A More Equitable Approach to Cutting Intergovernmental Aid

Bo Zhao and David Coyne

Federal Reserve Bank of Boston

Abstract

State aid plays a major role in addressing local fiscal disparities in the United States. However, in response to the recent fiscal crisis, state governments have deeply cut aid, often by the same percentage across localities. This across-the-board approach ignores disparities in underlying local fiscal health and the existing aid distribution and is widely considered unfair. Thus, we introduce a more equitable approach that allocates smaller cuts to localities in worse underlying fiscal health and that receive less existing aid. While we use Massachusetts non-school aid to conduct policy simulations, the approach is applicable to other states and countries, as well as other aid categories.

Keywords: intergovernmental aid, aid cuts, fiscal disparities, fiscal equalization, need-capacity gap

JEL Classification: H70, H72, H73, H77, H83

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1. Introduction

Local jurisdictions face disparities in underlying fiscal health "because of spatial differences in economic resources and in the uncontrollable costs of providing public services" (Reschovsky and Schwartz, 1990, P. 235). Some localities have more economic resources to finance their public services than others, because they have larger local tax bases and their constituents have higher incomes. On the other hand, some localities must pay higher costs than others to provide the same level of public services, because they face a harsher socioeconomic environment that is outside the direct control of local policymakers (Bradford, Malt, and Oates, 1969). For example, a school district faces higher education costs if it has more students from poor families or with limited English proficiency (e.g., Downes and Pogue, 1994a). Such socioeconomic factors contribute to a community's underlying fiscal health, which the literature often measures using a "need-capacity gap" (e.g., Ladd, 1982; Bradbury et al., 1984; Ladd, 1994; Ladd and Yinger, 1994; Martinez-Vazquez and Boex, 2006). We will further discuss the need-capacity gap in the next section.

The existence of fiscal disparities is often regarded as inequitable (e.g., Thurow, 1970; Le Grand, 1975; Bradbury et al., 1984; Downes and Pogue, 2002). Simply because they live in different communities, two identical households or businesses could have to bear different tax burdens for the same level of local public services, or receive different levels of local services for the same amount of taxes. This violates the fair-compensation equity standard proposed by Yinger (1986), who states that "no citizen should be worse off simply because he or she lives in a city with high costs and/or low resources" (p. 332).[1]

Recognizing that fiscal disparities are largely due to factors beyond the control of

[1] There are also inefficiency concerns associated with fiscal disparities. Higher-income residents may move out of a community in response to fiscal disparities. This movement imposes a negative externality to the community, because it creates a harsher socioeconomic environment and raises the costs of providing local public services (Oates and Schwab, 1988).

lower-level governments, many studies suggest that higher-level governments should use intergovernmental aid to reduce these fiscal disparities between lower-level governments (e.g., Thurow 1970; Ladd, 1982; Bradbury et al., 1984; Derycke and Gilbert, 1985; Ladd and Yinger, 1994).[2] Indeed, central governments in a number of countries, such as Australia, Canada, England, France, Germany, and Sweden, provide more funds to lower-level governments with small tax bases and/or high costs of public services (Advisory Commission on Intergovernmental Relations, 1981; Bennet, 1982; Gilbert and Guengant, 1989; Chernick, 2004). Shah and Boadway (2006) summarize these worldwide designs and practices in intergovernmental aid.

In the United States, aid from state governments plays a major role in addressing local fiscal disparities, especially those among school districts. As a result, local governments depend on state aid to provide vital public services to residents and businesses. According to the U.S. Census Bureau's Survey of State and Local Government Finance, revenue transfers from state government accounted for 33 percent of local government general revenue in FY 2009. That was the second-largest revenue source for local governments, behind local taxes.

However, in response to the recent and ongoing fiscal crisis, state governments have deeply cut local aid. The Congressional Budget Office (2010) reports that 22 states reduced aid to local governments in FY 2010, and notes that 20 states have proposed additional cuts in FY 2011. For example, Michigan cut almost 10 percent of total payments to cities, villages, and townships, and 16 percent of aid to 20 counties in FY 2010 (National Association of State Budget Officers, 2009). Oregon cut state aid to K–12 education by 5.7

[2] Oakland (1994) raises efficiency concerns against the use of equalizing aid. One of his main arguments is that fiscal disparities must be fully capitalized in property values because people "vote with their feet" (Tiebout, 1956). Therefore, more aid from higher-level governments would simply result in higher housing rents and prices. However, the conditions for this Tiebout equilibrium, such as the costless mobility, are unlikely to hold in reality. Ladd and Yinger (1994) point out that low-income households face severe barriers to mobility because of their age, disability, and poverty status, housing discrimination, and land-use regulations. Ladd and Yinger (1994) also show that even with perfect mobility, full capitalization may not occur in a general equilibrium case.

percent during the 2009–2011 biennium, compared with the previous biennium. In FY 2011, Minnesota cut aid to cities and counties by 35 percent, while New Jersey cut the two major components of state aid to municipalities by a total of 17 percent (National Association of State Budget Officers, 2010).

Because it is often politically easy to implement, states tend to cut aid either on an *ad hoc* basis or across the board, with every community receiving the same percentage cut from the previous year's aid (Fisher and Prasad, 2009). For example, one recently proposed bill in Minnesota planned to eliminate all Local Government Aid for three largest cities in the state in FY 2012, while other communities would lose a smaller percentage of their aid (Hoglund, 2011).[3] On the other hand, Colorado made an across-the-board cut in school aid of nearly 5 percent in FY 2011 (National Access Network, 2011). Massachusetts cut unrestricted municipal aid 4 percent across the board in the same year. The FY 2012–2013 budget in Texas calls for an across-the-board 6 percent reduction in aid for all school districts (Torres, 2011).

Ad hoc and across-the-board approaches to aid cuts are widely considered unfair (e.g., Murphy, 2011; Norton, 2011). *Ad hoc* approaches are not based on economic rationale and lack transparency in the decision-making process. Across-the-board cuts ignore fiscal disparities across communities and place a larger burden on communities in worse underlying fiscal health.

In general, communities in worse underlying fiscal health receive a larger amount of existing aid if it is distributed through formulas with some equalizing elements. For example, in Massachusetts, municipalities in the bottom 20 percent of per capita taxable property

[3] The final state budget revised this proposal to treat all Minnesota cities and towns the same (Salisbury, 2011). However, the state did implement an *ad hoc* approach to cutting aid during the previous fiscal crisis in FY 2003 (Anderson, 2007). Over 10 percent of small cities with at least 500 residents lost all of their general-purpose aid, while over half of small cities experienced a cut of at least 19 percent. Large cities with more than 5,000 residents experienced an average 54 percent decrease in general-purpose aid, while over one-quarter of those cities saw their aid completely eliminated.

values received an average per capita amount of $1,230 in state aid in FY 2009, compared to an average of $316 in state aid among municipalities in the top 20 percent of per capita taxable property values. Therefore, the same percentage cuts in state aid result in larger per capita dollar aid cuts in communities in worse underlying fiscal health.

