

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 by combining the insights from Pressman and Wildavsky's classic work with concepts of goal congruence from principal agent theory. One time grants require local political institutions and administrative structures to foster credible commitments between federal and local authorities. Based on administrative records from the U.S. Department of Energy and a national survey of local government recipients of DOE grants, we predict incompliance as evidenced by delay in expending grant funds given that the goal of the federal government is to rapidly stimulate the economy and produce gains in energy efficiency. We employ a Bayesian multivariate survival model to estimate the time from receipt of a stimulus grant until the funds are expended, and we find compelling evidence that effective grant management is a significant factor in limiting delays.

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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 compliance in single-shot grant situations that delineates distinct factors that influence outcomes in single shot versus repeated play grant games. We expand and extend their insights by incorporating 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. Building upon the fiscal federalism argument that goal congruence is a major factor in achieving congruity, we offer an improved measure of the construct and acknowledge the insufficiency of goal congruence for achieving compliance in single shot games. Moreover, we extend literature on fiscal federalism by proposing that political institutions can play a 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.

We analyze a recent example of one-shot grants from the American Recovery and Reinvestment Act of 2009 (ARRA), the Energy Efficiency and Conservation Block Grant (EECBG) program. The EECBG program was intended to stimulate investments in energy efficiency innovations by local governments. It was one of the largest injections of federal funds into local governments since the Great Society. The DOE had almost no direct interaction with local governments prior to the EECBG program as most of its funds pass through the 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 then 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 outcomes (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 Pressman and Wildavsky study and the fiscal federalism research that followed. We then advance a theory of grant compliance for single shot games. After describing the data, we estimate 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

We 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;Brooks, 2010;Gordon, 2004;Fisher, 1982;Rodden, 2002). 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 immediately address a specific problem. Thus, expedience is an important program goal. In such cases, public perception is a key component in performance evaluation. So, if program implementation is sluggish, citizens assume the program is ineffective even if the anticipated results are fully realized in the future.

Pressman and Wildavsky

A frequently underappreciated aspect of Pressman and Wildavsky's work is their 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, they are deemed failures based on the timing of expenditures if their purpose is 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 emphasize that knowledge of a policy area is not sufficient because experienced personnel who can get the job accomplished are often required. Thus, they reject theories based on assumptions that an organization external to the bureaucracy can overcome implementation problems and avoid delays.

Pressman and Wildavsky's case analysis focused on an issue often neglected in the policy studies 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 grant 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 research produced numerous prescriptions for public managers, but did not go so far as to provide a general theoretical foundation for grant administration. Their study was limited by the examination of a single city and the lack of variation in the institutional setting, making generalization difficult. More generally, they did not offer a behavioral model linked to economic incentives, sociological influences, or political motivations to predict grant outcomes or even incorporate their own recommendations. We advance a theoretical approach based in principle agent theory that can encompass both Pressman and Wildavsky's prescriptions and more recent fiscal federalism 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. He uses 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 efficiency which cut across conventional ideological and partisan cleavages. 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 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

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. Unlike reoccurring federal grants with repeated interactions around well-developed policy arenas such as public safety and healthcare, one-shot games may see no interaction between the granting authority and the recipient in the past or in the future. In single-shot games, 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 employs fiscal federalism and principal agent theory to encapsulate and expand Pressman and Wildavsky's recommendations into a more generalizable theory.

The Principal: Grant Management

Most municipal governments applying for EECBG grants 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 reduce the likelihood of errors in applications and to realize compliance and improved performance as a result of clear expectations.

While grant management undoubtedly impacts both single and multiple period grants, we expect it influences single-shot grants more heavily because repeated interactions are not present

to align goals. 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 and/or too late, so more attention and resources must be focused on the front end of the process. Developing simple application processes, providing assistance and feedback to agents, timely dispersal of resources, and many other factors which impact performance can 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.

Measuring the quality of grant management is a daunting task, but at least one component of quality is customer satisfaction or perceived 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 for the EDA. As Pressman and Wildavsky point out, there are numerous decision nodes from which implementation can be hindered including the application, technical assistance, and dispersal of funds. We measure grant recipient satisfaction in those stages of the application process, in addition to the general satisfaction. The expectation is that recipients who experience higher quality administration and assistance from the DOE 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 link implementation success to experienced personnel at the local level who get the job accomplished. This relates to a key issue for single-shot grants, the resources and capabilities of the agent. For repeated, multi-year grants local governments typically hire or contract full time personnel and retain a core competency. Local governments

are less likely to hire full time staff to implement projects supported by a short term grant and are more likely to rely on existing resources. Pressman and Wildavsky focused only on one of the resource limitations facing agents when dealing with single-shot grants. 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, an injection of funds cannot lead to timely implementation.

