Crowding Out in Public and Private Funding for Medical Research

by

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Abstract

Numerous studies have been conducted that examine the relationship between private and public sector spending on public goods, providing both theoretical and empirical evidence that public sector spending crowds out private sector spending. The empirical tests that have been conducted do not examine medical research, which is an important public good that receives both public and private funding. This paper examines the interaction between public funding - through spending by the National Institutes of Health - and private funding - through private foundation grants - for medical research. An empirical analysis is conducted using NIH spending and private donations to specific types of disease research for years 2003-2012, testing for crowding out in both directions of causality. Changes in total spending were analyzed, as well as fluctuations in how total NIH spending and total private medical research grants are distributed amongst various disease categories and research areas. This empirical analysis finds evidence of NIH spending crowding out private donations.

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Table of Contents

I. Industry Structure

Public Sector

The National Institutes of Health functions as the government's primary channel for funding medical research conducted in government laboratories, as well as research conducted by universities and private institutions. There are a total of 27 institutes within the NIH that focus on separate areas of medical research (for institute list, see *NIH Institutes*). State-sponsored medical research funding traces back to the 19th Century, but was not formalized until the passing of the Ransdell Act of 1930, which established the NIH[1]. As of 2013, approximately 83% of the NIH budget was dedicated to extramural research, funding projects conducted by more than 300,000 non-federal researchers and supporting staff at more than 2,500 research institutions nationwide. 11% of the budget funds in-house research conducted by researchers working in NIH laboratories or at the NIH's Clinical Center and the remaining 6% provides for administrative and organizational activities[2].

[1] "Chronology of Events - Historical Data - The NIH Almanac - National Institutes of Health (NIH)." U.S National Library of Medicine. U.S. National Library of Medicine, n.d. Web. 7 Apr. 2015. <http://www.nih.gov/about/almanac/historical/chronology_of_events.htm>.

[2] Johnson, Judith A. "Brief History of NIH Spending: Fact Sheet." Congressional Research Service (n.d.): n. pag. 23 Dec. 2013. Web. <https://www.fas.org/sgp/crs/misc/R43341.pdf>.

Private Sector

Medical research is also funded by the private sector, which includes a large amount of philanthropic support from private non-profit foundations. The Council on Foundations defines private foundations as those that make grants based on charitable endowment funds. The three major types of private foundations listed by the Foundation Center include independent foundations, corporate-giving programs, and grant-making operating foundations[3]. These three categories are all designated under the 501(c)(3) Internal Revenue Code classification. Though they are not legally defined as being separate from one another, however, the Council on Foundations does make distinctions between all three. Independent foundations are distinct from private foundations in that their activities and spending practices are not governed by their benefactor(s)[4]. Corporate-giving foundations are separate legal entities created by corporations to manage their charitable donations. Though some corporate-giving foundations can be established as public foundations and receive public support, the corporate-giving foundations examined in this paper are controlled and financed privately by individual corporations. Operating charities are private

[3] "Grantmaking Foundations Nationwide, 2011 Stats about the Number of Foundations, Assets, Giving, and Gifts Received by All Active Grantmaking Foundations in the U.S." Foundation Stats: Guide to the Foundation Center's Research Database. N.p., n.d. Web. 10 May 2015.

[4] "Independent Foundations." Council on Foundations. N.p., n.d. Web. 5 May 2015. <http://www.cof.org/foundation-type/independent-foundations>.

foundations that do not have to pay out 5% or more of its assets each year as the other private foundations are required to do, but are required to conduct their own charitable purposes instead[5].

There are numerous factors that could affect the spending behaviors of public and private sources of research funding. NIH spending is largely determined by the budget it receives from Congress. Each year, the NIH receives a budget from Congress that includes budget allocation and spending guidelines approved by Senate subcommittees. Therefore, the total budget received by each institute comes at the discretion of Congress. Except for budgets for particular types of disease research that are specified by the Congressional budget, each institute determines how it will distribute its amongst the various research areas it focuses on[6]. The NIH institutes do not expressly budget according to disease category, but instead decide their spending through the approval of individual grants for specific research projects[7]. Consequently, factors that are taken into account when approving grant requests, such as the quality of the project proposals and likelihood of successful research, affect the spending of each NIH institute by dictating what research areas it supports.

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[5] "Foundation Basics." Council on Foundations. N.p., n.d. Web. 1 May 2015. <http://www.cof.org/content/foundation-basics>.

[6] Kaiser, Jocelyn. "Within NIH's Flat 2015 Budget, a Few Favorites." Science. N.p., n.d. Web. 8 May 2015. <http://news.sciencemag.org/funding/2014/12/within-nih-s-flat-2015-budget-few-favorites>.

[7] "Categorical Spending." NIH RePORT. N.p., n.d. Web. 10 Apr. 2015. <http://report.nih.gov/categorical_spending.aspx>.

There are also several factors that affect private spending. Independent foundations may budget according to the personal objectives of their benefactors. These foundations may, for example, allocate more money to donate to a certain disease if the benefactor has been affected by it. Likewise, corporate-giving programs may concentrate on research areas that relate in someway to the corporation.

The relationship between the public and private sources of funding is also an important factor that may affect what type of research each sector decides to fund as well as the aggregate level of funding for medical research as a whole. Private foundations may reduce their donations to medical research in response to an increase in overall NIH spending. Alternatively, this crowding-out effect could also occur in the opposite direction, where the NIH may reduce its spending in response to an increase in private donations to medical research. Furthermore, medical research funding can be broken down into disease-specific funding and crowding-out can occur in both directions within a specific type of disease research. For example, private foundations may reduce their spending on AIDS research in response to an increase in government spending on AIDS research by the National Institute of Allergy and Infectious Diseases. This paper explores the interaction between public and private donations to medical

research on the whole, as well as how this interaction plays out within specific types of research.

II. Past Literature

Literature on crowding out with has proposed both theoretical and empirical evidence for its existence with regards to provision of public goods. Work by Warr (1982) and Roberts (1984) provide a theoretical framework showing that exogenous increases in government funding to charities results in a dollar-for-dollar decrease in private donations to those same charities[8]. Kingma (1989) provides empirical evidence for crowding-out, examining charitable donations to public radio[9]. However, this evidence showed crowding-out at a rate less than the one-for-one proposed by Warr and Roberts.

Empirical investigation has been taken further in more recent years that explore the possibility of alternative relationships that could exist between public and private sector spending. Heutel (2010) provides an empirical test for crowding out in both directions, examining donations to charities involved in crime, employment, food and nutrition, housing, human services and

[8] Warr, Peter. 1982. "Pareto Optimal Redistribution and Private Charity." *Journal of Public Economics*, 19(1): 131-38.