Across-the-board cuts also have a greater impact on local budgets in communities in worse underlying fiscal health. This is because state aid typically makes up a larger share of total revenue in these communities than in communities in better underlying fiscal health. For example, in Massachusetts, state aid constituted an average of more than 46 percent of their general revenue in municipalities in the bottom 20 percent of per capita taxable property values in FY 2009. In comparison, state aid made up an average of just 9 percent of their general revenue in communities in the top 20 percent of per capita taxable property values. Therefore, the same percentage cuts in state aid may result in larger budget cuts in communities in worse underlying fiscal health.

For instance, in response to the across-the-board 6 percent cut in FY 2012 school aid in Texas, the Pasadena school district, where 80 percent of families live at or below the federal poverty line, had to eliminate 340 positions including 180 teaching positions and raise class size (Sanchez, 2011). Lynn, M.A., which has a poverty rate of nearly 20 percent, has postponed road paving projects and municipal building repairs after losing more than $2 million from across-the-board cuts in unrestricted municipal aid between 2010 and 2012 (Ford, 2012). Similarly, Camden, N.J. laid off half its police force to deal with recent reductions in state aid in New Jersey in 2011 (Denvir, 2011). Local policymakers have therefore raised serious concerns that *ad hoc* and across-the-board aid reductions will widen the gap among communities, effectively undoing years of fiscal equalization by states (Robertson, 2009; Jaklich, 2011; Post-Standard Editorial Board, 2011; Beagle, 2011; Sanchez, 2011).

Some of previous research focuses on a theoretical model, in which higher-level governments redistribute each year's aid pool based solely on measures of underlying fiscal health, such as need-capacity gaps, while ignoring the previous year's aid distribution (e.g., Shah and Boadway, 2006). In theory, that formula would be sufficient to distribute aid reductions in an equitable matter. However, in reality, states and other higher-level governments do not ignore the previous year's aid distribution and instead use it as a starting point for aid increases or aid cuts.

Other previous research focuses on designing need-capacity gap-based formulas only for distributing aid increases, while preserving existing aid distributions or holding existing aid harmless (e.g., Ladd, 1982; Bradbury et al., 1984; Wasylenko and Yinger, 1988; Ladd, Reschovsky, and Yinger, 1991; Zhao and Bradbury, 2009). Those formulas with hold-harmless are therefore incompatible with aid-reduction scenarios.

Reschovsky and Schwartz (1990) is the only other paper to our knowledge that has explored designing a gap-based formula for aid reductions. They distribute aid cuts inversely proportional to only the gaps while ignoring the existing aid distribution. However, as previous research shows, the existing aid distribution often bears weak or no relation to need-capacity gaps (e.g., Wasylenko and Yinger, 1988; Ladd, Reschovsky, and Yinger, 1991). Therefore, the post-cut aid distribution after using Reschovsky and Schwartz's formula could still be poorly related to need-capacity gaps. In addition, as previously mentioned, state governments typically use the existing aid distribution as a starting point for aid cuts in practice. This makes Reschovsky and Schwartz's aid-cut formula less practical to policymakers.

We propose a new approach to distributing aid cuts based both on need-capacity gaps and the existing aid distribution. Simply put, holding per capita existing aid equal, our new approach cuts less aid from communities with larger need-capacity gaps. Among

communities with similar need-capacity gaps, it cuts less from communities that received less aid in the previous year.

This paper has several important policy implications. First, we provide a more rational and equitable approach to cutting aid than commonly used *ad hoc* or across-the-board methods. This approach helps states (or other higher-level governments) to continue advancing fiscal equalization, even in difficult fiscal circumstances. Second, our approach helps transition the distribution of state aid from non-gap-based to gap-based, even in years of aid cuts. This allows states to accelerate the reform process without having to wait for aid increases to implement a regular gap-based formula with hold-harmless. Third, this research is practical and timely, considering that many states are making or plan to make additional local aid cuts in coming fiscal years (e.g., Sanchez, 2011). Finally, while we use Massachusetts non-school aid to conduct policy simulations, the approach is applicable to other states and countries, as well as other aid categories.

2. General Approach to Measuring the Need-Capacity Gap

The need-capacity gap is defined as a difference between expenditure need and revenue-raising capacity of a community. Expenditure need (sometimes also called uncontrollable costs or environmental costs) is not actual expenditure, because actual expenditure reflects the decisions of local policymakers, which may not be efficient. Instead, expenditure need indicates how much a local government must spend to provide public services of standard quality, given its socioeconomic environment for which it has no direct control. For example, a higher concentration of poor households or households speaking English as a second language increases the costs of elementary and secondary education.

To identify such cost factors and estimate their impact on expenditure need, researchers usually run a regression analysis of local public spending on various local

economic and social characteristics that are outside the direct control of local policymakers (e.g., Bradbury et al., 1984; Wasylenko and Yinger, 1988; Ladd and Yinger, 1989; Ratcliffe, Riddle, and Yinger, 1990; Ladd, Reschovsky, and Yinger, 1991; Downes and Pogue, 1994b; Bradbury and Zhao, 2009). In the regressions, they control for local preferences and tastes, available resources, efficiency factors, and special institutional factors.[4] They then apply the coefficients of uncontrollable cost factors to the value of these factors of each locality and sum them up to obtain its expenditure need.

Revenue-raising capacity is defined as the underlying ability of local governments to raise revenues from their own sources. Like expenditure need is not actual spending, revenue-raising capacity is not actual revenue, because actual revenue reflects tax rates selected by local policymakers.

There are two common approaches to measuring revenue-raising capacity. The first approach, commonly known as a "representative revenue system," calculates how much revenue a local government could raise from all of its tax bases under standard or average tax rates (Advisory Commission on Intergovernmental Relations, 1986). Thus, this capacity measure solely reflects the size of a community's tax bases, regardless of whether it chooses to tax and how heavily it taxes each of its tax bases. The second approach imposes a standard tax burden on the income of residents in a community, while taking into account tax burdens exported to nonresidents of the community (Yinger, 1986 and Ladd and Yinger, 1989).[5]

The popular foundation school aid formula is essentially based on a need-capacity gap calculated for education services. Under the foundation formula, which 41 states currently use, state aid for each school district fills the gap between the foundation spending and a

[4] For example, Bradbury and Zhao (2009) indirectly control for efficiency by including a measure of revenue capacity, taxable property value, income, ratio of state aid to income, tax price, age distribution, education level, and owner-occupied percentage of housing units. Duncome and Yinger (2008) suggest that these variables reflect voters' ability and incentives to monitor local government's efficiency.

[5] See Ladd and Yinger (1989), Downes and Pogue (1992), and Oakland (1994) for details about the comparison of the two approaches.

measure of revenue-raising capacity of that district (Huang, 2004, Table B.3). Foundation spending is the amount of money required to provide the minimum, adequate level of public education for each student. It is often calculated based on input costs, such as teachers' wage, and uncontrollable cost factors, such as the share of students that qualify for free school lunch and the share of students with limited English proficiency. To calculate the revenue-raising capacity of each school district, states typically apply a state-specified uniform tax rate to the property tax base in that school district.