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

In addition to internal administrative capacity, communities vary in the external information and capacity they can tap into through networks of collaborative relationships. Collaborative efforts can include 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 that 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 that Pressman and Wildavsky cover are almost all vertical or veto players, which may act differently than collaborative network 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 collaboration is anticipated to have a net positive effect.

Collaboration often requires reaching beyond actors in the community and surrounding communities to identify expertise, technical knowledge and abilities 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 issues. 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, but we expect agents to look outside their peer circles on complex or radically different issues such as those related to 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 relationships that may obstruct implementation. The first is a measure of DOE impediments in the grant process. Second, we measure intervention 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 or opposition 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 and monitoring is a conventional solution for deterring defection. However, monitoring is expensive and complicated when agents contract out work to sub-contractors, which blurs lines of accountability. It is not difficult to imagine a situation where the monitoring costs exceed the amount of grant funds. Moreover, monitoring is almost always in 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 when trust between the principal and the agent reduces transaction costs. One reason that goal agreement is a dominant factor in grant effectiveness in repeated games is simply that it enhances trust among participants (Nicholson-Crotty 2004). The same logic plays out 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 lack 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. Lubell (2007) demonstrates that goal agreement among groups in a network makes them more likely to share information and work

together. Goal agreement therefore serves a more critical role in single shot than repeated play games.

Previous studies have focused on the relationship between goal agreement and spending compliance (Bradford & Oates, 1972; Nicholson-Crotty, 1997), but have not addressed how goal agreement impacts the timeliness of implementation. These studies focus primarily on programs with unitary goals, such as crime reduction. The EECBG enabling legislation establishes 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 as 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). Council-Manager 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.

We include a range of control variables. EECBG grants were given in 14 different categories, so we include a set of dummies to account for 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

Comment [K1]: Table 1 shows 15 including the "other" category.

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 and 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 DOE, 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 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. 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 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 Cox regression by incorporating both repeated events (Sinha, Maiti, Ibrahim, & Ouyang, 2008) and also grouped frailty terms (Yin & Ibrahim, 2005a, b) which allow researchers more flexibility by relaxing some of the restrictive assumptions regarding proportionality in the Cox model.

We employ a shared frailty term to adjust for cities which received multiple grants. We use a Gamma distributed frailty term because it has the intriguing quality that the population hazards are not proportional (i.e. Cox model), but the individual clusters are proportional. The assumption of proportional rates within clusters means that variables such as citizen ideology and form of government have the same impact on each grant within the same city but not across cities, which we find to be a reasonable conjecture. The difference between the standard Cox model and the frailty relative risk model models is clear in the equations below. The frailty term ω conditions the model on cluster Z just the same way a random effect conditions a multilevel model. The frailty term requires estimating additional parameters and specifying a reasonable distribution to these random effects in order to prevent biased results. The Gamma frailty is used frequently because of the wide diversity of shapes it can take on with different parameterizations.

$$\text{Standard model: } h_0(t|X, \theta, \beta) = h_0(t) + e^{(X \cdot \beta)}$$

$$\text{Frailty model: } h_0(t|X, \theta, \beta, \eta, \omega_j) = h_0(t|\theta) + e^{(X \cdot \beta)} * \omega_j$$

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

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.

The specific Bayesian frailty model was estimate in the R language using the survBayes package (Henschel et al. 2009). The model uses cubic B-splines to estimate the hazard function for the semiparametric survival model. The frailty term is given an uninformative prior of $\text{Gamma}(.001, .001)$ and all of the regression coefficients were given uninformative normal priors $N(0, 100)$. The model had a burn-in of 8,000 iterations and ran for an additional 16,000 before convergence was diagnosed. The Geweke diagnostic along with trace plots failed to indicate non-convergence¹.

Results

We estimate a Bayesian relative risk model with a gamma distributed frailty term clustering on city for this analysis. The frailty survival model results are presented in Table 3. The posterior distribution means, standard errors, and the 95% credible intervals are presented for all of the model coefficients. The asterisks indicate the variables that are statistically significant at $p < 0.05$. In interpreting the results, negative signs indicate shorter delays. The 512 frailty terms posterior distribution means are presented in graphical form because of space limitations.