[9] Kingma, Bruce. 1989. "An Accurate Measurement of the Crowd-Out Effect, Income Effect, and Price Effect for Charitable Contributions." *Journal of Political Economy*, 97(5): 1197- 1207.

community improvement[10]. Though Heutel finds additional empirical evidence of government spending crowding out private donations, none can be found for crowding out in the opposite direction[11].

Seeing as medical research has been excluded from the empirical tests that have been conducted on crowding out, this paper will focus directly on medical research funding, testing for crowding out in both directions. More specifically, the paper's primary objective is to analyze whether changes in the NIH's budget allocations for specific types of disease research result in changes in how private foundations distribute their charitable funds among different types of disease research, and vice versa. Crowding out may not exist as a function of total spending on medical research, but rather as a function of the spending on research for a particular disease. In other words, changes in total NIH spending may not have any effect on the total amount spent on medical research by private donations, but private donations to a particular disease may respond to the NIH allocating more of its budget to a particular institution. For example, private foundations may reduce spending on AIDS research and allergies research in response to the NIAID receiving more money out of the total NIH budget. Alternatively, private foundations and the NIH might react simultaneously to

[10] Huetel, Garth, 2009. "Crowding Out and Crowding In of Private Donations and Government Grants," NBER Working Papers 15004, National Bureau of Economic Research, Inc.

[11] Huetel, Garth, 2009. "Crowding Out and Crowding In of Private Donations and Government Grants," NBER Working Papers 15004, National Bureau of Economic Research, Inc.

changes in need or scientific climate, leading both to increase or decrease spending to a particular research area at once.

III. Data Collection

NIH Spending

NIH expenditure was measured for years 2003-2012 using the spending history published[12] by the NIH titled "Actual Obligations, FY 2000 - FY 2014". The total of all spending obligations met by each institute under the NIH for each year was recorded. Total spending by the NIH was taken from the NIH's "Actual Total Obligations, FY 2000 – FY 2014."

Spending by each NIH institute was then calculated as a percentage of the NIH's total spending for each year. For example, the National Cancer Institute (NCI) spent $4.595 billion in 2003, which was 17.19% of the $26.7 billion in total spending by the NIH in 2003.

The 27 institutes that operate under the NIH were then categorized based on their fields of interest as stated on the institute-specific websites. Of the 27 institutes, 16 institutes spent directly on specific types of disease research. For example, the National Institute of Diabetes and Digestive and Kidney Diseases

[12] "Actual Obligations, FY 2000 – FY 2014." National Institutes of Health. *Office of Budget*. Web. 12 May 2015

lists diabetes, digestive disease and nutrition, endocrine and metabolic disease, hematologic disease, kidney disease, liver disease, obesity, and urologic disease under its primary research areas (for a complete list of institutes, see *Appendix I*). The remaining 11 institutes had either broad spending categories that could not be tied directly to specific disease research, spent money on subjects that could not be described by any of the grant subject categories specified in the FDO database, or supported activities that are specific to the government and are not funded by the private sector. For example, the NIH Clinical Center (CC) is a research hospital that houses NIH-conducted research, which is conducted entirely by NIH researchers and does not receive funding from private foundations.

Private Foundation Spending

Private sector spending was measured using data on private sector grants from the FDO database. The FDO website has multiple databases to select data from, including a "Grantmakers" database, which provides information on grant-making foundations, as well as a "Grants" database, which provides information on the grants made by these foundations. Information on individual grants - including the grant-maker name, the recipient organization, the total value of the grant, the year the grant was made, and the grant's "subject area" -

was collected from the Grants database. The FDO categorizes all grants according to the intended purpose of the grant, which is listed under "subject area." For example, the FDO would categorize a grant to fund research involving metastatic tumor cells under the broad category of "Health" and the subcategories of "Medical research," "Cancer," and "Cancer research."

For each of the 16 NIH institutes, whose budgets are dedicated to funding research for a specific subject or disease category, a list of equivalent subject categories used by the FDO database was compiled (*see Appendix I*). FDO subject categories were determined by sorting through the primary interests of each institute, which are published on the individual institute's website, and matching these interests to a relevant category or subcategory from the FDO grant subject area list. Information on all grants made to each of these subject categories in years 2003-2012 were then collected using an HTML scraping program written in python.

Since the Grants database does not allow users to search grants based on the "type of grant-maker" (independent foundation, operating foundation, etc.), the dataset included grants made by public charities or government-linked foundations, which had to be removed from the dataset. This was accomplished by compiling a list of all public charities and government-linked foundations listed in the FDO Grantmakers database and removing all grants from the

dataset whose grant-maker name was contained in the list of public charities and government-linked foundations.

The total annual spending for each subject category was recorded as the sum of all grants made to each subject that were greater or equal to $1000 (for total annual donations per category *see Appendix II*). The total annual spending for each category was then computed as a percentage of the total annual spending on medical research by all private foundations.

Before this could be done, the total annual spending on medical research for all private foundations was estimated by applying the methods used by McGeary and Burstein (1999) to estimate cancer research donations as a percentage of all donations to health-related subjects using aggregate data from the Foundation Giving annual report provided by the Foundation Center. Here, the total annual spending on the FDO subject category "Health" – which consists of the subcategories "Hospitals and Medical Care," "Medical Research," "Mental Health," "Policy, Management, and Information," "Public Health," "Reproductive Health Care," and "Specific Disease" – was used as an estimate for the total private sector spending on health-related subjects. A similar approach was taken to estimate the total private sector spending for years 2003-

2012, using data from the Foundation Giving annual report that is now aggregated by the Foundation Stats database[13].

Due to the structure of the Foundation Stats database, the exact total spending on the "Health" subject area for all private foundations was not found and had to be estimated. Foundation Stats consists of two separate data collections under the names "Grants" and "Foundations." The "Foundations" database provides aggregate data on total annual spending for all private foundations (including all grants from independent, operating and corporate-giving foundations). The "Grants" database provides more detailed information on grants, including annual spending to specific subject areas (e.g. "Health," "Education," etc.), though it only provides subject-specific aggregate data for grants made by the top 1000 most-giving foundations (referred to by the FDO as the FC 1000) for years 2003-2012. Since Foundation Stats only breaks down spending by subject area (such as "Health") for the FC 1000 and not all of the private foundations in its database (which consist of more than 81,000 foundations), the exact total annual spending on "Health" by all private foundations was not provided by Foundation Stats and had to be estimated. The annual total spending by all private foundations was estimated by multiplying

[13] "Grantmaking Foundations Nationwide, 2011 Stats about the Number of Foundations, Assets, Giving, and Gifts Received by All Active Grantmaking Foundations in the U.S." Foundation Stats: Guide to the Foundation Center's Research Database. N.p., n.d. Web. 10 May 2015.

the total annual spending for all private foundations by the fraction of grants made by the FC 1000 that went to "Health," assuming that the spending behavior of the top 1000 most-giving private foundations reflects that of all private foundations in terms of how they allocate their budget amongst different spending subject areas.