Ladd and Yinger (1994) suggest that states should also use a gap-based approach to distributing non-school aid across localities. Like education, key non-school public services, such as police and fire protection and social services, are important for a person's life opportunities. However, like education services, localities have different ability to provide these municipal services. In practice, only Massachusetts and Minnesota to our knowledge have adopted gap-based formulas to distribute non-school municipal aid.[6]

Despite the explicit or implicit intent of fiscal equalization, the actual distribution of intergovernmental aid often bears weak or no relation to underlying fiscal health of lower-level governments (Reschovsky and Schwartz, 1990). For example, Wasylenko and Yinger (1988) note that municipal aid to each city and town in Nebraska is proportional only to population size. Similarly, Fisher and Prasad (2009) report that each county government in Arkansas claims an equal share of the 75 percent of state aid to all counties, while the other 25 percent of county aid is distributed proportionally to county population. In a non-U.S. context, Albouy (2010) shows evidence that federal transfers across provinces in Canada do not target low-income areas.

[6] Massachusetts once used a gap-based formula to allocate so-called "Additional Assistance" to cities and towns, although the state has not used that formula since the early 1990s. Minnesota still has a similar formula in place to allocate its Local Government Aid (League of Minnesota Cities, 2008).

3. Conceptual framework

Figure 1 illustrates a simple case of our gap-based approach to cutting intergovernmental aid. For simplicity, we assume that each locality received the same $1 per capita aid in the previous year—an extreme case of aid inequity. (We introduce inter-local variation in existing aid in following subsections.)

We suggest that, in principle, the state should distribute aid cuts inversely proportional to need-capacity gaps. Therefore, localities with larger gaps (i.e., those in worse underlying fiscal health) would receive smaller aid cuts.

This aid-cut approach also takes political considerations into account in order to increase its chance of being implemented in practice. Policymakers can consider selecting a minimum aid cut and a maximum aid cut, which they can define as a percentage of the previous year's aid or as a per capita amount. Setting the minimum cut guarantees that all localities share some of the burden of the statewide aid reduction, regardless of their underlying fiscal health. The state sets the maximum cut to ensure that no locality loses all its aid and experiences too extreme a hardship for local budget making.

This approach provides policymakers with the flexibility to decide which localities should be subject to the maximum aid cut. Policymakers select a gap threshold called the "baseline gap," such that localities with a per capita gap lower than the baseline gap receive the maximum aid cut. In doing so, policymakers regard these localities as in sufficiently good underlying fiscal health to be able to afford the maximum aid cut.

3.1 The case of defining aid cuts as a percentage of previous aid

Unlike the uniform distribution of existing aid in Figure 1, in reality, localities are likely to receive different per capita payments of existing aid. To reflect this reality, we introduce inter-local variation in existing aid. We assume that a community receives a per

capita aid amount of $a_{x,t-1}$ in year $(t-1)$ that varies across communities, and that the distribution of $a_{x,t-1}$ may or may not be based on need-capacity gaps. Suppose that policymakers choose maximum and minimum changes in aid as a percentage of the previous year's aid, α_t and β_t, such that $-100\% \leq \alpha_t \leq \beta_t \leq 0$.[7]

All localities fall into one of three groups as in Figure 1. Groups *I* and *K* include communities receiving the maximum cut and the minimum cut, respectively. Among communities in group *J*, post-cut aid receipts fill the same fraction (r_t) of a locality's need-capacity gap ($G_{x,t}$) above the baseline gap (G_t^*). The fraction, r_t, can be interpreted as an indicator of the equalizing effect of state aid, because a higher value of r_t indicates that more aid is targeted to larger-gap communities (Zhao and Bradbury, 2009).

Under this gap-based approach, the percentage change in aid for any community x in year t, $\tau_{x,t}$, is

$$\tau_{x,t} = \begin{cases} \alpha_t & \text{if} \quad G_{x,t} \leq G_t^* \quad \text{or} \quad [\frac{r_t(G_{x,t}-G_t^*)}{a_{x,t-1}} - 1] < \alpha_t \\ \frac{r_t(G_{x,t}-G_t^*)}{a_{x,t-1}} - 1 & \text{if} \quad G_{x,t} > G_t^* \quad \text{and} \quad \alpha_t \leq [\frac{r_t(G_{x,t}-G_t^*)}{a_{x,t-1}} - 1] \leq \beta_t \\ \beta_t & \text{if} \quad G_{x,t} > G_t^* \quad \text{and} \quad \left[\frac{r_t(G_{x,t}-G_t^*)}{a_{x,t-1}} - 1\right] > \beta_t. \end{cases} \quad (1)$$

The fraction, r_t, is calculated as

$$r_t = \frac{TA_t - \sum_I (1+\alpha_t)(a_{i,t-1}N_{i,t}) - \sum_K (1+\beta_t)(a_{k,t-1}N_{k,t})}{\sum_J (G_{j,t} - G_t^*)N_{j,t}}, \quad (2)$$

where TA_t is the statewide aid pool in year t, and $N_{x,t}$ is the population of community x in year t. In practice, it requires several computational iterations to determine r_t and which communities fall into each of the three groups.

It is worth noting that this aid-cut approach includes the method presented in

[7] In a special case, where $\alpha_t = \beta_t$, all communities receive an across-the-board percentage aid cut.

Reschovsky and Schwartz (1990) as a special case. Reschovsky and Schwartz assume that the aid distribution in the previous year ($a_{x,t-1}$) was already based purely on need-capacity gaps. Under such condition, they ignore the existing aid distribution and allocate aid cuts only inversely proportional to the size of a community's need-capacity gap. Specifically, they give zero aid reduction (that is, $\beta_t = 0$) to the community with the largest need-capacity gap. On the other hand, communities whose gaps are at a certain level and below would lose all their previous aid (that is, $\alpha_t = -100\%$).

3.2 The case of defining aid cuts in dollar amounts

Policymakers can also define maximum and minimum aid cuts in dollar amounts as an alternative to defining them as percentage cuts. To model this, we redefine α_t and β_t to represent the maximum and minimum per capita dollar change in year t, such that $\alpha_t \leq \beta_t \leq 0$.

