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Author: A. Abigail Payne

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Does Government Funding Change Behavior? An Empirical Analysis of Crowd-Out

A. Abigail Payne, *McMaster University*

Executive Summary

When governments introduce programs or funding for initiatives that are partially provided by lower levels of governments or in the private or third sectors, should the government be concerned about whether its efforts are crowded out by changes in behavior by individuals and institutions participating in the provision of this good or service? The bulk of the theoretical literature suggests that crowd-out is an issue. The (historic) bulk of the empirical literature, however, has failed to find a measurable crowd-out effect. With better data and more sophisticated empirical techniques, there is a burgeoning literature that shows that crowd-out exists. The purpose of this paper is to examine the recent literature that studies the issue of crowd-out across a variety of venues to understand better the empirical estimation issues as well as the institutional details that can lead to a better understanding of the effects of government programs on individuals and organizations.

I. Introduction

In many instances, government funding of goods and services is designed to address issues associated with an underprovision of that good or service by the private sector. The reasons for this underprovision include such things as individuals not recognizing the value of benefits that extend beyond themselves (positive externalities), a good or service that is used by many people (e.g., a park), and incomplete markets (e.g., insurance). Regardless of the underlying reason for the government funding, the goal is usually to increase the provision of the good or service being provided. Does the government meet this goal? Economic theory often predicts that as the government steps in, the private funding declines. Sometimes the theory predicts that for every dollar of government funding, private funding declines by that entire dollar. Sometimes the theory predicts that crowd-out is not complete: private

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funding declines by less than a dollar. The phenomenon of the government funding undoing the private support is commonly referred to as "crowd-out."[1]

The theoretical prediction of crowd-out covers many topics. Sometimes we seek to understand whether the government funding crowds out private funding. Examples of the types of goods and services for which government funding may displace private funding include charitable goods, artistic and cultural goods, health insurance, safety, and education. Sometimes we are concerned with how two layers of government interact, often seeking to understand whether federal funding support of state or local goods results in fiscal substitution by the lower-level government. Examples of the types of goods and services for which there may be direct benefits to a local community as well as benefits that extend beyond the area covered by the local government are roads, education, and environment conservation.

Verifying the theoretical predictions empirically is an important step for understanding how best to minimize these crowd-out effects. If government provision is important to provide an optimal level of the good or service, then policy makers need to understand better the mechanisms for crowd-out. Unfortunately, empirically testing these predictions is complicated. There are issues associated with the types and quality of data we can gather for these tests and statistical issues that affect the ability to obtain an unbiased estimate of crowd-out. It is also important to identify the governmental institutions and the environment under which the good or service is being provided to understand better how the expected crowd-out varies from the theoretical prediction.

Across the many types of goods and services for which we expect to observe crowd-out, researchers face similar empirical issues. Yet, it is all too common to rely only on previous research that has a direct bearing on the immediate question, ignoring lessons that have been learned in the many areas in which the crowd-out hypothesis is tested. The purpose of this paper is to explore what we have learned about the empirical estimation of crowd-out across the many strands of public economics in which this question has been studied. It is beyond the scope of this paper to review all work that has been written on crowd-out. I focus on the analysis that has been conducted that has advanced our understanding of the issues that must be addressed when seeking to estimate the crowd-out effect.

My focus is on three types of crowd-out analysis. First, I explore the research that measures the effect of federal funding on state and local government expenditures. Much of the early empirical work suggested

a positive effect, commonly referred to as the "flypaper" effect. Current research suggests that the flypaper effect is attributable to an identification issue in the statistical analysis. In the instances in which we still observe the flypaper effect, there are institutional constraints on the lower level of government provision that explain a failure to observe crowd-out.

Second, I explore the research that measures the effect of government grants on private donations to charitable and religious organizations. Most of the early empirical work measured no crowd-out effect. Current research uses panel data that allow one to control for differences across charities and to create a better match between government funding and private donations. This newer research suggests that crowd-out is quite significant. There is, however, more to the story than just a relationship between private donors and government funding. There are institutional features that suggest that part of this crowd-out is attributable to the institutions that deliver the charitable goods and services.

Third, I explore the research that is focused on understanding how individuals change their behavior when the government steps in to provide a privately consumed good for which the individual may not have a strong preference or the financial means but for which there are strong reasons to provide public support. Although there are several types of goods that fall under this category, I focus on the research that has studied the relationship between public and private health insurance coverage. With the right identification strategy there is a significant amount of crowd-out. The more striking result, however, is the relatively low take-up rate of the public insurance program. The research in this area also highlights the importance of considering the manner of the public provision and how the difference in quality between the public and private goods affects the take-up rate and the level of crowd-out.

Across all strands of the literature, empirically identifying a negative effect has been difficult. Recent work suggests that there are several key issues we should consider when trying to assess whether crowd-out exists. It is important to carefully consider issues associated with the empirical specification and the quality of the data that are used for the analysis. Are there measures that are correlated with the public funding and the dependent variable that are difficult to measure but could bias the results? In addition, we should undertake to understand whether a change in government funding is exogenous. Government funding that is tied to politics or other aspects that also directly affect voter sentiment suggests that government funding is endogenous. A good statistical analysis will control for this endogeneity. A failure to

consider these statistical issues can distort the estimation of the effect of government funding on the dependent variable, resulting in drawing misleading conclusions.