IV. Hypotheses and Measures

This paper explores three possible scenarios that may describe the relationship between NIH funding and private donations:

1. Increases in NIH spending result in decreases in private donations. This will indicate that NIH spending crowd out private donations.
2. Increases in private donations result in decreased NIH funding. This will indicate that private donations crowd out NIH spending.
3. There is no relationship between NIH spending and private donations. Though various factors affect NIH spending and private donations, there is no evidence that they affect one another.

Three different measures were examined in order to test which of these three scenarios is supported by the data. First, total annual spending by all NIH institutes was compared to total annual private donations to health-related subject areas (*see Fig. 1*). These amounts were then adjusted for inflation using the Biomedical Research and Development Price Index (BRDPI), which is published by the Bureau of Economic Analysis and specific to the biomedical research industry. After adjusting for inflation, it appears that the NIH annual spending declined between 2003 – 2012 (It is important to note that the BRDPI assumes a much higher rate of inflation than other indexes, such as the Consumer Price Index, so the actual trend in NIH spending may be flatter).

Private donations grew overall, ignoring decreases in donations between 2008 – 2010 and 2011-2012.

Figure 1

In comparing the 16 institutes with specific research interests to private donations to their corresponding set of disease categories, public spending appears much larger than private spending, where the mean spending per

institute is $1.56 billion, while only $58.1 million for their private donation equivalent categories (*see Table 1 on page 19 for descriptive statistics*). Compared to total spending, the institutes and categories of interest show a different trend (*see Fig. 2*). Both public and private spending increased overall between 2003 – 2013.

Figure 2

There are a couple of key observations that can be made from this data. First, the annual change in NIH spending in Fig. 1 and Fig. 2 appears to be much more constant than the annual change in private donations for these years. This could be a result of differences in scale since the NIH spends roughly twice as much as private foundations, or it could indicate that the NIH uses a more consistent approach to determine its spending than private foundations. NIH spending also appears to be less responsive to external conditions than private donations. For example, NIH spending appears to have been unaffected by the 2008 financial crisis, while private donations show a large decline from 2008 – 2010. These observations suggest that NIH spending is endogenously determined while private donations are more affected by exogenous factors, which is consistent with crowding out where private spending is exogenously determined with public spending as the endogenous regressor.

In addition to looking at total spending, two additional measures were calculated and compared to allow for more robust analysis of these trends: (1) annual spending by each institute/disease-category as a percentage of total spending, and (2) annual change in percentage of total spending.

Percentage of Total Spending

For this measure, the total annual spending by each NIH institute and the total private donations to the disease categories that correspond to each institute

were calculated as a percentage of total spending by each sector. As explained in the Data section, NIH institute expenditure was calculated as a percentage of total NIH expenditure and private donations were calculated as a percentage of total private donations to health-related subjects.

Using institute-level and disease-level spending as a percentage of total spending provides a several advantages over using spending in dollars. Since this paper's primary focus how total private and public sector funding for medical research is allocated across different types of diseases, it is important to examine each institute's spending relative to the spending by other institutes and private donations to one disease category relative to private donations to all disease categories. Percentage of total spending allows for easier comparison between institutes and diseases. Just as an investor's preferences may be deduced from the varied composition of their investment portfolio, the preference to allocate more funding for one disease than another may be deduced from the fraction of total spending that is spent on each disease or group of diseases for the NIH and private foundations. Furthermore, calculating percentage of total spending incorporates changes due to inflation, changes in total NIH budget and changes in total private donations to health-related subjects, eliminating the need to control for these factors separately.

Change in Percentage of Total Spending

In addition to calculating percentage of total spending, the change in percentage of total spending from the previous year to the current year was also calculated. For example, if NIDDK spending was 6.47% of total NIH spending in 2005 and 6.44% in 2006, then the change between these two years was recorded as -0.03%. Similarly, if total private donations to NIDDK equivalent disease categories (diabetes, digestive diseases, kidney diseases, liver diseases and nutrition) were 1.90% of all private donations to health in 2005 and 1.92% in 2006, then the change between these two years was recorded as +0.02%. This measure allows for more direct comparison of fluctuations in private and public spending on a year-to-year basis, in that the specific change between two consecutive years can be isolated and compared.

Table 1: Descriptive Statistics

	Mean	St. Dev.	Min	Max
NIH Institute Spending				
In dollars (millions)	1560	1350	186	5100
% of total	.0539	.0463	.00678	.172
Change in % of total	.0000249	.00156	-.00293	.0125
Private Donations (equivalents)				
In dollars (millions)	58.1	110	0.0396	904
% of total	.0303	.0308	.000323	.160
Change in % of total	.000341	.0150	-.0762	.0724

V. Analysis

Two different approaches were taken when analyzing percentage of total spending and change in percentage of total spending.

The first approach involved running separate regressions for each measure. Panel data was created by matching each institute's annual expenditure to its corresponding set of private donation disease categories for years 2003-2012. A regression was run with private percentage of total spending as the dependent variable and NIH institute percentage of total spending as the endogenous regressor, including NIH institute fixed effects. An identical set of regressions was run using the change in percentage of total spending measure. Regressions comparing contemporaneous values are presented in column 1 of tables 2 – 5.

The second approach accounts for a delayed response on behalf of the dependent variable. Since crowding out depends on either the NIH or private foundations being able to respond to the level of spending from the other, the static model that is assumed in the first approach may not capture the effect of timing. For instance, private foundations may not be able to adjust immediately to changes in NIH spending, and vice versa. To test for a crowding out effect that

is delayed by one year, a second set of regressions were run, using values that are lagged by one year for the endogenous regressor.