In this case, the percentage change in aid for any community x in year t is calculated as

$$\tau_{x,t} = \begin{cases} \frac{max(-a_{x,t-1}+c_t, \alpha_t)}{a_{x,t-1}} & \text{if} \quad G_{x,t} \leq G_t^* \quad \text{or} \quad [r_t(G_{x,t} - G_t^*) - a_{x,t-1}] < \alpha_t \\ \frac{r_t(G_{x,t}-G_t^*)}{a_{x,t-1}} - 1 & \text{if} \quad G_{x,t} > G_t^* \quad \text{and} \quad \alpha_t \leq [r_t(G_{x,t} - G_t^*) - a_{x,t-1}] \leq \beta_t \\ \frac{max(-a_{x,t-1}+c_t, \beta_t)}{a_{x,t-1}} & \text{if} \quad G_{x,t} > G_t^* \quad \text{and} \quad r_t(G_{x,t} - G_t^*) - a_{x,t-1}] > \beta_t, \end{cases} \quad (3)$$

where c_t is a small aid amount, such that $0 \leq c_t \leq min(a_{1,t-1}, a_{2,t-1}, \ldots, a_{X,t-1})$, and X is the total number of communities in the state. The per capita dollar aid cut is bounded by $(a_{x,t-1} - c_t)$, because policymakers may want every community to keep at least a small amount of per capita aid (c_t) instead of cutting all their aid. In the dollar-cut case,

$$r_t = \frac{TA_t - \sum_I max(c_t, a_{i,t-1} + \alpha_t)N_{i,t} - \sum_K max(c_t, a_{k,t-1} + \beta_t)N_{k,t}}{\sum_J (G_{j,t} - G_t^*)N_{j,t}}. \quad (4)$$

3.3 Comparative analysis and policy choice

The percentage of aid cut for a community in group J depends on both its gap and its existing aid (see equations 1 and 3). Holding existing aid equal, if the gap ($G_{j,t}$) is larger, community j will receive more aid in year t and thus experience a smaller-percentage aid cut. Conversely, holding the gap constant, community j will receive the same level of aid in year t, regardless of its existing aid ($a_{j,t-1}$). Therefore, community j will experience a smaller-percentage aid cut with lower existing aid than with higher existing aid.[8]

Policymakers may consider raising the baseline gap over time if they implement consecutive years of aid cuts. This allows the state to give the maximum aid cut to more small-gap communities, leaving more aid for large-gap communities, and thus protecting them from larger aid cuts.

The selection of maximum and minimum cuts affects both the fraction r_t and the number of communities in the three groups. However, the impact is ambiguous in theory, because iterations of the formula simultaneously determine r_t and the number of communities in the three groups. This suggests that data simulations should play an important role in the policy planning and decision-making process.

3.4 Drawbacks of the gap-based approach to cutting aid

The gap-based approach has some drawbacks. First, while it has an explicit goal of fiscal equalization, it does preserve some aid inequity. It does not take into account differences in the gap and existing aid among communities receiving the maximum aid cut. Nor does it consider these differences among communities receiving the minimum aid cut.

Second, the gap-based approach is more complicated than *ad hoc* or across-the-board

[8] A larger-gap community may not necessarily receive a smaller-percentage aid cut in year t than a smaller-gap community if the former received a rather large amount of aid in the previous year.

approaches. It requires several policy parameters, and is somewhat less transparent than across-the-board cuts. Therefore, policymakers could find it challenging to communicate and agree on specific policy parameters in practice.

In addition, it may be difficult for policymakers to gather enough votes for adopting a gap-based approach to cutting aid. Reschovsky and Schwartz (1990) hypothesize that a majority of state legislators could prefer to shift most of the burden of aid reductions to a relatively small number of communities. Therefore, because fewer communities bear the majority of statewide aid reductions under across-the-board cuts than under other approaches, policymakers may be more willing to support across-the-board cuts than vote for a gap-based approach.

4. Data for policy simulations

In principle, our gap-based approach can be applied to all states and countries, as well as all equalizing aid categories. In this paper, we use unrestricted municipal aid in Massachusetts as an example to demonstrate the effect of implementing the gap-based approach to cutting aid.

Unrestricted municipal aid is a common category of state aid in the United States. Fisher and Prasad (2009) report that unrestricted municipal aid represented about one-quarter of state aid to municipalities nationwide in FY 2007, second only to restricted school aid. Twenty-four states including Massachusetts offered unrestricted municipal aid. That aid accounted for 6.2 percent of local general revenue in Massachusetts in FY 2007—near the median among all states providing such aid.

In Massachusetts, unrestricted municipal aid was mandated to "provide general purpose financial assistance to municipalities on an equalizing basis" (Municipal Data Management and Technical Assistance Bureau, 2003, p. 26). However, political interference

created a bias favoring certain municipalities over time (Ladd and Kennedy, 1985). Local policymakers have thus expressed concerns over the inequity in the distribution of unrestricted municipal aid (Schworm, 2003; Ford, 2012).

In response to the recent fiscal crisis, Massachusetts cut unrestricted municipal aid across the board by 9.7 percent, 21 percent, and 4 percent in FY 2009, 2010, and 2011, respectively.[9] These recent aid reductions offer us a unique opportunity to simulate alternative distributions of aid cuts using the gap-based approach.

To use a gap-based formula for distributing non-school municipal aid, we need to calculate a need-capacity gap for non-school municipal services (the municipal gap, for short). Bradbury and Zhao (2009) develop such a gap measure for Massachusetts communities, based on a regression analysis of 2000 data. We update this gap measure using the most recently available data.

To estimate expenditure need, Bradbury and Zhao (2009) regress each community's spending on non-school municipal services on potential cost factors, controlling for income, available resources, tax price, etc. They identify four robust cost factors: poverty rate, unemployment rate, population density, and number of jobs per capita. These factors affect expenditure need for municipal services in several ways. For example, communities with higher poverty rates and unemployment rates tend to experience more crime. Thus, costs of police protection rise with poverty rate and unemployment rate. Similarly, higher population density is associated with increased costs for fire protection, because there is a greater fire hazard among housing that is more closely packed. The number of jobs per capita captures the impact of businesses and workers who commute into the community. These businesses and commuters add the need for municipal services, such as road maintenance.

To estimate local revenue-raising capacity from property tax (the largest local revenue

[9] In fact, the state did not cut unrestricted municipal aid exactly across the board in FY 2010. While about 79 percent of communities received a uniform aid cut of 21.6 percent, other communities experienced various lower percentage aid cuts in FY 2010.

source in Massachusetts[10]), Bradbury and Zhao (2009) regress each community's property tax levy on taxable property values and the personal income of local residents, controlling for the share of owner-occupied housing units, older population, political preference, etc. They suggest that the coefficient on the income reflects the constraints of Proposition 2½ (a local property tax limitation in Massachusetts). Because the residents of lower-income communities are less able to pay for public services, they are less likely to pass an override to Proposition 2½. As a result, a lower-income community has a lower ability to tax its property tax bases than another community that has the same property values but higher income.

Bradbury and Zhao (2009) then use the representative-revenue-system approach to estimate the capacity to raise revenues from local hotel/motel excise taxes, motor vehicle excise taxes, and other smaller local revenue sources.[11] Because they develop the capacity measure for non-school municipal services, Bradbury and Zhao (2009) subtract part of the capacity that is statutorily required to support school services and other intergovernmental services. Each year the state's Department of Education sets a net minimum required local contribution to public schools for each city and town, which must come from its local revenues. Each city and town is also required to pay for service assessments from other state agencies, regional planning authorities, and regional transits.

