.359	0.004
Workshops, Training, and Education	0.126	0.127	-0.123	0.376
Building Energy Audits	0.233	0.112	0.012	0.454
Other	0.201	0.101	0.003	0.399

Appendix A: Factor Analysis and Scale Information

Factors

	Factor Pattern	Communality
Green Development as Economic Development Tool		0.6035
Promoting sustainability will attract business and investment.	.861	
Sustainability programs put a city at a competitive disadvantage in promoting economic development.	-.6091	
Energy efficiency and attracting "green business" is important to our city's economic development strategy.	.836	
Green Development in Planning		0.7509
Our city's planning documents explicitly address energy efficiency issues.	.8604	
Our city's planning documents explicitly address energy production issues.	.874	
Our city's planning documents explicitly address climate change issues.	.8652	
Goal Agreement		0.693
Greenhouse gas reduction	.8371	
Green job creation	.8331	
More sustainable community	.8271	
Obstacles from DOE		0.6246
Buy American provisions	.8015	
Davis-Bacon labor requirements	.8377	
Federal reporting requirements (Fedreporting.gov)	.7276	
Obstacles from Other Federal Agencies		0.719
Environmental impact statements (NEPA requirements)	.8303	
Historic Preservation requirements	.862	
New EPA lead rules	.8513	
Obstacles from Local Organizations		0.7392
Lack of community support or awareness	.8769	
Lack of support from private sector	.9297	
Lack of support from nonprofit sector	.9162	
Opposition from community based groups or organizations	.6959	
Obstacles from Administrative Capacity		0.6212
Lack of staff capacity	.7764	

Lack of informational resources	.7783	
Time provided for implementation	.8093	
Collaboration within Region		0.7832
Other cities within your county	.9189	
Cities within the region or metro area	.9279	
Regional organizations or partnerships	.8027	
Collaboration with State/Federal		0.6572
Universities	.7685	
State agencies	.8284	
Federal agencies other than DOE	.8335	

Scales

External Assistance in Application		
Neighboring Local Governments	Local Business	Environmental Groups
Neighborhood Organizations	Non-Municipal Utility	County Government
Nonprofit Community Organizations	The Media	Technology Firms
Nonprofit Research Organizations	General Public	ESCOs
Neighborhood/Homeowner Associations	Local Colleges or Universities	Real Estate Developers
Regional Economic Development Organization	Chamber of Commerce	
Citizen Participation in Application		
Town Hall meetings/community meeting	Citizen feedback via the web	Citizen surveys
Citizen advisory boards/committees	Citizen focus groups	Public hearings
Media Involvement		
Website	Newsletter	
Social media (i.e. Facebook)	Periodic reports	
Media/Press release		

Number of Prior Sustainable Policies
Adoption by the governing body of a resolution stating sustainability policy goals.
Adoption by the governing body a plan with specific targets or benchmarks.
Provided a budget specifically for the sustainability effort
Dedicated staff to the sustainability effort
Introduced renewable energy sources (wind, solar, biofuel, etc.)

Provided loans, rebates or tax credits for renewable energy efficient devices
Introduced alternative fuel or hybrid vehicles into the city fleet

Count of Green Practices	
LEED Certification for New Construction	Green Procurement Practices
LEED Certification for Retrofitted buildings	Energy Efficient Devices
Energy Efficient Systems	