VI. Results

Table 2: Crowding Out Private Sector - Percentage of Total Spending

	Determinants of Private Donations (% of Total Spending)	
	(1)	(2)
Intercept	.0242	.298***
	(.0379)	(.132)
NIH Spending	.0561	-1.592**
	(.228)	(0.795)
NHLBI	-.0233	-.111**
	(.0152)	(.0515)
NIDCR	-.0205	-.251**
	(.0350)	(.121)
NIDDK	-.0228	-.170**
	(.0235)	(.0811)
NINDS	-.0231	-.170**
	(.0259)	(.0811)
NEI	-.0204	-.246**
	(.0328)	(.114)
NIAID	0.0185	.0601***
	(.00562)	(.0167)
NIGMS	-.0192	-.141*
	(.0278)	(.0786)
NICHD	-.0191	-.175*
	(.0281)	(.0972)
NIA	-.0236	-.227**
	(.0298)	(.103)
NIAMS	-.0231	-.261**
	(.0340)	(.117)
NIDCD	-.0214	-.269**
	(.0349)	(.121)
NIDA	-.0222	-.231**
	(.0301)	(.104)
NIAAA	-.0232	-.273**
	(.0347)	(.120)
NIMH	-.0251	-.183*
	(.0269)	(.0932)
NIMHD	-.0190	-.264**
	(.0364)	(.126)
Observations	160	144
Lagged Endogenous Variable?	No	Yes
Balanced Panel?	Yes	Yes
R-squared	0.2217	0.8683
Adjusted R-squared	0.2058	0.8517

* significant at 10% ** significant at 5% *** significant at 1%

Table 3: Crowding Out Private Sector – Change in Percentage of Total Spending

Determinants of Private Donations (Change in % of Total Spending)		
	(1)	(2)
Intercept	-0.000115	-.000338
	(.883)	(.00547)
NIH Spending	0.578	-3.799***
	(0.884)	(1.20)
NHLBI	.000918	.000771
	(.00746)	(.00776)
NIDCR	1.20e-18	-.000183
	(.00744)	(.00774)
NIDDK	.00236	.00283
	(.00744)	(.00774)
NINDS	.00136	.00128
	(.00744)	(.00774)
NEI	-.000279	-.000999
	(.00744)	(.00774)
NIAID	.00408	.00622
	(.00752)	(.00793)
NIGMS	.00150	.0000266
	(.00751)	(.00775)
NICHD	.00144	.00372
	(.00744)	(.00774)
NIA	-.000357	.0000155
	(.00744)	(.00774)
NIAMS	.00123	.00136
	(.00744)	(.00774)
NIDCD	-.000609	-.000701
	(.00744)	(.00774)
NIDA	-.00120	-.00114
	(.00744)	(.00774)
NIAAA	-.000480	-.000193
	(.00744)	(.00774)
NIMH	-.00269	-.00167
	(.00744)	(.00774)
NIMHD	-.000195	.000154
	(.00744)	(.00774)
Observations	144	128
Lagged Endogenous Variable?	No	Yes
Balance Panel?	Yes	Yes
R-squared	0.0159	0.0918
Adjusted R-squared	-0.1081	-0.0391

* significant at 10% ** significant at 5% **significant at 5%

Table 4: Crowding Out Public Sector - Percentage of Total Spending

	Determinants of NIH Spending (% of Total Spending)	
	(1)	(2)
Intercept	.0242	.166
	(.0379)	(.000571)
Private Donations	.00147	.004676
	(.00599)	(.00762)
NHLBI Equivalents	-.0233	-.06575
	(.0152)	(.000605)
NIDCR Equivalents	-.0205	-.152
	(.0350)	(.000646)
NIDDK Equivalents	-.0228	-.102
	(.0235)	(.000646)
NINDS Equivalents	-.0231	-.1025
	(.0259)	(.000646)
NEI Equivalents	-.0204	-.143
	(.0328)	(.000646)
NIAID Equivalents	0.0185	-.0197
	(.00562)	(.00113)
NIGMS Equivalents	-.0192	-.0983
	(.0278)	(.000672)
NICHD Equivalents	-.0191	-.123
	(.0281)	(.000646)
NIA Equivalents	-.0236	. -.130
	(.0298)	(.103)
NIAMS Equivalents	-.0231	-.148
	(.0340)	(.000646)
NIDCD Equivalents	-.0214	. -.153
	(.0349)	(.121)
NIDA Equivalents	-.0222	-.132
	(.0301)	(.000675)
NIAAA Equivalents	-.0232	-.151
	(.0347)	(.120)
NIMH Equivalents	-.0251	-.118
	(.0269)	(.000645)
NIMHD Equivalents	-.0190	-.159
	(.0364)	(.000645)
Observations	160	144
Lagged Endogenous Variable?	No	Yes
Balanced Panel?	Yes	Yes
R-squared	0.998	0.999
Adjusted R-squared	0.998	0.999

* significant at 10%
** significant at 5%
*** significant at 1%

Table 5: Crowding Out Public Sector – Change in Percentage of Total Spending

Determinants of NIH Spending (Change in % of Total Spending)		
	(1)	(2)
Intercept	-.0000633	-.0000646
	(.000527)	(.000428)
NIH Spending	.00581	.00467
	(.008878)	(.00761)
NHLBI Equivalents	.000918	-.000361
	(.00746)	(.000605)
NIDCR Equivalents	1.20e-18	.0000312
	(.00744)	(.000605)
NIDDK Equivalents	.00236	-.000188
	(.00744)	(.000605)
NINDS Equivalents	.00136	-.0000121
	(.00744)	(.000605)
NEI Equivalents	-.000279	.0000216
	(.00744)	(.000605)
NIAID Equivalents	.00408	-.000135
	(.00752)	(.000605)
NIGMS Equivalents	.00150	.00138
	(.00751)	(.000606)
NICHD Equivalents	.00144	-.000122
	(.00744)	(.000605)
NIA Equivalents	-.000357	0000752
	(.00744)	(.000605)
NIAMS Equivalents	.00123	8.65e-06
	(.00744)	(.000605)
NIDCD Equivalents	-.000609	.0000621
	(.00744)	(.000605)
NIDA Equivalents	-.00120	-.0000678
	(.00744)	(.000605)
NIAAA Equivalents	-.000480	.0000308
	(.00744)	(.000605)
NIMH Equivalents	-.00269	-.0000565
	(.00744)	(.000605)
NIMHD Equivalents	-.000195	.000339
	(.00744)	(.000605)
Observations	144	128
Lagged Endogenous Variable?	No	Yes
Balance Panel?	Yes	Yes
R-squared	0.728	0.102
Adjusted R-squared	-0.0277	-0.0275

VII. Discussion

A total of eight regressions were run, four regressions with the private sector as the dependent variable – presented in tables 2 and 3 - and four regressions with the public sector as the dependent variable – presented in tables 4 and 5. NIH institute-fixed effects were included for each regression. The reported standard errors are robust to heteroskedasticity and autocorrelation. Regressions using percentage of total spending are presented in tables 2 and 4, while the regressions using change in percentage of total spending are presented in tables 3 and 5. Results from using contemporaneous values are listed in column 1 of each table, while results from using lagged values for the independent variable are listed in column 2.