We must also pay careful attention to the institutional environment under which the government program operates. The theoretical framework tends to be general with respect to institutional detail. Different settings, however, can affect whether we observe crowd-out and the attribution of the crowd-out to different players. For example, if publicly provided and privately provided goods are not perfect substitutes, it is important to consider how this could affect the relationship between the two sources of goods/funding. Similarly, if individuals are latent in their actions or if there are special features of the institutions that provide the publicly supported good, there may be other actors involved that can affect the crowd-out that is measured.

The paper proceeds as follows. Section II explores the statistical issues associated with identifying crowd-out and illustrates how researchers have addressed these issues across the three examples. Section III illustrates the importance of considering the institutional framework under which the government funding operates. Section IV provides a synthesis of the research discussed and a conclusion.

II. Empirical Context for Crowd-Out and Examples

A. *Empirical Context*

Across the different examples, the theoretical motivation for expecting a negative relationship between government funding and the dependent variable varies. These variations are discussed below. The empirical issues, however, are similar. The basic setup is to estimate the following equation:

$$Y_{it} = \alpha + \beta\,\mathrm{Govt}_{it} + \mathrm{Exog}_{it}\delta + \varepsilon_{it},$$

where Y is the dependent variable (e.g., state/local funding, private donations, private spending), Govt is the measure of government funding, Exog is a set of exogenous measures that help to identify variations in Y, and ε is an error term. The subscript i identifies the unit of observation (e.g., individual, state or locality, charitable organization), and the subscript t identifies the period the measure covers (e.g., year). The data can be cross-sectional and cover a single period. Most of the current research uses data with repeated observations for a set of units, allowing the researcher to observe differences across the units as well as within the units.

With a panel data set (also sometimes called a time-series, cross-sectional data set), one can control for unobserved heterogeneity across the cross section through a fixed-effects estimation. Under a fixed-effects specification, the constant term, α, contains a subscript i since the estimation includes a set of dummy variables that equal zero or one to identify time-invariant characteristics of the cross-sectional units. For example, if the cross-sectional unit is a state, the set of dummy variables equals the number of states under analysis. Each variable represents a single state, with the value of the variable equaling one for the observations for that state and zero for the observations for the other states. These dummy variables control for such things as size, geographic location, and time-invariant ideological perspectives of each state. If the cross-sectional unit is a charity, the dummy variable controls for such things as mission type, size, and time-invariant characteristics of the area in which the charity is located. These dummy variables help to control for expected differences between the dependent variable and the level of government funding across the units.

Crowd-out is measured by the coefficient on the government measure, β. Under ideal circumstances, this coefficient is unbiased, representing a statistically accurate measurement of the average effect from a change in government funding on the dependent variable. Most of the studies that seek to measure crowd-out rely on observational data derived from secondary sources. Nichols (2007) provides a synthesis of issues researchers face when using observational data for statistical analysis. In the context of crowd-out, there are numerous studies that suggest that we should be concerned about an upward bias (more positive) in the estimation of β.

The estimate of β can be biased because of endogeneity of the government funding measure and/or omitted variables that are correlated with the measure of government funding. The government funding measure is endogenous if there is a process by which the dependent variable and the government funding are jointly determined. A common source of endogeneity is attributable to the political process. Ultimately bureaucrats and politicians are responsible to the electorate. The mechanism for this responsibility is complicated. Baron and Ferejohn (1987, 1989), Besley and Case (2000), and Besley and Coate (2003) illustrate how the election process can affect bureaucratic and political decisions, resulting in government funding that is linked to political representation. If the dependent variable reflects voter preferences for the provision of the good or service in question, then we should be concerned about endogeneity of the government measure if the allocation of the government expenditure also reflects voter preferences.

For example, if voters are concerned about caring for the poor, their interests could translate into both giving to charities that help the poor and electing politicians who support government programs that are focused on the poor. It is fairly common to observe government and charitable goods aimed at alleviating poverty in areas with high poverty levels. Thus, across units of observations (e.g., neighborhoods) we should expect to observe neighborhoods with high and low levels of funding. A cross-sectional analysis of these neighborhoods would most likely result in a crowding-in effect. Similarly, within neighborhoods, if there is an increase in need, it would also be common to observe an increase in both private and public funding. From both a cross-sectional and within-unit perspective, it is important to control for these joint correlations. Otherwise, a statistical analysis could result in estimating a β that is positive or less than the predicted crowd-out. If the two types of funding are tied to the political process (via voter sentiment), however, a finding of no or smaller crowd-out would be fallacious.

A related but slightly different issue concerns potential omitted-variable bias. This type of bias results from the limited information researchers use for their analyses. In the equation above, the error term, ε, contains measures that affect the dependent variable that a researcher cannot easily observe. For example, it might be a dramatic event that would cause an increase (or decrease) in the flows of the dependent variable. If these omitted measures affect only the dependent variable and have no direct bearing on the government measure, the estimate of β is unbiased. If, however, this dramatic event also affects government funding, then excluding this measure from the estimation results in β being biased. An example might be a natural disaster that causes serious damage to the roads in a state. This damage would likely result in an increase in both state and federal funding to rebuild the roads. If this event is not observable to the researcher, the measure that would capture this event is in the error term. Another example of an omitted-variable bias is a case in which the researcher has incorrectly specified the relationship between the dependent variable and the government funding measure. In the example above, a linear relationship is assumed. If, however, the relationship is not a straight line, for example, the relationship has a curvature, then the exclusion of a higher-order term (e.g., government funding squared) would bias β as well.