We apply Bradbury and Zhao's regression coefficients to the most recent data available to us—FY 2007 data— to generate an updated gap measure for each city and town.[12] Table 1 shows how we calculate the updated gap measure for an average

[10] The state does not allow cities and towns to tax general sales, income, or other broadly based sources.
[11] Bradbury and Zhao (2009) do not count state aid as local revenue-raising capacity. Instead, they use state aid to fill a portion of the need-capacity gap. Zhao and Bradbury (2009) show that counting existing state aid as local-revenue raising capacity can exacerbate inequities while distributing aid increases through a gap-based formula.
[12] Because the gap measure is based on both the values of the cost and capacity factors and the regression coefficients on these factors, Bradbury and Zhao (2009) provide two separate guidelines for updating the gap measure with new data. First, the values of the cost and capacity factors should be periodically updated, when data allow. Second, the regression coefficients on the cost and capacity factors do not need to be updated often. This is because economic relationships underneath the regressions are not likely to change much in the short to medium run. Therefore, it is a common practice to use the same regression coefficients for updates within a

Massachusetts community and five prototype communities (large city, rural town, job-center suburb, higher-income residential suburb, and resort town). Each of the five prototypes is constructed based on data from several representative cities and towns in Massachusetts.

Municipal gaps vary significantly among the prototype communities. The large-city prototype has the largest per capita gap, because of high expenditure need and low revenue-raising capacity. However, the higher-income residential suburb prototype and the resort-town prototype have the smallest per capita gap, mostly because of their high revenue-raising capacities.[13]

For simplicity, we use this updated gap measure as a proxy for the gap measure in the simulation period of FY 2008 to FY 2011.[14] Although unrestricted municipal aid in Massachusetts has a declared goal of fiscal equalization, the actual distribution was not directly proportional to municipal gaps in FY 2008—the starting point of our simulation period (see Figure 2). We run a population-weighted regression of unrestricted municipal aid on municipal gap and a constant term. The adjusted R-squared of that regression is only 0.44, meaning that municipal gaps explain less than half of the variation in the aid distribution. This shows that an equitable aid-reduction approach should take into account differences in not only municipal gaps but also the existing aid distribution across local communities.

5. Policy simulations

We run simulations to explore what the changes in aid distribution might have looked like if the state had used the gap-based approach to cutting aid. We distribute the actual

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decade (see Bradbury et al., 1984; League of Minnesota Cities, 2008).

[13] Although their gap measures are negative, they do not necessarily imply that those communities do not need non-school municipal aid. Instead, they suggest that those communities need less aid than some other types of communities.

[14] The relative position of each community's gap measure—which is the key to determining a gap-based aid distribution—should be considerably stable in the short to medium run. This is because most cost and capacity factors are slow-moving and communities across the state often experience changes in cost and capacity factors in the same direction. While governments should use the most current data available for real-life policymaking, we believe that our updated gap measure is adequate for illustrating the gap-based approach for past aid cuts.

statewide reductions in municipal aid in FY 2009 (9.7 percent), FY 2010 (21 percent), and FY 2011 (4 percent) through a gap-based formula. We assume that the maximum and minimum aid cut is 2.5 times and one-tenth the statewide aid cut in a given year—defined as either a percentage of previous per capita aid or in dollar amounts. To make the dollar-cut scenario comparable to the percentage-cut scenario, we assume that the aid floor under the dollar-cut scenario (that is, c_t in equation 3) equals the lowest amount of per capita aid among cities and towns in FY 2011 under the percentage-cut scenario.

To better protect large-gap communities from these consecutive aid cuts, we increase the baseline gap over time. We assume that the baseline gap starts at the 10th percentile of the gap distribution in FY 2009, and then increases 1 percentile for every 3 percent of aid cut. Therefore, the baseline gap should rise to the 17th percentile in FY 2010, and to the 18th percentile in FY 2011.

Under the actual aid cuts, each community loses roughly the same percentage of their aid—slightly more than 31 percent— from FY 2008 to FY 2011.[15] However, if Massachusetts had used the gap-based approach to cutting aid, higher-gap communities would have received a smaller percentage aid cut than lower-gap communities. For example, under the percentage-cut scenario, communities in the fifth gap quintile—those in the worst underlying fiscal health—would have lost 24 percent of their aid, on average (weighted by population size), compared with an average loss of 66 percent for communities in the first gap quintile—those in the best underlying fiscal health— over the three-year period (see Table 2).[16]

When the maximum and minimum cuts are defined in dollar amounts, the gap-based

[15] Communities did not receive exactly the same percentage aid cut, because the state did not cut unrestricted municipal aid exactly across the board in FY 2010. See footnote 9.

[16] The average percentage aid cut of the fifth quintile is larger than that of the fourth quintile, because the fifth quintile includes Boston, which has about 10 percent of the state population and received relatively high per capita aid in FY 2008, and therefore would receive the maximum aid cut in the first two years. If we exclude Boston from the quintile analysis, the population-weighted average aid cut of the fifth quintile drops to 16.2 percent—below the average 20.6 percent aid cut of the fourth quintile under the percentage-cut scenario.

approach gives even more favorable treatment to large-gap communities. Because it cuts almost all the aid from some low-gap communities, communities with higher gaps retain more of their aid. Specifically, communities in the first gap quintile lose 97 percent of their aid from FY 2008 to FY 2011 under the dollar-cut scenario. In comparison, the average aid cut is only 21.5 percent for communities in the fifth quintile—even smaller than the average cut for the same communities under the percentage-cut scenario.[17]

Overall, more than half of all communities receive smaller aid reductions under either gap-based scenario than under the actual across-the-board aid cuts from FY 2008 to FY 2011. These communities represent about 52 percent of the state population and often have relatively large gaps.

Use of our gap-based approach would have also strengthened the relationship between aid and gap. Figure 3 compares the actual aid distribution and the simulated aid distribution under the percentage-cut scenario in FY 2011. The relationship between municipal aid and municipal gap under the actual cuts remains weak in FY 2011. A population-weighted regression of municipal aid on municipal gap yields the adjusted R-squared of 0.44. However, under the gap-based approach, the post-cut aid receipts of 38 percent of communities form an upward-sloping line, because they receive aid in proportion to their municipal gaps. As a result, municipal gaps are able to explain nearly two-thirds of the variation in municipal aid.

Figure 4 shows that the upward-sloping line is even steeper under the dollar-cut scenario than under the percentage-cut scenario. Because the dollar-cut scenario allows us to cut more aid from communities with relatively low gaps, the percentage of gap filled by municipal aid is slightly higher than under the percentage-cut scenario for those communities

[17] As with the percentage-cut scenario, the average percentage cut of the fifth gap quintile is slightly larger than that of the fourth gap quintile, because of Boston. Excluding Boston from the quintile analysis reveals that the population-weighted average cut of the fifth gap quintile is 15.3 percent—smaller than the 20.0 percent average aid cut of the fourth gap quintile.

on the upward-sloping line.[18]

6. Conclusion

In the wake of the Great Recession, local governments in the United States have faced deep cuts in state aid, losing revenues essential to maintaining local public services. State aid is likely to continue declining in many states in the coming years. For instance, Wisconsin will cut general school aid by 7.7 percent in FY 2013, while Texas is likely to cut school aid by 8 to 9 percent in the same year (Wisconsin Budget Project, 2011; Sanchez, 2011).