The coefficients of interest in the regressions in tables 2 and 3, are those of NIH spending. The expected sign of these coefficients would be negative if the data is consistent with crowding out. Comparing contemporaneous values yields a positive coefficient for both measures that is not statistically significant. However, using lagged values for the endogenous regressor results in a statistically significant negative coefficient for both measures, indicating that NIH spending crowds out private foundation spending. It is estimated that the percentage of private donations to a particular set of diseases in the current year will drop by a rate of -1.59 percentage points for every one percentage point

increase to the NIH institute that funds that same set of diseases in the previous year. The results from comparing change in percentage of total spending in table 3 agree in that the change in private donations between the current year and the next year are negatively correlated to the change in NIH spending between the previous year and the current year.

No statistically significant correlation can be found for regressions that were run in the opposite direction, with private donations as the endogenous regressor. The coefficients of interest in tables 4 and 5 are those of private donations. All four regressions produce positive coefficients, which may indicate that private spending actually crowds in NIH spending, in that increases in private donations to a particular set of disease results increased spending by the NIH institute funding that particular set of diseases. However, this effect is negligible, since the coefficients are relatively small and not statistically significant.

The analysis finds evidence that is consistent with public spending crowding out private spending. The evidence for crowding out in the opposite direction is weak, since no statistically significant relationship was found.

There are a variety of mechanisms that could explain these results. Private foundations may reduce their spending to a particular research area if the NIH spent more on that area in the previous year. One can assume that both the

private and public sector seek to use their charitable donations efficiently and that private foundations may donate to areas that lack public funding in an effort to make a larger impact. There are several possible explanations for the NIH budget being endogenously determined while private foundation spending can be exogenously determined. For one, NIH spending is largely pre-determined by Congress. The NIH also has a more robust mechanism for deciding what projects each institute funds, through a case-by-case review of grant requests from researchers. For this reason, it may be more sensitive to the particular merits of certain types of research and the likelihood that grant recipients will yield successful results. The private sector, on the other hand, lacks a standardized method for determining which types of disease-research to fund. Private foundations on the whole may not be as thorough in their decision-making process and could potentially be more inclined to look at public sector spending to guide their charitable giving.

VIII. Conclusion

There have been a number of empirical tests for the crowding out of private philanthropy by the government spending since the theory was first proposed by Warr (1982) and Roberts (1984). The majority of these empirical tests investigate samples comprised of a multiple public goods and, with the exception of Heutel (2010), only test for crowding out in one direction. This paper expands the scope of literature on crowding out by investigating a single public good, medical research, which has also been excluded from previous empirical studies. Furthermore, it explores crowding out in the opposite direction of causality: crowding out of public spending by private spending.

The empirical analysis is conducted on a large dataset that consists of total grants by 16 NIH institutes, whose research and diseases of interest are clearly defined, and donations to these areas from independent, corporate-giving, and operating foundations. Regression analysis uses two calculated measures to account for unobserved bias. The first measure calculates spending by each NIH institute as a percentage of the total NIH budget and private donations to each research area (that corresponds to an NIH institute) as a percentage of total private donations to medical research. The second measure calculates the actual change in the values for the first measure between each year. The purpose of using these measures is that they capture the variable of interest – fluctuations in

the distribution of money within the public and private sector – while excluding the effects that external factors, such as changes in government budget, income, or inflation.

Regression analysis using these two measures finds evidence that NIH spending crowds out private donations to medical research. A statistically significant negative correlation exists between increases in NIH institute spending in the current year and decreases in private donations to corresponding research areas in the next year. A 1% increase in the share of the total NIH budget that a particular institute receives is associated with a 1.6% decrease in the share of private donations being made to that institute's research area. No significant correlation is found between NIH spending as the dependent variable and private spending as the independent variable, indicating that crowding out only occurs in one direction.

Implications for Policy

There are several policy implications that arise from these findings. The main implication proposed by previous studies on crowding out is that the government must account for decreases in private spending that result from increased public spending. Empirical analysis of public and private spending on medical research shows that this implication is relevant for the NIH and for Congress. In order to maximize the efficiency of the funding it provides for

medical research, the government must consider the negative effect that changes in funding can have on private donations. For example, if Congress and the NIH agree to make funding cancer research a larger priority and reach a spending agreement that grants the National Cancer Institute 17% of the total NIH budget instead of the 16% it received in the previous year (an increase of 1%), then there is a high likelihood that the fraction of private donations going to cancer research will be 1.6% lower in the following year than if the NCI budget had not been changed. Although NIH provides much more funding than private foundations, the net effect of crowding out on the aggregate level of medical research funding should not be ignored, especially since crowding out occurs at a rate higher than one-for-one. Looking forward, the government should consider the effect of crowding out when deciding to make changes to NIH budget allocations in order to maximize the level of aggregate funding for each area of medical research.

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Appendix I – Private Grant Equivalents

NIH Institute	Full Name	Areas of Research Description Summary	FDO Subject Area Equivalents
NCI	National Cancer Institute	NCI leads a national effort to eliminate the suffering and death due to cancer. Through basic and clinical biomedical research and training, NCI conducts and supports research that will lead to a future in which we can prevent cancer before it starts, identify cancers that do develop at the earliest stage, eliminate cancers through innovative treatment interventions, and biologically control those cancers that we cannot eliminate so they become manageable, chronic diseases	
		raniofacial-oral-dental diseases and disorders that compromise millions of human lives.	"**Dental care**"

NIDDK	National Institute of Diabetes and Digestive and Kidney Diseases

***s*: "Allergies",**
"Allergies research",

NIGMS	National Institute of General Medical Sciences

muscle & bone diseases", Nerve, muscle & bone research"

NIDCD	National Institute on Deafness and Other Communication Disorders

s,
association", "**Mental health/crisis services, hot-**

NIMHD	National Institute on Minority Health and Health Disparities	**lth care, rural areas**"

Appendix II

Year	Cancer or Cancer Research	Heart & circulatory diseases OR Heart & circulatory research	Hematology OR Hematology research	Lung diseases OR Lung research
2003	$227,432,072.00	$107,208,024.00	$1,821,767.00	$91,184,815.00
2004	$190,710,027.00	$72,665,821.00	$3,118,454.00	$62,080,892.00
2005	$260,309,620.00	$68,339,669.00	$1,836,900.00	$21,616,198.00
2006	$432,816,954.00	$84,238,013.00	$2,613,781.00	$160,560,412.00
2007	$444,546,945.00	$131,615,696.00	$3,159,946.00	$361,218,532.00
2008	$324,930,563.00	$117,541,298.00	$7,681,890.00	$202,243,978.00
2009	$344,244,415.00	$77,469,512.00	$8,500,572.00	$120,620,445.00
2010	$285,058,189.00	$77,594,438.00	$10,700,754.00	$113,614,447.00
2011	$411,276,378.00	$87,408,968.00	$7,827,094.00	$115,913,727.00
2012	$313,234,566.00	$68,074,275.00	$3,127,225.00	$373,165,595.00