The issues of endogeneity and omitted-variable bias can be addressed by using measures or events that allow for the identification of the exogenous part of government funding. The prominent statistical strategies are two-stage least squares (2SLS), a difference-in-difference or natural

experiment, and regression discontinuity. In a 2SLS analysis, the goal is to identify a set of measures (called instruments) that directly explain government funding but only indirectly affect the dependent variable. Government funding is predicted using these instruments (first-stage estimation), and then the predicted government funding is used to measure the crowd-out effect on the dependent variable (second-stage estimation). Political variables that capture control, seniority, or some other aspect of political power are a common set of measures. The expectation is that political party affiliation and more general characteristics of voter sentiment affect both government funding and the private provision of or demand for the good or service under study. Measures that reflect such things as seniority in Congress or membership on congressional committees capture aspects of government funding that may not be directly tied to the dependent variable. These latter measures may be used to predict the exogenous aspects of government funding.

To be effective, the instruments must strongly predict government funding. A researcher should report the *f*-statistic for the significance of the instruments in predicting government funding in the first-stage analysis. A high *f*-statistic suggests a strong relationship between the instruments and the government funding. In addition, the instruments should not have a direct effect on the dependent variable. Ensuring this is more difficult. There are statistical tests that should be reported that test the sensitivity of the inclusion of the instruments in the second-stage estimation. Part of what makes a measure a good instrument, however, is a convincing story of why it is a good instrument.

The idea behind a natural experiment is that there is a major unexpected change that affects public funding. An example of such a natural experiment might be an event that causes voter sentiment to change. For example, in the 1990s there was a vocal reaction to government-funded art exhibitions by the Republican Party around the time the Republican Party took control of Congress. It would be difficult to attribute the political turnover in Congress to the government funding of art. A consequence of the change in government was that overall funding to art organizations declined after this political change. Thus, one can treat the change in political leadership as a natural experiment and treat the change in government funding as exogenous. This allows one to measure crowd-out on the basis the effect from the change in government funding to arts organizations between the year before and the year after the turnover on private donations to these organizations.

A more elaborate way to exploit a natural experiment is to use a difference-in-difference technique. In this technique, there is an unexpected

change that affects government funding to one group but not to another. Ideally one can use data that contain observations for before and after the change for both groups. The group of observations that is not affected by the change is considered a "control" group and the group that is affected by the change is considered a "treatment" group. The observations for the control group are used to control for variations in the dependent variable that affect both the treatment and control groups. Under this type of analysis, the crowd-out measured for the treatment group is considered exogenous.[2]

Regression discontinuity is a variation in the development of instruments under a 2SLS type of estimation. Under regression discontinuity, the researcher observes a discontinuity in the treatment of different groups that is attributable to something exogenous such as a rule. The cleanest discontinuity exists if there is a rule with a specific but somewhat arbitrary cutoff. Providing funding under a program for children born after 1990 but not for those children born earlier is such an example. There are also examples of discontinuities that change aspects of the rules. For example, if the government funding is distributed through a formula, there may be aspects of the formula that change discontinuously. As illustrated below, the formula used for federal education funding is based on historical data on poverty. Just prior to the release of census data, the formula uses a poverty measure that is approximately 10 years old. If the poverty level has changed during those 10 years, on the release of new census data, we should expect the government funding to increase or decrease, in the direction of the change in poverty levels. This discrete change is unexpected and can be used to identify an exogenous variation in government funding.

There is no simple formula one can follow to identify an exogenous variation in government funding. The techniques discussed above have their strengths and weaknesses. Overall, a good analysis discusses the potential weakness of the approach taken and provides a justification for why the reader should believe that the analysis is accurately measuring the crowd-out effect from government funding.

B. Do Federal Block Grants Crowd Out State and Local Spending?

Over the last century, the federal government has become increasingly involved in funding state and local government-provided goods and services. The nature of the federal grants ranges from open-ended to capped grants for designated categories and/or programs that broadly support a variety of programs. Gramlich and Galper (1973) point out

that the effects of federal grants on state/local governments depend, in part, on the form of grant. The discussion of crowd-out is limited to analyses that focus on block or categorical grants. Bradford and Oates (1971) suggest that if a block grant is fungible, some or all of this funding results in the state/local government returning funds to its taxpayers. Yet most of the empirical studies, even a recent study by Evans and Owens (2007), find that an increase in funding by the federal government results in an increase in the total expenditures of the recipient state or local government.

Bradford and Oates (1971) use a model that assumes that the lower level of government is satisfying the preferences of the representative voter, given budget constraints. A grant from the federal government causes the state/local government's budget to increase. An increase in the budget should result in an increase in the overall spending on the good for which the federal funding is targeted (called an "income effect"). Because the state/local funding for the targeted good already maximizes local voter preferences, the local funding should also decline since the federal funds can be used as a substitute for the local funding, resulting in a decrease in the amount of taxes collected by the state/local government. Hines and Thaler (1995) estimate that spending should rise by only about 5%–10% from the income effect. The bulk of the change in state/local funding should be seen through the substitution effect.