States traditionally cut local aid on an *ad hoc* or across-the-board basis, ignoring differences in underlying local fiscal health and the existing aid distribution. Those approaches often put more burden on communities that are already more fiscally stressed, and therefore work against the equalization goals of state aid (Reschovsky and Schwartz, 1990).

This paper offers a new approach to cutting intergovernmental aid in a more equitable manner. We show that a gap-based approach can allocate smaller aid cuts to communities with larger need-capacity gaps and that received less state aid in the previous year. While we use Massachusetts non-school municipal aid as a case study, this gap-based approach is applicable to other states and countries, as well as other equalizing aid programs.

[18] The percentage of communities on the line and the adjusted R-squared under the dollar-cut scenario are similar to those under the percentage-cut scenario.

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Table 1. Expenditure need and revenue-raising capacity for non-school municipal services

Prototype Massachusetts Communities, FY 2007 (unless otherwise noted)

	Average Community	Large City	Rural Town	Job-Center Suburb	Higher-Income Residential Suburb	Resort Town
Cost Factors:						
Poverty rate (percent)	9.93	22.82	5.39	3.84	2.84	7.16
Unemployment rate (percent)	4.90	6.87	4.68	3.54	2.60	5.32
Jobs (by place of work) per capita	0.49	0.35	0.29	0.99	0.21	0.54
Population density (000s per square mile)	4.02	8.84	0.08	1.55	1.42	0.25
Expenditure Need	1,411	1,921	1,136	1,246	934	1,297
Property Tax Capacity Factors:						
Per capita residential and open space property value	128,549	62,527	99,426	147,736	283,207	805,425
Per capita income, 2006	33,240	16,372	23,657	45,762	123,235	35,630
Per capita nonresidential property value	23,315	10,842	11,874	47,779	8,716	61,880
Property Tax Capacity	1,458	704	1,023	2,020	3,145	4,658
Other Local Revenue Capacity	125	69	127	162	167	296
Statutorily Required Reductions in Capacity	784	312	696	1,193	1,476	1,063
Revenue-Raising Capacity	798	461	453	989	1,835	3,891
Municipal Gap	613	1,460	683	256	-902	-2,594

Notes:

Calculations are based on regression coefficients from Bradbuy and Zhao (2009).

Expenditure need = 19.8 × poverty rate + 81.0 × unemployment rate + 272 × jobs per capita + 28.0 × population density + 570.2.

Property tax capacity = 0.0142 × (taxable residential and open space property value)$^{2/3}$ × (income)$^{1/3}$ + 0.0126 × taxable nonresidential property value (all in per capita terms).

Revenue-raising capacity = property tax capacity + other local revenue capacity - statutorily required reductions in capacity.

Municipal gap = expenditure need - revenue-raising capacity.

The sources for other local revenue capacity include motor vehicle excise taxes, hotel/motel excise taxes, urban redevelopment excise taxes, local share of racing taxes, and state government payments in lieu of taxes for state-owned land. Statutorily required reductions in capacity include net minimum required local contribution for public schools; county taxes; charges for regional transit, and regional planning authorities; and state assessments for air pollution control and mosquito control.

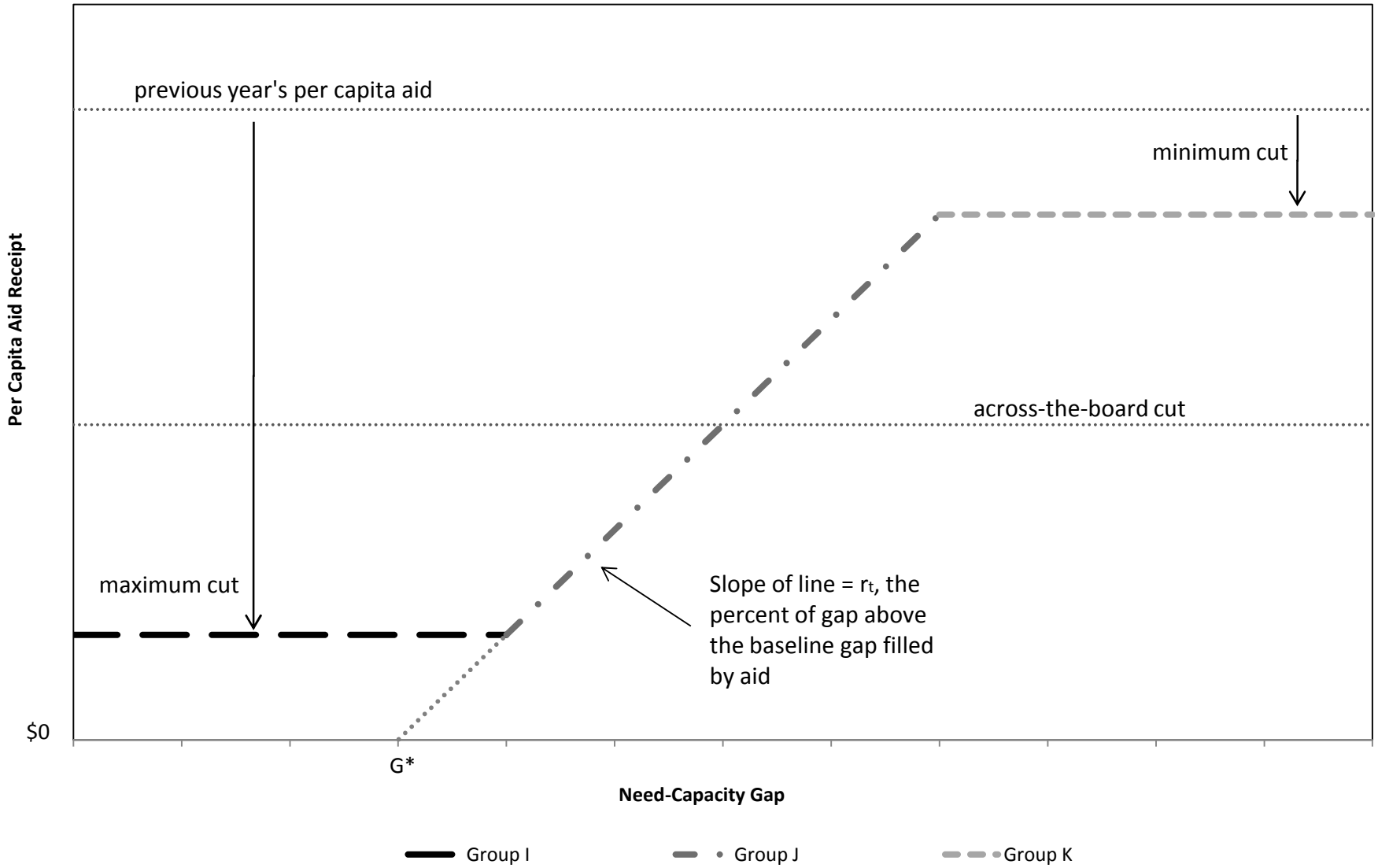
The large city prototype is based on Lawrence, Lowell, Lynn, New Bedford, Springfield, and Somerville. The resort town prototype is based on Eastham, Edgartown, Nantucket, Orleans, Stockbridge, and Williamstown. The job-center suburb prototype is based on Andover, Braintree, Canton, Natick, and Westborough. The rural town prototype is based on Ashby, Ashfield, Blandford, Clarksburg, Huntington, Lanesborough, Oakham, and Whately. The higher-income residential suburb prototype is based on Belmont, Carlisle, Dover, Lincoln, and Wayland. The average Massachusetts community is defined as a hypothetical community experiencing the population-weighted average among 351 Massachusetts cities and towns for cost and capacity factors.