Year	Sickle cell disease OR Sickle	Dental care	Diabetes OR Diabetes research	Digestive diseases OR Digestive
2003	$358,976.00	$25,334,813.00	$23,036,845.00	$3,624,492.00
2004	$2,830,220.00	$38,658,425.00	$31,998,984.00	$4,068,270.00
2005	$1,510,993.00	$42,157,964.00	$45,030,714.00	$2,682,601.00
2006	$239,649.00	$40,884,545.00	$42,239,828.00	$58,988,228.00
2007	$1,407,726.00	$52,748,395.00	$44,772,047.00	$14,720,248.00
2008	$640,409.00	$59,635,641.00	$91,266,254.00	$78,522,186.00
2009	$2,967,500.00	$46,747,371.00	$43,357,755.00	$43,182,023.00
2010	$1,481,852.00	$45,672,445.00	$75,281,293.00	$123,500,393.00
2011	$4,937,862.00	$38,800,938.00	$64,832,445.00	$105,596,208.00
2012	$1,654,500.00	$34,496,215.00	$60,954,940.00	$107,998,873.00

Year	Kidney diseases OR Kidney	Liver disorders OR Liver research	Nutrition	Brain disorders OR Brain researc
2003	$2,758,639.00	$1,011,894.00	$45,222,594.00	$28,015,806.00
2004	$2,753,288.00	$1,717,427.00	$37,056,804.00	$28,546,157.00
2005	$5,453,320.00	$14,446,596.00	$79,051,308.00	$57,333,341.00
2006	$12,639,841.00	$1,827,718.00	$62,801,364.00	$34,619,599.00
2007	$7,707,114.00	$3,527,813.00	$163,732,640.00	$46,625,775.00
2008	$6,183,031.00	$3,508,437.00	$321,776,687.00	$42,867,518.00
2009	$3,845,075.00	$5,801,906.00	$206,562,559.00	$34,880,809.00
2010	$4,996,770.00	$6,540,365.00	$112,297,890.00	$57,612,359.00
2011	$7,666,529.00	$2,387,113.00	$211,050,473.00	$67,765,225.00
2012	$3,621,458.00	$2,595,810.00	$204,439,871.00	$54,622,946.00

Year	Multiple sclerosis OR Multi	Nerve, muscle & bone diseases OR Nerve, muscle & bone res	Neuroscience OR Neuroscience researc	Parkinson's disease OR Parkinso
2003	$3,358,984.00	$14,923,600.00	$42,782,011.00	$3,396,498.00
2004	$3,318,095.00	$8,055,104.00	$52,004,283.00	$3,990,709.00
2005	$7,011,600.00	$10,409,241.00	$42,546,457.00	$6,604,182.00
2006	$9,529,007.00	$9,834,024.00	$40,564,634.00	$8,071,865.00
2007	$10,493,225.00	$115,527,341.00	$88,643,400.00	$21,301,512.00
2008	$9,965,610.00	$96,865,223.00	$58,056,120.00	$7,897,792.00
2009	$8,076,778.00	$50,680,581.00	$92,346,155.00	$8,045,574.00
2010	$18,435,154.00	$158,075,057.00	$62,264,986.00	$6,175,505.00
2011	$9,514,695.00	$192,552,155.00	$70,334,592.00	$16,877,002.00
2012	$9,122,358.00	$148,037,111.00	$80,828,076.00	$10,032,738.00

Year	Blind/visually impaired	Eye diseases OR Eye research	Optometry/visual screening	AIDS OR AIDS research
2003	$52,813,884.00	$30,370,016.00	$6,237,169.00	$179,491,070.00
2004	$73,417,831.00	$44,685,807.00	$24,548,040.00	$177,817,812.00
2005	$80,224,535.00	$55,410,206.00	$19,201,688.00	$185,217,031.00
2006	$84,651,391.00	$46,558,209.00	$23,548,853.00	$427,495,640.00
2007	$98,205,649.00	$64,256,993.00	$27,775,057.00	$384,122,768.00
2008	$100,234,616.00	$64,440,154.00	$41,107,566.00	$378,107,276.00
2009	$57,464,676.00	$32,088,487.00	$19,797,671.00	$234,961,475.00
2010	$71,175,326.00	$44,817,526.00	$17,164,710.00	$148,127,487.00
2011	$66,512,421.00	$42,859,475.00	$10,503,315.00	$376,603,340.00
2012	$75,572,111.00	$43,563,923.00	$11,760,075.00	$307,903,822.00

Year	Allergies OR Allergies resea	Diseases (rare) OR Diseases (rare) research	Immunology OR Immunology research	Parasitic diseases OR Parasitic di
2003	$684,400.00	$1,165,500.00	$11,495,016.00	$1,172,576.00
2004	$672,807.00	$1,340,000.00	$22,037,093.00	$2,046,134.00
2005	$1,396,206.00	$1,177,431.00	$26,732,592.00	$2,533,000.00
2006	$1,582,277.00	$264,750.00	$294,987,287.00	$88,940,661.00
2007	$8,413,672.00	$4,382,500.00	$81,350,369.00	$64,022,160.00
2008	$2,058,561.00	$41,571,263.00	$125,345,015.00	$82,789,789.00
2009	$1,460,968.00	$440,910.00	$23,320,379.00	$51,543,346.00
2010	$2,129,923.00	$4,364,955.00	$127,404,227.00	$51,062,798.00
2011	$2,052,334.00	$2,962,399.00	$102,336,410.00	$79,739,509.00
2012	$4,702,737.00	$4,346,025.00	$625,824,820.00	$22,457,292.00

Year	Pathology OR Pathology res	Public health, STDs	Public health, communicable diseases	Tropical diseases OR Tropical dis
2003	$4,414,461.00	$96,912,136.00	$252,546,471.00	$139,551,129.00
2004	$1,787,998.00	$20,052,534.00	$903,757,155.00	$43,922,749.00
2005	$4,839,204.00	$20,538,697.00	$366,767,448.00	$123,638,306.00
2006	$6,120,900.00	$8,957,797.00	$482,335,547.00	$118,412,659.00
2007	$14,659,339.00	$31,113,417.00	$717,593,737.00	$135,961,721.00
2008	$10,458,973.00	$120,953,065.00	$675,919,927.00	$294,214,134.00
2009	$3,801,621.00	$11,090,906.00	$370,590,747.00	$172,513,810.00
2010	$5,145,034.00	$3,527,159.00	$535,047,820.00	$108,664,389.00
2011	$1,442,203.00	$2,161,623.00	$549,261,632.00	$102,897,346.00
2012	$75,000.00	$51,255,396.00	$786,796,227.00	$50,968,260.00