The types of data used to measure the effect of federal funding on state or local expenditures are similar across most papers. Researchers rely on government-level data on spending and revenue. Given that we expect to observe the substitution effect through a reduction in the payment of state or local taxes, research could be improved if information on individual incomes and taxes paid were linked to government spending. As pointed out by Hines and Thaler (1995), if voter preferences are not accurately captured in government-level data, the crowd-out estimate is biased because of misspecification error. The bigger issue in this area of research, however, is endogeneity. These studies concern two or more levels of government funding, and each level is responsible to its electorate. Thus, it is reasonable to be concerned about the funding for each level to be tied to voter sentiment.

Knight (2002) studies the effect of federal highway funding on state spending. Knight frames the endogeneity issue by considering the bargaining that occurs within a congressional committee when there are states with differing needs for highway funding. While most of the federal highway funding is allocated under a formula, Knight provides

compelling evidence that the components of the formula are subject to political considerations. He uses a set of instruments that reflect membership, party affiliation, and tenure on the transportation committee. His results demonstrate that if one ignores the issue of endogeneity, one would erroneously conclude that an increase in federal funding results in an increase in state funding. After controlling for the endogeneity of the government grants, the estimates suggest that the federal grants crowd out state spending, by a range of $0.88–$1.12 per dollar of federal funding.

Gordon (2004) examines the effects of the Title I program for education—a significant initiative by the federal government to support elementary and secondary education. Title I was first enacted in 1965 as part of a series of measures designed to tackle poverty. Understanding the relationship between different layers of government funding for education is difficult given that revenues come from local, state, and federal governments. A change in federal government funding, thus, can affect the revenues collected at both the local and state government levels.

Gordon (2004) also is concerned with the endogeneity of the federal program. The Title I funds are allocated under a formula that includes state-level education spending. This and other complexities of the formula provide a credible argument for treating the federal funding as endogenous. Gordon relies on a discontinuity in the formula to identify the federal funding. The formula relies on decennial census data to identify poverty levels in the United States. This reliance creates a discontinuity between the reported and actual poverty levels. This is especially prominent around the time when census data are released. Upon the release of census data, the poverty measures used in the formula are updated. If there have been dramatic changes in poverty rates from one census to the next, the distribution of grants across the states also changes dramatically. Gordon uses this change in funding as an instrument for the federal funding a school district receives under Title I.

Gordon (2004) studies the effect of federal funding on both local and state educational funding. In the first year of a change in funding, there is no measurable effect on local funding. There is, however, a significant amount of crowd-out in the second and third years of funding. On average, she finds a crowd-out that is close to a dollar for every dollar received in federal funding.

The effects of a change in federal funding on state education funding are less clear. Over time Gordon observes a high degree of crowd-out between federal funding and state formula aid funding to a school district. There is no measurable crowd-out of state categorical aid. Moreover, the

crowd-out of state funding is observed only if the state gains Title I funding. There is less evidence of crowd-out in states that lose Title I funding.

C. *Do Government Grants for Charitable Goods Crowd Out Private Donations?*

Researchers have been trying to measure the effect of a change in government funding for privately provided charitable services on private donations since the late 1970s. The theoretically expected change in private donations from an increase in government funding depends in part on the underlying motivation for the private donation. Andreoni (2006) illustrates that if individuals are solely altruistic in their giving, care only about the provision of the good, and are indifferent between giving directly and giving indirectly by being taxed, we should expect that an increase in government funding (via taxation) results in a decrease in private donations, dollar for dollar. This result holds even if some taxpayers do not donate provided that the number of potential donors in the population is large (see, e.g., Bergstrom, Blume, and Varian 1986; Andreoni 1988). If, however, individuals are more than altruistic and receive a private benefit from giving ("warm glow"), government funding crowds out individual contributions but at a rate that is less than dollar for dollar (see Andreoni 1990, 2006).

A key data issue is finding a data set that permits a suitable match between private and public funding.[3] Most researchers have resorted to using data aggregated at the charity level. A benefit to using charity-level data is that the researcher can observe private and public funding received by the charity and a panel data analysis can be used. In the United States, researchers have used charity tax returns, data on international relief organizations, and data on postsecondary institutions from surveys collected by the government. Early studies using U.S. data were limited to a random sample of charity tax return data. Starting in 1998, machine-readable data for all charities that file tax returns and whose revenues exceed a minimum threshold became available to researchers.

With charity-level data, researchers can control for heterogeneity in the provision of the charitable goods because of differences in such things as the organizational structure of the charities, the type of good or service being provided, and the reputation of the organization. Researchers can also segregate their analysis on the basis of the type of charitable goods or services being provided. This aspect is important given that the motivations for giving may differ on the basis of the type of good being

provided. For example, the motive for giving may be more altruistic for gifts to poverty-related organizations than for artistic or education-related organizations.

A downside to using charity-level data is that one cannot study the crowd-out effect on individual donors. Instead the relationship represents the average effect across all donors and donor types. A second downside to using data based on the charity's revenues is that we cannot observe the entire reaction by a donor to a change in government funding. If, for instance, government grants to charities increase and private donations to that charity decrease, do the donors to this charity stop giving or do they just stop giving to that particular charity? If these donors continue to give, do they give to charities that are providing a type of good similar to that of the initial charity? A third downside to using charity revenue data is that the quality of the data depends on the attention given to filling out the forms that reflect the charity's revenue and expenditures. In most instances, these data come from the tax returns filed by the charities with the federal government. Given that charities pay no taxes, the likelihood that a given charity is audited by the government is lower than for taxpaying organizations. In addition, many charities are run by volunteers, and so the quality of the information reported on the tax return is likely to be quite noisy.