Table 2. Average percentage of aid cut in Massachusetts communities from FY 2008 to FY 2011 by quintile of the gap distribution (quintile 5 = largest gaps)

	Actual cuts	Percent-cut scenario	Dollar-cut scenario
Statewide	31.6	31.6	31.6
Quintile 1	31.9	66.1	97.0
Quintile 2	31.5	46.7	52.0
Quintile 3	30.5	30.6	29.9
Quintile 4	31.1	20.6	20.0
Quintile 5	31.8	23.6	21.5

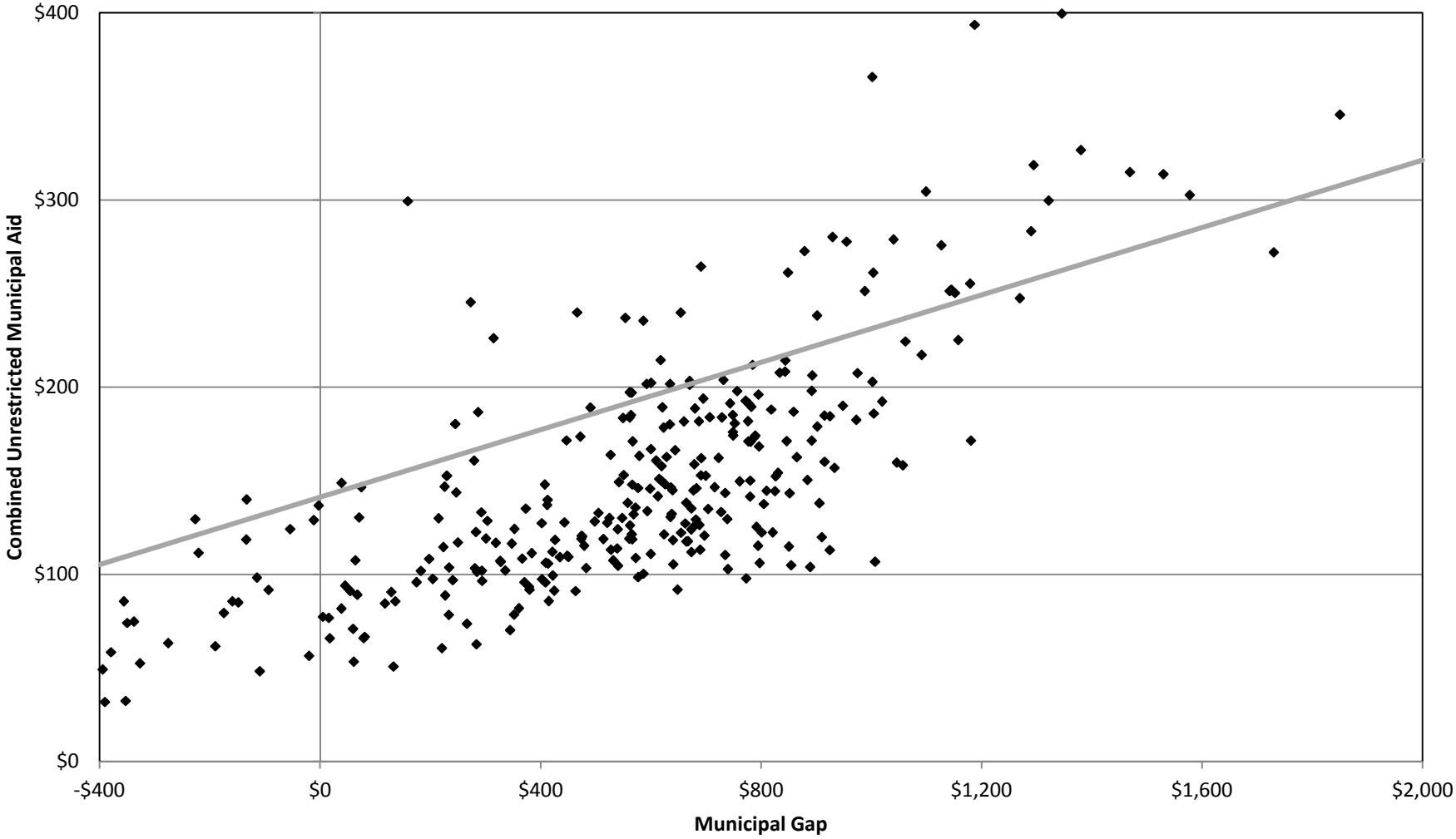
Note: Averages are population-weighted.