Year	Biology/life sciences	Biomedicine OR Biomedicine research	Cerebral palsy OR Cerebral palsy resea	Down syndrome OR Down syndr
2003	$95,770,790.00	$96,615,286.00	$5,583,021.00	$423,348.00
2004	$227,824,815.00	$99,136,069.00	$3,375,447.00	$285,181.00
2005	$185,751,466.00	$138,099,537.00	$5,356,210.00	$709,461.00
2006	$228,040,490.00	$310,211,432.00	$6,215,789.00	$972,702.00
2007	$240,892,016.00	$246,812,700.00	$7,056,992.00	$1,046,439.00
2008	$226,290,530.00	$458,478,669.00	$5,369,023.00	$803,650.00
2009	$237,396,226.00	$284,296,967.00	$4,006,298.00	$1,280,412.00
2010	$174,658,540.00	$207,682,066.00	$4,854,717.00	$6,594,026.00
2011	$307,587,538.00	$557,462,771.00	$4,734,496.00	$2,901,810.00
2012	$219,107,193.00	$373,615,761.00	$3,529,447.00	$4,128,102.00

Year	Pediatrics OR Pediatrics res	SIDS OR SIDS research	Youth, pregnancy prevention	Alzheimer's disease OR Alzheime
2003	$53,257,792.00	$325,725.00	$16,516,363.00	$18,134,943.00
2004	$35,491,321.00	$175,300.00	$15,378,828.00	$18,133,209.00
2005	$51,244,541.00	$70,400.00	$12,162,892.00	$20,343,308.00
2006	$48,838,156.00	$213,735.00	$34,904,581.00	$20,809,842.00
2007	$87,419,790.00	$11,255,636.00	$17,075,190.00	$26,167,556.00
2008	$314,013,776.00	$178,417.00	$22,745,055.00	$26,348,985.00
2009	$64,216,258.00	$312,875.00	$39,354,762.00	$20,823,710.00
2010	$70,066,822.00	$167,547.00	$30,766,356.00	$25,306,012.00
2011	$50,982,815.00	$55,375.00	$26,169,651.00	$22,857,909.00
2012	$78,067,180.00	$188,506.00	$29,441,078.00	$21,929,044.00

Year	End of life care	Geriatrics OR Geriatrics research	Gerontology	Palliative care
2003	$7,054,080.00	$38,946,439.00	$22,918,945.00	$18,745,054.00
2004	$10,969,937.00	$29,771,411.00	$11,470,554.00	$15,353,911.00
2005	$13,752,492.00	$46,348,255.00	$13,921,142.00	$18,805,062.00
2006	$5,999,654.00	$87,021,374.00	$38,740,903.00	$18,300,383.00
2007	$7,510,459.00	$61,886,363.00	$31,409,041.00	$12,823,448.00
2008	$6,196,256.00	$62,401,022.00	$7,782,682.00	$13,815,248.00
2009	$5,336,584.00	$69,309,288.00	$25,770,296.00	$11,265,960.00
2010	$7,793,836.00	$36,715,050.00	$12,077,324.00	$14,022,781.00
2011	$7,186,887.00	$89,208,724.00	$29,168,945.00	$20,171,846.00
2012	$5,530,965.00	$75,714,356.00	$34,918,269.00	$18,249,759.00

Year	Reproductive health	Reproductive health, fertility	Arthritis OR Arthritis research	Muscular dystrophy OR Muscula
2003	$232,541,348.00	$65,000.00	$4,253,318.00	$610,458.00
2004	$162,068,365.00	$39,600.00	$5,472,441.00	$2,122,295.00
2005	$231,021,593.00	$476,875.00	$4,293,260.00	$3,039,687.00
2006	$244,214,163.00	$569,170.00	$6,055,853.00	$2,125,715.00
2007	$423,894,587.00	$1,712,055.00	$4,722,687.00	$3,401,075.00
2008	$716,270,279.00	$1,522,177.00	$3,538,625.00	$3,583,760.00
2009	$680,986,346.00	$840,580.00	$3,516,708.00	$2,230,051.00
2010	$363,059,371.00	$207,800.00	$2,857,386.00	$8,135,687.00
2011	$485,182,473.00	$223,800.00	$12,329,963.00	$2,305,388.00
2012	$621,669,406.00	$1,875,050.00	$4,305,927.00	$1,429,146.00

Year	Nerve, muscle & bone disea	Skin disorders OR Skin disorders research	Deaf/hearing impaired	Speech/hearing centers
2003	$14,923,600.00	$2,835,362.00	$35,657,166.00	$24,396,044.00
2004	$8,055,104.00	$3,187,418.00	$49,089,674.00	$32,064,314.00
2005	$10,409,241.00	$3,716,010.00	$55,060,513.00	$31,115,572.00
2006	$9,834,024.00	$4,181,188.00	$45,259,571.00	$27,017,695.00
2007	$115,527,341.00	$3,412,856.00	$47,072,388.00	$29,096,894.00
2008	$96,865,723.00	$5,724,745.00	$39,259,627.00	$26,882,159.00
2009	$50,680,581.00	$1,558,155.00	$33,657,296.00	$24,613,599.00
2010	$158,075,057.00	$1,183,327.00	$36,657,945.00	$25,309,205.00
2011	$192,552,155.00	$2,286,029.00	$33,990,247.00	$22,520,082.00
2012	$148,037,111.00	$2,087,774.00	$25,528,672.00	$16,133,165.00

Year	Mental health, addictions	Substance abuse, prevention OR	Substance abuse, treatment	Substance abuse, services	Alcoholism OR Alcoholism resea
2003	$743,298.00		$72,048,955.00	$43,725,293.00	$37,783,715.00
2004	$1,209,771.00		$65,929,422.00	$22,578,039.00	$20,656,586.00
2005	$762,979.00		$101,700,026.00	$34,131,341.00	$17,139,276.00
2006	$1,820,814.00		$82,584,377.00	$31,436,945.00	$10,215,874.00
2007	$3,606,661.00		$105,788,679.00	$34,371,715.00	$8,361,294.00
2008	$2,531,355.00		$80,317,432.00	$62,855,084.00	$33,495,174.00
2009	$1,666,133.00		$55,016,995.00	$32,618,268.00	$6,475,385.00
2010	$557,518.00		$60,849,603.00	$28,515,802.00	$4,794,926.00
2011	$4,108,000.00		$59,700,291.00	$35,396,571.00	$4,498,742.00
2012	$1,508,964.00		$45,974,874.00	$33,705,254.00	$8,738,244.00