The key empirical issues are endogeneity and omitted-variable bias. Payne (1998) raises this issue in the context in which the government officials awarding the grants to charities are elected by the individuals who donate. Payne (1998), Hungerman (2005), Gruber and Hungerman (2007), and Dokko (2009) address this endogeneity issue. The first three papers address endogeneity by using a 2SLS specification. Payne and Hungerman explore the effects of changes in social welfare funding for social service organizations and religious organizations, respectively. Payne uses data that match government grants and private donations to a group of more than 400 charities. She controls for endogeneity by using instruments that identify government spending levels for similar types of services within the area in which the charity is located. Hungerman uses data that match contributions to a set of more than 9,000 Presbyterian churches to per capita government welfare spending in the area in which the church is located. His instrument is based on the 1996 welfare reform, which affected noncitizens differently from citizens. Both of these papers suggest that crowd-out is in the 40¢–70¢ range. This estimate has been recently confirmed in Andreoni and Payne (2009) using a data set that has more recent data that cover a greater set of organizations and a specification with stronger instruments.

Gruber and Hungerman (2007) step back in time to explore the effects of the Depression's New Deal spending on church contributions at approximately 50,000 churches from different denominations. Their instrument is based on the strength of the congressional delegation in the area in which the church is located. Their measure of crowd-out, however, is quote low, suggesting that for every dollar of New Deal spending, church spending per capita declines by only 5.7¢ per church member. An issue with church spending, however, is that church spending on activities that are comparable to the New Deal spending is relatively small when compared to the amount of government spending under the New Deal programs.

Dokko (2009) exploits a natural experiment resulting from the change in political leadership in the U.S. House of Representatives in the 1994 election to explore the effects of a dramatic decline in the allocation of funding to the National Endowment of the Arts. She compares the grant allocations and private donations made to arts organizations in 1995 to those made in 1996. She measures a crowd-out of approximately 60¢ per dollar.[4]

D. Does Government Support Crowd Out Private Goods and Services?

The final type of crowd-out estimation covered in this paper is the crowd-out associated with the government support of goods supplied to individuals. I focus on the literature that has sought to understand better the effects of providing publicly funded health insurance coverage on the use of private health insurance. This type of crowd-out, however, might be observed when thinking about public provision or subsidization of education, public support of housing and households, or the government subsidization of research and innovation.

Peltzman (1973) provides a framework for thinking about this issue. The underlying assumption is that individuals have different preferences toward health insurance coverage, subject to a budget constraint. This results in high and low demanders for insurance. If the government introduces public insurance programs, we should expect some individuals to switch from private to public insurance coverage. The story, however, is not this simple. Public insurance, historically, is not a perfect substitute for private insurance. The types and level of services covered tend to be lower, and often there is a stigma associated with public insurance programs targeted to low-income families. In addition, most private insurance is provided through one's workplace. Cutler and Gruber (1996) demonstrate that even with these wrinkles, we should expect a reduction

in private insurance coverage by individuals who are eligible for public insurance coverage.

Cutler and Gruber examine the effect of expanded public health insurance in the 1990s on the crowd-out of private insurance. Their identification strategy is to use data on children and women to estimate the effect of own public insurance eligibility on own insurance coverage, after controlling for individual characteristics and state and year effects. Recognizing that public insurance eligibility is endogenous, they use a 2SLS strategy instrumenting public insurance eligibility with measures that reflect the legislative environment in the state and year in which the individuals under study live. They identify a significant amount of crowd-out of private insurance.

Card and Shore-Sheppard (2004) adopt a different identification strategy, use different data, and measure a smaller crowd-out effect. These results are attributed to two key things. First, they exploit a discontinuity in a feature of the changes in the public health insurance program. They examine two changes to the program. In the first change, the program was expanded to cover pregnant women and children up to the age of 6 whose family incomes fell below 133% of the federal poverty level. The second expansion extended coverage to children born after September 30, 1983, to families whose incomes fell below 100% of the federal poverty line. Each of these changes resulted in the ability to identify groups that were on either side of the cutoff allocation. This strategy allows one to use the group that did not qualify for the program as a control group and the group that just qualifies for the program as a treatment group. Through the identification of treatment and control groups, Card and Shore-Sheppard are able to identify whether the public insurance program crowds out private insurance.[5]

Card and Shore-Sheppard's analysis suggests that the take-up rate of the public insurance programs after the policy changes was low, and this resulted in little crowd-out between public and private insurance programs. They replicate the earlier work by Cutler and Gruber (1996) and demonstrate that the earlier results are sensitive to whether the estimation specification includes/excludes age and income measures.

Gruber and Simon (2007) have continued the exploration of whether public insurance programs crowd out private insurance programs. They consider further the empirical estimation and whether income should be treated as an endogenous measure insofar as the distribution of children into the treatment and control groups is a function of family income. By considering more carefully the role played by income, Gruber and Simon

provide evidence that crowd-out exists and is quite strong, ranging from 47% to 92% of federal funding.