Table 3 here

The results provide strong support for the hypothesized influence of grant management on delay, moderate support for the political institutions hypotheses and inconclusive findings for

¹ Two Geweke diagnostic(s) were above 1.96. This is not uncommon considering we would expect at least one or two false positive when comparing almost forty chains. All of the trace plots appear to have converged.

the other hypothesized relationships. Satisfaction with the application process and satisfaction with technical assistance were statistically 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.

Several control variables were significant. Citizen advocacy reduced implementation delays. Surprisingly, cities that promote sustainability for economic development purposes were less likely to expeditiously spend funds. Higher unemployment, higher education levels, and more resources in the form of grant size per capita were all associated with shorter implementation times. Finally, the type of EECBG program for transportation was significant. (The coefficients are all in comparison to 'Building Retrofits' which is the reference group.)

A plot of the frailties is presented in Figure 1. The frailties estimates graphed are the posterior means. A Gamma distributed frailty term only produces positive results. Values below one indicate reduced delay and values above one indicate longer delays. A total of 64 of the 512 random coefficients are statistically significantly different from one (results not shown here), indicating that a shared frailty term is appropriate and there is heterogeneity among the groups.

Figure 1 here.

Discussion

Collectively, the findings suggest a broader framework for understanding the success of one-shot grants. Our results show that recipients who are more 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. Since achieving compliance through monitoring in

single-shot grants is not an optimal solution, increased preparation and involvement on the front end of the principal-agent relationship is needed. Further study is required to identify the specific strategies that grant administrators can use to support recipients. Additionally, we know little about the degree to which municipalities rely on grant administrators for guidance in using funds.

The findings for grantee capacity, collaboration and goal agreement were inconclusive. The most unexpected result was the failure of goal agreement to achieve significance. Goal agreement has been found to be a robust predictor of grant compliance in studies on repeated games (Nicholson-Crotty, 2004) and was theorized to have greater importance in single shot-games. However, this was the first time that the impact of goal agreement 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.

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. Local decision-makers in municipalities with district representation are more likely to steer grant dollars toward projects that benefits their own districts rather than to the city overall or to areas with the greatest need. As a result, deciding how and where to spend grant monies is likely to take more time because of the political wrangling and compromises that are often necessary when resource distribution is unequal across a given jurisdiction. While most of the control variables were in the expected direction, there was

one particularly interesting finding. Municipalities using green development as an economic development tool were expected to expend grant funds more slowly. In general, we would have expected that cities engaged in green development would be more interested in spending quickly because they are interested in green policies. However, with countless green economic development tools, these tools may be entirely distinct from EECBG-funded projects. Furthermore, green economic development tools have numerous benefits – not just positive environmental consequences. Therefore, this measure may not have adequately captured municipality preferences in terms of green policy.

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 and political institutions have significant impacts on predicting implementation delay.

Overall, we make a number of contributions to the literature on fiscal federalism and one shot grants. The use of delay as a dependent variable 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 criticism of the Obama administration for a “failed stimulus” dramatically reinforces the importance of this insight. Single-shot grants are often intended to be stimulative. In some cases, quickly spending the money can be as important as where the money is spent. However, 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.

The link between effective grant management and performance that is identified in this research fills a lacuna which the public management scholarship has yet to fill. We have shown that administrative support and capacity of the principal are important to implementation success. While this is clearly an important finding, there is room for improved conceptualization and measurement. Agent assessment of satisfaction with performance is a useful proxy for the quality of grant management by principals but objective measures may tell us more about how to replicate quality grant management.

Another lacuna this analysis begins to fill is the lack of theory on local level political institutions in fiscal federalism research. We find support for the theory that the incentive structures within policymakers operate influence the promptness of spending. Future work can extend this by categorizing different energy policy choices based on their distributional outcomes and examining the effects of district representation at a disaggregated level. Future work can also examine the non-additive moderating effects of institutions.

This research marks the initial steps in advancing a broad research agenda investigating intergovernmental relationships in the EECBG programs. 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. As more EECBG projects are started by municipalities, we can begin to measure the performance of these programs using objective performance outcomes, such as green jobs, to supplement and expand these efforts

Beyond our formal hypotheses and energy policy specific goals, the broader intent of this work was to incorporate Pressman and Wildavsky's groundbreaking work into an empirically accessible framework. Our findings confirm Pressman and Wildavsky's observation that grant implementation can be expedited by providing adequate resources and proper grant administration. We add to their work by suggesting that political institutions can encourage compliance and generalize the findings to all single-shot grants. There is considerable room to develop different measures goal agreement and compliance. This will enrich our theoretical framework. Overall, we believe that the integration of Pressman and Wildavsky into the current principal agent theory and fiscal federalism literatures will provide the groundwork for a deeper understanding of single-shot grant management and performance.