Figure 1. Aid cuts under the gap-based approach



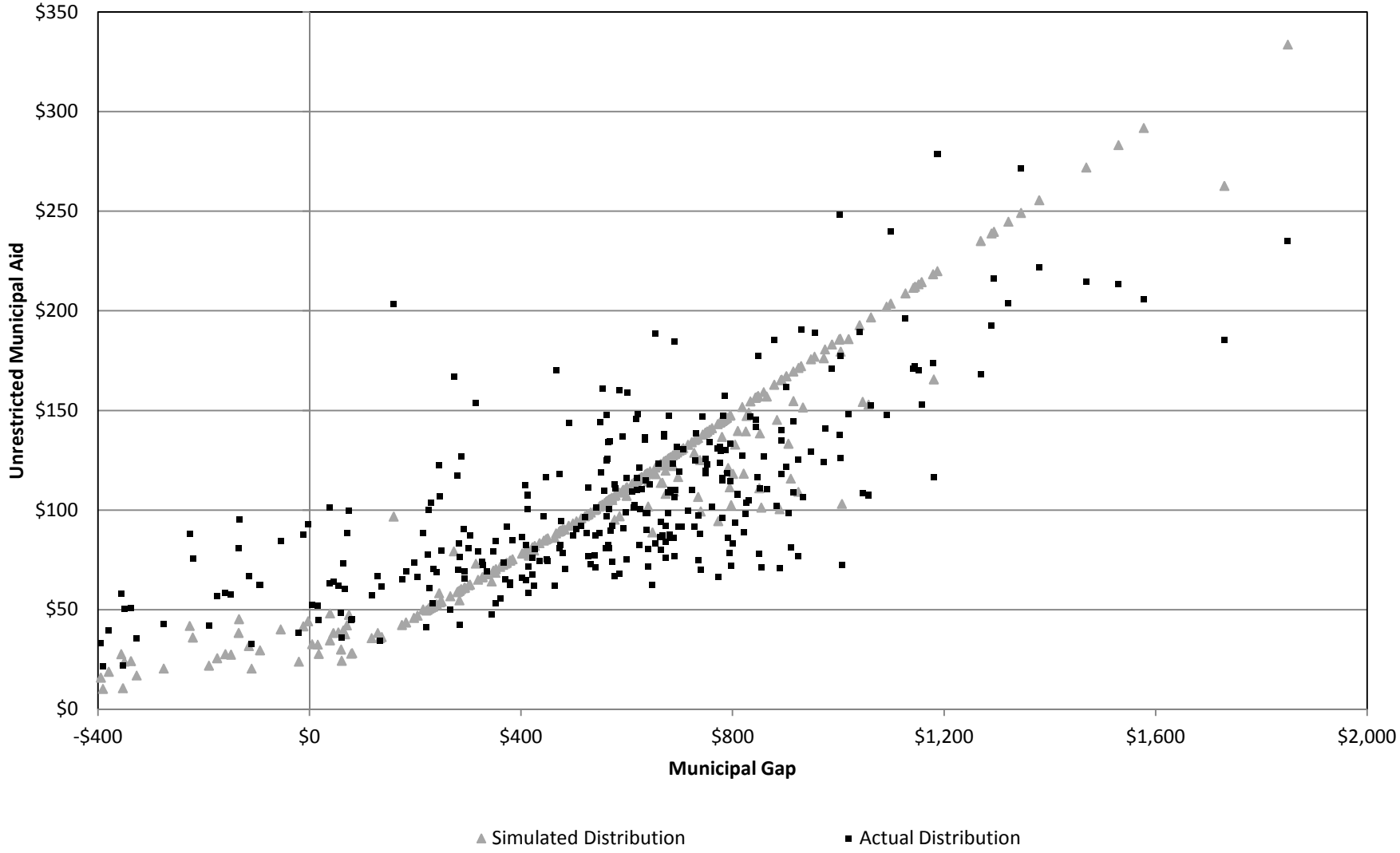
Note: For simplicity, we assume that each community in this example receives a $1 per capita aid payment in the previous year. The baseline gap is represented by G*.

Figure 2. Comparing municipal aid with municipal gaps in Massachusetts (FY 2008, per capita)



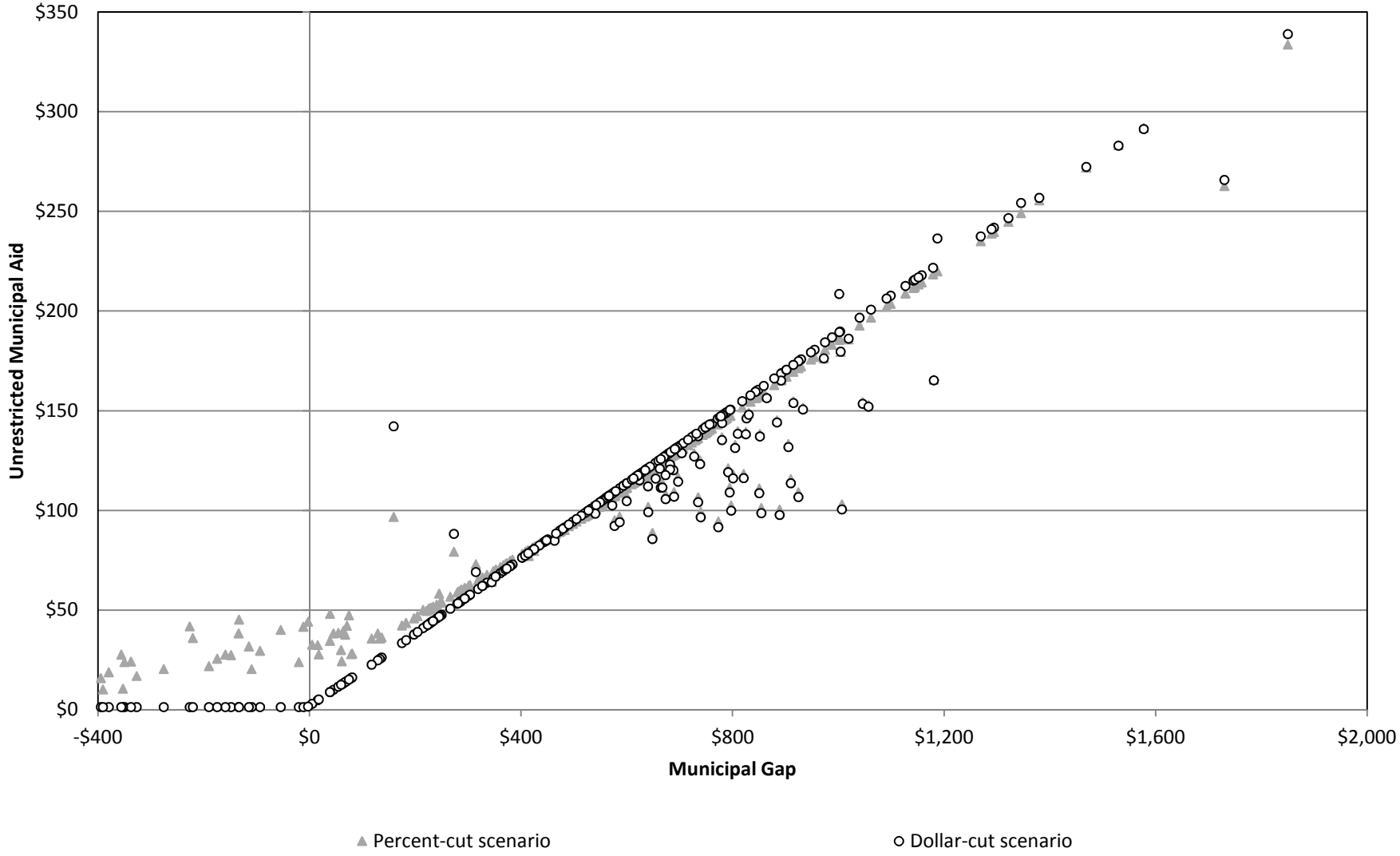
Note: To show the general pattern more clearly, 40 communities with a per capita gap below -$400 have been omitted. The gray line is created from a population-weighted regression of combined unrestricted municipal aid on the municipal gap over all 351 cities and towns.

Figure 3. Comparing simulated aid distribution under the percentage-cut scenario with actual aid distribution in Massachusetts in FY 2011 (per capita)



Note: To show the general pattern more clearly, 40 communities with a per capita gap below -$400 have been omitted.

Figure 4. Comparing simulated FY 2011 aid distributions in Massachusetts (per capita)



Note: To show the general pattern more clearly, 40 communities with a per capita gap below -$400 have been omitted. The percentage-cut and dollar-cut scenarios display the aid distribution after corresponding gap-based aid cuts in FY 2009 through FY 2011.