III. Importance of Institutional Details When Estimating Crowd-Out

The last section discussed the importance of considering statistical issues when estimating crowd-out. This section discusses the importance of considering the context under which the federal funding is being provided. Across the three contexts, the theoretical frameworks are generally straightforward. Most start with some aspect of individual behavior and an aspect of the good or service that suggests that, if there were no government support of the good, it would be underprovided. For example, if built solely with state funding, interstate highways will cater to the needs of the voters of that state. The state is likely to ignore the needs of users of the interstate system who reside outside of the state. While the theoretical framework is sufficient to capture the essence of why we would expect a crowd-out effect, it may not capture other constraints or features of the funding or the delivery of the goods and services to explain why we might not measure crowd-out. Alternatively, if crowd-out is measured, how can it be counteracted? Are there policies that can be implemented that encourage an efficient level of good or service provision? For the three areas of research, I highlight the issues that could affect the measurement or the interpretation of crowd-out.

A. Constraints Placed on State and Local Governments

A recent paper by Brooks and Phillips (2008) studies the effects of the federal government's Community Development Block Grant (CDBG), the federal government's largest program providing aid to cities, on local government responses. The CDBG is distributed to local governments via a formula. Unlike Knight (2002), Brooks and Phillips argue that the formula used to distribute the federal funding is exogenous since it is based on a given city's need relative to all other cities, limiting the ability of the federal government to direct funding to a given city for political reasons.

Brooks and Phillips (2008) suggest that there is a flypaper effect from the government program. A key insight of this study is a careful consideration of what drives the flypaper effect. The theory assumes that local governments maximize voter preferences given budget constraints. Local governments are also assumed to have no additional constraints on

the extent to which they tax their citizens. In recent decades, however, state governments and/or state referenda have imposed tax and spending limits on some city governments. These limits restrict a city government's ability to raise an efficient level of revenue to cover the costs of their programs. Brooks and Phillips show that part of the observed flypaper effect is due to these limitations. Thus, in these instances, local governments may use the federal funding as a supplement that enables them to provide a level of goods or services that meets their voter preferences.

B. The Source of Crowd-Out for Charitable Goods

The bulk of the theory on the crowd-out of charitable giving ignores that most charitable goods and services are delivered by an organization. Most of the theoretical literature on this issue also does not address the fact that many individuals are latent donors and give only when asked to give. As a result, most charities must engage in fund-raising efforts. Andreoni and Payne (2003, 2009) tackle this issue to explore the extent to which charities change their behavior toward fund-raising when they receive government funding and how this affects the measurement of crowd-out. If charities are more concerned with service provision than revenue growth, they may not be net revenue maximizers. Instead, charities may view fund-raising as a necessary evil and fund-raise only if it is needed. Receiving a government grant could reduce fund-raising efforts, resulting in a decline in donations that is more attributable to a change in charity behavior than a change in individual donor behavior.

Adding the component of fund-raising complicates the estimation of crowd-out even further. One wants to measure the effect of a change in government grants and a change in fund-raising behavior on private donations. Fund-raising behavior, however, also depends on government grants, and we remain concerned about the endogeneity of the government funding measure. Andreoni and Payne (2009) illustrate one method to address the estimation issue using a 2SLS framework. On the basis of a panel of more than 8,000 organizations that provide support social services, their results suggest that government funding crowds out private donations by approximately 72¢. The crowd-out attributable to changes in private donor behavior ranges from 30% to a slight crowd-in, and the remainder is attributable to a decrease in fund-raising effort by the charity. Thus, the bulk of crowd-out can be attributable to actions taken by charities, suggesting that government policy

taken to counteract crowd-out may want to consider the role played by charities in their solicitation of private funding.

Another consideration is whether the role of government funding is just as a funding source. The discussion to this point assumes that individuals are fully informed prior to making their decision. In some contexts, individuals may not have the expertise to be fully informed. For example, with respect to funding for scientific research, a private donor may not have sufficient information to assess the quality of the research. Most government funding for research is allocated on the basis of a peer-reviewed assessment, ensuring that the funding is allocated to the best projects. Private donors, thus, may look to the government funding of research as a signal of quality. If this is the case, we should expect private donations to increase with an increase in government funding. Payne (2001) illustrates these points and finds a positive crowd-in effect from government research funding on private donations at research-intensive universities and a crowd-out effect on less research-intensive post-secondary institutions.

A third aspect of crowd-out is to consider the sociodemographics of the private donors. Can the profile of a community from an age, income, or racial perspective affect the measurement of crowd-out? Hungerman (2007) illustrates this point. He uses data from a panel of Methodist churches between 1984 and 2000 to study the effects of the post-1991 expansion of the supplemental Social Security program on church spending. His source of exogenous variation in the government funding is the 1991 Supreme Court ruling requiring the program to expand its coverage to include children. While he observes crowd-out in communities that are relatively homogeneous, he presents evidence of minimal crowd-out in the more heterogeneous communities.

C. Is Public Health Insurance the Same as Private Health Insurance?

Gruber and Simon (2007) illustrate a high level of crowd-out between public and private insurance. Gruber and Simon (2007) and Shore-Sheppard (2008), however, document an aspect of the public health insurance program that affects the measurement of crowd-out. Both papers highlight the fact that the take-up rate of the public insurance programs is relatively low. Gruber and Simon show that the take-up rate is relatively low, especially in cases in which children were previously covered by a private insurance program. In part this is attributable to government procedures designed to counteract crowd-out. Gruber and Simon further demonstrate that the low take-up rate is due to a consideration of family

coverage. If a child is eligible for public coverage but not the parent, a working parent who receives coverage through her employer is less likely to switch from the private to the public insurance programs. When family eligibility is considered, Gruber and Simon find greater evidence of switching to public insurance coverage in families in which most members are eligible for the public insurance coverage.