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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

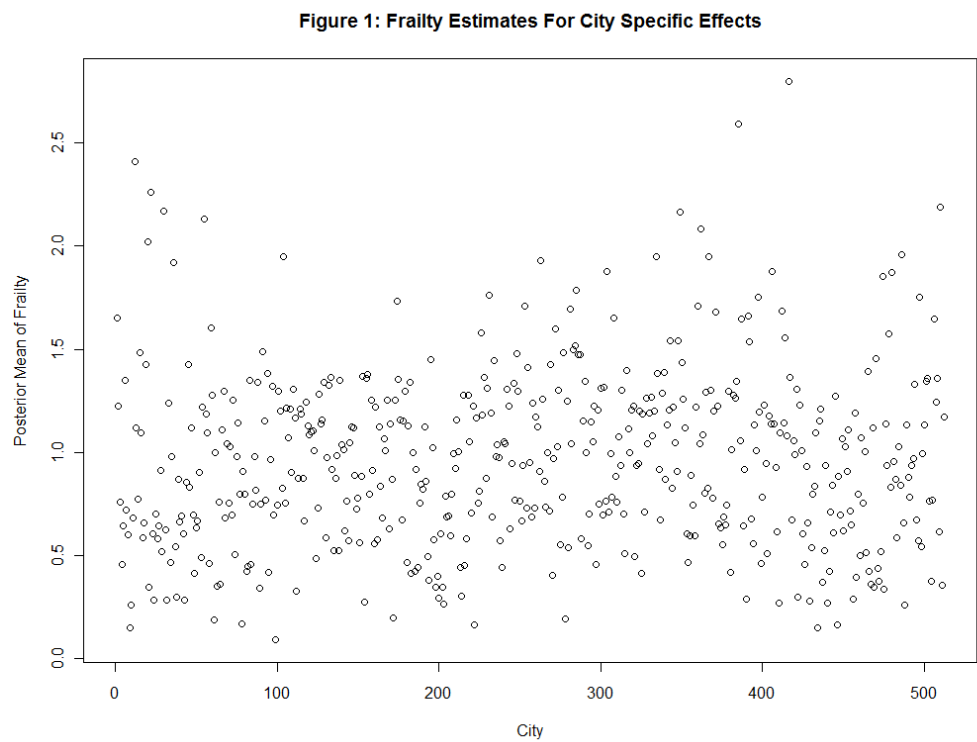
Variable	Mean	S.D.	Min	Max
Delay (in days)	97.88	171.89	-408.00	690.00
Censored	0.79	0.41	0.00	1.00
Grant Management				
Satisfaction with Approval Process	5.65	2.38	1.00	10.00
Satisfaction with Disbursement Process	5.81	2.48	1.00	10.00
Satisfaction with Overall Process	6.64	2.22	1.00	10.00
Grantee Capacity				
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
External Assistance in Application	1.95	2.55	0.00	17.00
Other Decision Nodes				
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 Congruence				
Goal Agreement	0.08	0.93	-2.59	1.67
Number of Prior Sustainable Policies	2.04	1.96	0.00	7.00
Count of Green Practices	2.16	1.27	1.00	5.00
Agent's Institutional Environment				
City Manager Form of Government	0.74	0.44	0.00	1.00
Percent At-Large Representation	0.65	0.40	0.00	1.00
Control Variables				
Green Development as Economic Development Tool	6.73	2.13	1.00	10.00
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
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 for Green Policies	2.96	0.75	1.00	4.00
Ideology of City Council	5.81	2.29	1.00	11.00
Unemployment	9.12	2.22	2.70	17.00
Education	27.25	8.47	9.10	54.60
2009 Population	1370162	2111982	11380	9848011
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	0.025%	0.975%
Grant Management				
Satisfaction with DOE Application Process	-0.0467*	0.0249	-0.0949	-0.0007
Satisfaction with DOE Approval Process	0.0111	0.0242	-0.0361	0.0586
Satisfaction with DOE Technical Support	-0.1056*	0.0219	-0.1477	-0.0625
Grantee Capacity				
Obstacles from Administrative Capacity	0.0355	0.0514	-0.0663	0.1339
Collaboration within Region	0.2246	0.1546	-0.1173	0.5313
Collaboration with State/Federal	-0.1105	0.0592	-0.2258	0.0069
External Assistance in Application	-0.0190	0.0242	-0.0659	0.0291
Other Decision Nodes				
Obstacles from DOE	-0.0953	0.0560	-0.2053	0.0137
Obstacles from Other Federal Agencies	0.0537	0.0541	-0.0520	0.1598
Obstacles from Local Organizations	-0.0805	0.0483	-0.1752	0.0148
Goal Congruence				
Goal Agreement	0.1729	0.0877	-0.0184	0.3370
Number of Prior Sustainable Policies	0.0113	0.0301	-0.0474	0.0697
Count of Green Practices	-0.0227	0.0395	-0.0999	0.0543
Agent's Institutional Environment				
City Manager Form of Government	-0.2494	0.1322	-0.4816	0.0224
Percent At-Large Representation	-0.2483*	0.1093	-0.4588	-0.0296
Control Variables				
Green Development as Economic Development Tool	0.1503*	0.0528	0.0483	0.2544
Green Development in Planning	0.0357	0.0510	-0.0646	0.1338
Citizen Participation in Application	-0.0192	0.0542	-0.1250	0.0875
Copied Policies from Other Government	-0.0519	0.1023	-0.2518	0.1452
Media Involvement	-0.0622	0.0328	-0.1259	0.0026
Innovative (New) Policies to Implement	0.0785	0.1100	-0.1343	0.2931
Citizen Advocacy for Green Policies	-0.3343*	0.0609	-0.4525	-0.2147
Ideology of City Council	-0.0506	0.0295	-0.1193	0.0083
Unemployment	-0.2447*	0.0177	-0.2789	-0.2103
Education	-0.0538*	0.0051	-0.0640	-0.0438
Population Density	0.0000	0.0000	-0.0001	0.0001
Grant Size Per Capita	-0.0986*	0.0327	-0.1647	-0.0344
Clean Energy Policy	0.0677	0.1067	-0.1458	0.2745
Financial Incentives for Energy Efficiency and Other Covered Investments	-0.0486	0.1652	-0.3842	0.2647
Government, School, Institutional Procurement	-0.0659	0.1170	-0.2950	0.1617
Loans and Grants	-0.0576	0.1457	-0.3433	0.2231
Renewable Energy Market Development	-0.0558	0.1269	-0.3082	0.1896
Technical Assistance	-0.0504	0.1116	-0.2717	0.1668
Transportation	-0.1833*	0.0971	-0.3743	-0.0066