Year	Mental health, association	Mental health, clinics	Mental health, counseling/support gro	Mental health, depression
2003	$8,276,851.00	$28,096,836.00	$18,783,244.00	$12,862,671.00
2004	$5,595,484.00	$23,569,413.00	$23,570,500.00	$8,061,705.00
2005	$5,307,806.00	$22,479,796.00	$47,471,731.00	$4,065,960.00
2006	$5,837,264.00	$29,736,138.00	$34,932,924.00	$6,182,383.00
2007	$8,634,288.00	$37,761,051.00	$32,383,213.00	$6,503,706.00
2008	$8,821,598.00	$23,380,253.00	$30,743,037.00	$7,653,694.00
2009	$9,670,060.00	$24,392,275.00	$29,999,844.00	$3,793,722.00
2010	$7,323,045.00	$32,706,952.00	$28,622,024.00	$3,158,784.00
2011	$8,221,790.00	$39,333,903.00	$33,514,038.00	$4,481,631.00
2012	$7,700,597.00	$23,266,781.00	$23,100,641.00	$4,715,415.00

Year	Mental health, disorders	Mental health, eating disorders	Mental health, gambling addiction	Mental health, grief/bereaveme
2003	$9,381,320.00	$1,014,464.00	$42,000.00	$4,284,416.00
2004	$8,834,943.00	$280,970.00	$204,359.00	$4,653,437.00
2005	$15,450,650.00	$737,063.00	$512,000.00	$5,407,674.00
2006	$8,769,911.00	$473,100.00	$952,250.00	$5,061,675.00
2007	$23,506,517.00	$1,174,509.00	$974,500.00	$8,868,162.00
2008	$6,567,302.00	$511,622.00	$1,385,000.00	$10,445,159.00
2009	$5,166,538.00	$498,580.00	$40,000.00	$9,553,004.00
2010	$6,012,431.00	$416,954.00	$476,000.00	$11,055,894.00
2011	$8,155,850.00	$434,828.00	$400,000.00	$10,783,368.00
2012	$5,096,142.00	$552,607.00	$450,000.00	$7,351,646.00

Year	Mental health, schizophren	Mental health, transitional care	Mental health, treatment	Mental health/crisis services
2003	$818,592.00	$3,545,118.00	$57,131,895.00	$68,778,873.00
2004	$769,345.00	$5,664,768.00	$66,814,108.00	$43,573,069.00
2005	$1,209,807.00	$6,767,323.00	$87,079,499.00	$65,272,075.00
2006	$2,437,613.00	$4,989,055.00	$100,256,120.00	$72,845,811.00
2007	$565,781.00	$7,363,218.00	$114,579,733.00	$86,079,799.00
2008	$5,186,000.00	$7,899,373.00	$109,514,698.00	$65,597,025.00
2009	$810,000.00	$5,292,982.00	$83,168,810.00	$52,885,008.00
2010	$416,840.00	$6,605,241.00	$92,050,252.00	$61,766,685.00
2011	$1,355,000.00	$4,803,969.00	$78,738,428.00	$92,457,311.00
2012	$1,277,000.00	$4,745,205.00	$74,533,729.00	$55,280,680.00

Year	Mental health/crisis service	Mental health/crisis services, association	Mental health/crisis services, hot-lines	Mental health/crisis services, pu
2003	$2,346,523.00	$1,210,000.00	$5,581,427.00	$6,244,420.00
2004	$3,164,251.00	$1,569,644.00	$4,049,747.00	$2,904,884.00
2005	$2,854,119.00	$1,567,578.00	$8,859,194.00	$6,351,120.00
2006	$5,767,820.00	$2,044,566.00	$3,577,935.00	$4,725,812.00
2007	$2,269,178.00	$1,466,130.00	$7,158,401.00	$5,658,620.00
2008	$3,095,505.00	$830,347.00	$6,474,407.00	$5,388,510.00
2009	$2,953,216.00	$880,265.00	$6,908,980.00	$2,204,085.00
2010	$4,593,540.00	$949,050.00	$8,041,716.00	$2,163,086.00
2011	$5,117,479.00	$1,060,430.00	$28,535,758.00	$712,290.00
2012	$3,082,526.00	$743,115.00	$4,861,349.00	$1,178,600.00

Year	Mental health/crisis service	Mental health/crisis services, research	Mental health/crisis services, single or	Mental health/crisis services, sui
2003	$9,442,984.00	$20,074,012.00	$2,050,718.00	$998,743.00
2004	$7,768,369.00	$5,670,904.00	$2,800,541.00	$1,910,559.00
2005	$9,160,347.00	$11,191,579.00	$4,649,925.00	$1,999,140.00
2006	$12,522,990.00	$13,077,463.00	$5,752,877.00	$1,961,919.00
2007	$11,128,280.00	$14,436,674.00	$7,659,790.00	$3,521,084.00
2008	$13,234,976.00	$14,710,733.00	$6,159,134.00	$4,286,405.00
2009	$11,623,375.00	$11,919,651.00	$3,459,183.00	$2,314,435.00
2010	$12,429,067.00	$11,903,957.00	$7,044,026.00	$1,773,768.00
2011	$13,092,071.00	$15,716,052.00	$6,879,372.00	$1,913,553.00
2012	$12,138,098.00	$13,282,640.00	$6,782,506.00	$2,636,174.00

Year	Pyschology/behavioral scie	Health care AND Minorities	Health care AND Minorities/immigrant	Health care, equal rights
2003	$54,228,785.00	$72,680,838.00	$11,732,917.00	$28,665,472.00
2004	$52,798,750.00	$81,070,691.00	$7,794,847.00	$41,493,264.00
2005	$59,436,832.00	$105,838,043.00	$14,416,083.00	$61,324,954.00
2006	$65,528,997.00	$107,515,719.00	$8,703,757.00	$83,253,505.00
2007	$76,630,200.00	$105,150,985.00	$15,243,161.00	$91,257,123.00
2008	$88,406,837.00	$141,234,214.00	$7,665,819.00	$130,333,036.00
2009	$68,337,010.00	$109,149,293.00	$13,298,367.00	$95,268,815.00
2010	$60,399,434.00	$103,461,322.00	$9,345,056.00	$74,237,457.00
2011	$92,053,960.00	$102,722,379.00	$4,087,236.00	$92,283,486.00
2012	$67,757,239.00	$103,638,229.00	$10,032,101.00	$92,353,007.00

Year	Health care, rural areas
2003	$13,712,110.00
2004	$29,560,640.00
2005	$23,687,084.00
2006	$18,188,459.00
2007	$21,946,811.00
2008	$36,134,865.00
2009	$33,402,392.00
2010	$32,880,271.00
2011	$26,808,052.00
2012	$27,568,552.00