The low take-up rate raises another question, namely, what is different about the public and private insurance systems that makes the two systems to not be considered as substitutes? Unlike the other two areas of crowd-out examined in this paper, the public insurance system represents a service that is delivered by the government. The other examples study a role played by the government as financial supporter. Thus, in considering the issue of crowd-out, one should consider the mechanism of support by the government. When the good that is supported by the government is of a different (especially lesser) quality than the good that is provided privately, crowd-out of the private good may be welfare reducing. Brown and Finkelstein (2008) illustrate that individuals switch from private to public insurance programs despite there being a lower level of health benefits under the public insurance program.

IV. Discussion and Conclusion

Across the three strands of research covered in this paper, there is a plethora of research that would suggest that the theoretical prediction of crowd-out is not justified empirically. As illustrated in table 1, however, a smaller subset of the research in these areas suggests that crowd-out exists. Many things distinguish this latter research from the former. This paper illustrates the key features of quality empirical analyses. It also provides some caveats. A good empirical analysis considers general issues concerning data quality and the ability to match data on government behavior with the dependent variable. It also carefully considers the empirical estimation and explores the potential endogeneity of government funding as well as omitted-variable bias. Finally, it considers the strengths and weaknesses of the approach taken to address the statistical issues.

Across the papers discussed there were several methods used to address the issue of endogenous government funding and/or omitted-variable analysis. The most common approach is to identify a set of measures that predict government funding but have no direct prediction of the dependent variable under study. Knight (2002) and Andreoni and Payne (2009) illustrate the use of political seniority and/or committee

Table 1
Summary of Crowd-Out Research

Author(s)	Infusion of New Funding	Type of Existing Funding	Description of Data Used	Identification Strategy	Summary of Results
	Effects of Federal Funding on State/Local Expenditures				
Knight (2002)	Federal highway aid program	State highway spending	State-level data on federal highway aid, spending on highways/streets, congressional membership, transportation committee membership	2SLS using federal legislature party affiliations, tenure, and committee participation as instruments	Crowd-out of state spending ranges between 0.88 and 1.12
Gordon (2004)	Title I federal education grants	State/local education spending	School district data on Title I grants, revenues, and expenditures by category	2SLS using differences in reported poverty rates in 1990 Census and expected poverty rates based on 1980 Census as instruments	Local revenue is crowded out under a 2- or 3-year period, ranging 0.95–1.2; evidence of crowd-out of state formula aid over a 3-year period of −1.2; no evidence of crowd-out of state categorical aid; greater evidence of crowd-out when the state gains Title I funding
Brooks and Phillips (2008)	Community Development Block Grants	Local spending	Municipal data on spending, tax, and spending limitations, and CDBGs	OLS on the argument that the block grants are a formula that cannot be manipulated by politicians or bureaucrats	Crowd-in of local spending that increases in localities that face tax and spending limitations

(continued)

Table 1
Continued

Author(s)	Infusion of New Funding	Type of Existing Funding	Description of Data Used	Identification Strategy	Summary of Results
	Government Grants on Private Donations to Charities/Churches				
Payne (1998)	Government grants to social service charities	Private donations	Charity tax return data	2SLS using state-level funding of welfare transfers to individuals	Crowd-out of private donations is approximately 0.50
Payne (2001)	Government research grants to colleges and universities	Private donations	Revenues and expenditures reported by universities	OLS and 2SLS with university fixed effects	Crowd-out of private donations is approximately 0.45 for liberal arts colleges and 0.09 for universities whose highest degree offered is a master's degree; crowd-in for research universities
Hungerman (2005)	State-level welfare expenditures	Church spending on benevolent activities	Church data for group of Presbyterian churches and government spending data at the state level	2SLS using welfare law changes (post-1997) × share of noncitizens living in the community	Crowd-out of church spending ranges from 0.40 to 0.67
Gruber and Hungerman (2007)	New Deal government relief spending	Church spending on benevolent activities	Church data for churches across several denominations	2SLS using tenure on House Appropriations Committee × post-1932 year dummy variable	Crowd-out of approximately 0.029 of church spending.
Dokko (2009)	Government funding to arts organizations	Private donations	Charity tax return data and state art council data	OLS using the change in political control of U.S. House of Representatives as source of natural experiment	Crowd-out of private donations range of 0.57–0.63

Hungerman (2007)	Supplemental Social Security funding	Church spending on benevolent activities	Church data for group of Methodist churches and government spending data at county level	2SLS using as instruments post-1990 dummy variable × share of impoverished children, and post-1990 dummy variable × share of impoverished children × diversity measure	Crowd-out of per-member church spending is substantially greater in homogeneous communities than in heterogeneous communities
Andreoni and Payne (2009)	Government funding to social service organizations	Private donations and charity expenditures	Charity tax return data and tenure and party affiliation of congressional respresentation	2SLS and LIML estimates of effect of government grants on private donations and charity fund-raising efforts	Total crowd-out of private donations by approximately 0.47; approximately 32% of this is attributable to a direct reduction in private donations and 68% is attributable to a reduction in fund-raising efforts
	Government Support of Privately Consumed Goods				
Cutler and Gruber (1996)	Public insurance	Private insurance coverage	Current Population Survey	2SLS using an instrument derived from simulated eligibility based on entire nation	Crowd-out of coverage for children range 31%–40%; crowd-out of coverage for families approximately 49%
Card and Shore-Sheppard (2004)	Public insurance	Private insurance coverage	Survey of Income and Program Participation	Regression discontinuity/ difference in differences are discrete change in eligibility	No crowd-out observed but may be attributed to low take-up rate of public coverage
Gruber and Simon (2007)	Public insurance	Private insurance coverage	Survey of Income and Program Participation	2SLS using an instrument derived from simulated eligibility based on entire nation	Crowd-out of coverage for children range 24%–37%; crowd-out of coverage for families approximately 61%–68%