Workshops, Training, and Education	0.0275	0.1419	-0.2567	0.3025
Building Energy Audits	0.0079	0.1227	-0.2340	0.2448
Other	-0.1138	0.1112	-0.3342	0.1019

Figure 1:



Appendix A: Factor Analysis Information

Factors	Factor Pattern	Communality
Green Development as Economic Development Tool		0.60
Promoting sustainability will attract business and investment.	.861	
Sustainability programs put a city at a competitive disadvantage in promoting economic development.	-.609	
Energy efficiency and attracting "green business" is important to our city's economic development strategy.	.836	
Green Development in Planning		0.75
Our city's planning documents explicitly address energy efficiency issues.	.860	
Our city's planning documents explicitly address energy production issues.	.874	
Our city's planning documents explicitly address climate change issues.	.865	
Goal Agreement		0.69
Greenhouse gas reduction	.837	
Green job creation	.833	
More sustainable community	.827	
Obstacles from DOE		0.62
Buy American provisions	.802	
Davis-Bacon labor requirements	.838	
Federal reporting requirements (Fedreporting.gov)	.728	
Obstacles from Other Federal Agencies		0.72
Environmental impact statements (NEPA requirements)	.830	
Historic Preservation requirements	.862	
New EPA lead rules	.851	
Obstacles from Local Organizations		0.74
Lack of community support or awareness	.877	
Lack of support from private sector	.930	
Lack of support from nonprofit sector	.916	
Opposition from community based groups or organizations	.696	
Obstacles from Administrative Capacity		0.62
Lack of staff capacity	.776	
Lack of informational resources	.778	
Time provided for implementation	.809	

Collaboration within Region		0.78
Other cities within your county	.919	
Cities within the region or metro area	.928	
Regional organizations or partnerships	.803	
Collaboration with State/Federal		0.66
Universities	.769	
State agencies	.828	
Federal agencies other than DOE	.834	