Note: 2SLS = two-stage least squares; OLS = ordinary least squares; LIML = limited information maximum likelihood.

membership as effective instruments. Other researchers such as Card and Shore-Sheppard (2004) and Gordon (2004) have used discrete changes in the formulas to develop a set of simulated predictions of the government funding that are used as instruments. An alternative to 2SLS is to identify a natural experiment such as the one used by Dokko (2009), which used the change in the majority party in Congress to explore how changes in government funding affected private donations to arts organizations.

An equally important issue is to consider the institutional setting under which the government funding is provided. The research has highlighted many examples in which the nature of crowd-out is affected by the institutional detail. With respect to the provision of public health insurance, several researchers have highlighted the concern of a low take-up rate. This low take-up rate can affect whether one measures a crowd-out effect. With respect to federal block grants, we should be concerned with whether the state or local government receiving the grant is operating under a fiscal constraint that prevents it from providing the locally optimal level of goods or services. As illustrated in Brooks and Phillips (2008), cities that were subject to tax and spending limits were less likely than those not subject to tax and spending limits to engage in crowd-out behavior from the receipt of federal block grant funding. The studies on charitable giving illustrate the importance of considering the mechanisms under which the good is provided and issues concerning community diversity. As illustrated in Andreoni and Payne (2009), if charities are not profit maximizers and if individuals give only if asked to give, increased government funding may crowd out private donations because of a change in the behavior of the charity.

Finally, the mechanism of support should be considered. In most of the examples discussed in this paper, financial support is given. Direct government provision, as in public health insurance coverage, is also a possibility. Crowd-out and other inefficiencies can be exacerbated if the government-provided good is not similar to the privately provided good.

Why is it important to understand these empirical and institutional issues? Government provision is predicated on an observed underprovision of the good if left solely in the hands of the private market (or local government). In addition, the government funding used to support these goods and services is often raised under a distortionary tax system. Depending on the level of crowd-out, if it is found to exist, government support may create more waste than help.

To ensure that government funding increases the level of the goods it is supporting, policy makers must consider how best to combat crowd-out. At the same time, as illustrated in the concern about low take-up rates for public insurance programs, policy makers must ensure that their efforts to counteract crowd-out do not result in negative unintended consequences.

What is lacking in the research is a better understanding of what measures help to combat crowd-out. Matching grants are often suggested as a means to combat crowd-out. Brueckner (2000), for example, discusses the importance of matching grants as they relate to welfare reform. Brueckner discusses the 1996 changes to the federal programs for supporting state government spending on welfare programs. These changes included a switch from a matching grant to a block grant formula for distributing federal funding to state governments. While block grants give states more latitude in how to use the funding, they also provide the states with an opportunity to redirect their spending on welfare programs to other types of programs or to provide a tax reduction to its residents. As Brueckner points out, there are other considerations that should be taken into account when considering whether to use a matching or block grant method of allocation. These things include the administrative complexities of a matching grant program and a consideration of satisfying taxpayers' interests.

Another potential means to combat crowd-out is for the government to consider more carefully its role in providing full funding for a good or service through the direct production of the good or service or in the financing of the production costs. In the last few decades there has been an interest in downsizing government and in finding private alternatives to support all or part of previously publicly provided goods and services. There is limited research on understanding whether transferring part of the government support to private organizations results in any type of crowd-out behavior.

In summary, this paper illustrates that crowd-out exists—at least sometimes. Empirical estimation of crowd-out is complicated, and there are many institutional features and other considerations that affect whether there is crowd-out of a given government program. When enacting new programs and modifying existing programs, policy makers should consider the potential for crowd-out. In addition, more research is needed to understand which types of policies best combat crowd-out.

Endnotes

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1. In some cases, theory predicts "crowd-in," which results in an increase in private funding when government funding is increased. Payne (2001) illustrates this in the context of studying the effect of research funding on private donations to research-intensive universities.

2. If there are more groups that can be studied, another method is to develop a difference-in-difference-in-difference estimator. Jensen (2004) uses such a strategy to study the effect of public transfers on private transfers to households in South Africa.

3. See Brown and Lankford (1992), Day and Devlin (1996), and Simmons and Emanuele (2004) for analyses that focus on the effect of government funding on volunteer donor time.

4. Dokko relies on a data set that reports only total private and public donations and so must back out the amount of the donations that are attributable to government funding. Thus, her measure of private donations will be noisy if she has not properly attributed the funding across private and government funding channels.

5. This identification strategy, however, estimates a "local effect" insofar as it is centered around the discontinuity and compares those individuals who barely qualify for public insurance and those who barely do not qualify for public insurance.

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