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Forecasting the Revenues of Local Public Health Departments in the Shadows of the ‘Great Recession’

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Abstract

Context—The ability of local health departments (LHD) to provide core public health services depends on a reliable stream of revenue from federal, state, and local governments. This study investigates the impact of the “Great Recession” on major sources of LHD revenues and develops a fiscal forecasting model to predict revenues to LHDs in one state over the period 2012 to 2014. Economic forecasting offers a new financial planning tool for LHD administrators and local government policy-makers. This study represents a novel research application for these econometric methods.

Methods—Detailed data on revenues by source for each LHD in Wisconsin were taken from annual surveys conducted by the Wisconsin Department of Health Services over an eight year period (2002-2009). A forecasting strategy appropriate for each revenue source was developed resulting in “base case” estimates. An analysis of the sensitivity of these revenue forecasts to a set of alternative fiscal policies by the federal, state, and local governments was carried out.

Findings—The model forecasts total LHD revenues in 2012 of \$170.5 million (in 2010 dollars). By 2014 inflation-adjusted revenues will decline by \$8 million, a reduction of 4.7 percent. Because of population growth, per capita real revenues of LHDs are forecast to decline by 6.6 percent between 2012 and 2014. There is a great deal of uncertainty about the future of federal funding in support of local public health. A doubling of the reductions in federal grants scheduled under current law would result in an additional \$4.4 million decline in LHD revenues in 2014.

Conclusions—The impact of the Great Recession continues to haunt LHDs. Multi-year revenue forecasting offers a new financial tool to help LHDs better plan for an environment of declining resources. New revenue sources are needed if sharp drops in public health service delivery are to be avoided.

Keywords

public health finance; local health department; financial management; public health funding

Introduction

The ability of local government public health departments (LHDs) to provide core public health services depends in large part on their receipt of a reliable stream of revenue from the federal government, their state government, and their parent local government. As a result of the Great Recession this flow of revenue has been disrupted. In many parts of the country, the public sector revenues of LHDs from all three levels of government have declined sharply over the past couple years.¹

In this paper, we investigate the impact of the Great Recession on the major sources of LHD revenue. Using data from LHDs in Wisconsin, we develop a fiscal forecasting model that allows us to predict the total amount of revenue that will be available to each Wisconsin LHD over the period from 2012 to 2014.

One reason the Wisconsin experience is relevant to other states is that the state's local public health system is a "local governance" type similar to what is found in 27 states.² In addition, as is the pattern nationally over two-thirds of LHDs in Wisconsin serve county jurisdictions. In terms of governance, nearly all LHDs in Wisconsin operate with a local board of health. For the nation as a whole, 75 percent of LHDs operate with a local board of health.² Finally, Wisconsin's LHDs rely on the same sources of revenue as do most other states, although the share of revenue from their county or municipal governments is higher in Wisconsin (47 percent) compared to the national average (26 percent).²

In the next section, we provide a brief overview of the current fiscal conditions of state and local governments in the United States. After describing the sources of revenue of Wisconsin's 92 LHDs, we describe our methodology for forecasting LHD revenues. We then summarize the results of our forecasting exercise and conclude with a discussion of the role revenue forecasts can play in assisting LHDs in planning how best to maintain core services during this period of severe fiscal challenges.

The Impact of the Recession on the Financing of State and Local Governments

The economic recession coupled with the fallout from the financial crisis and the sharp drop in the housing market continue to have a large impact on the financing of state and local governments. Since the beginning of the Great Recession most state governments have faced repeated large budget deficits. Collectively, states have had to close budget gaps totaling more than \$500 billion.³ Although state tax collections have been growing since the first quarter of 2010, their rate of growth has been slower than in most post-World War II economic recoveries, and after adjusting for inflation, total revenues are still lower than they were four years ago.⁴ The recession also resulted in sharp increases in the number of people eligible for Medicaid and other state-funded programs for the needy.

Because state constitutions require the enactment of balanced budgets, states have responded to recession-related budget gaps by spending down any available rainy day funds, by cutting spending, and by raising taxes. Rainy day funds proved to be totally inadequate to fill gaping

budget gaps. While taxes were increased in many states, most increases were quite small. In aggregate state tax increases in fiscal years 2009 and 2010 totaled about \$32.5 billion, an amount that was equal to about 11 percent of the total budget gaps states faced over this two-year period.⁵ Thus, in most states, most of the budget balancing came through reductions in state spending. Although the pattern varied across states, cuts were divided between state-operated programs, such as state universities and prisons, and transfers to local governments for the financing of schools and municipal and county public services, including public health.⁶ In most states, a wide range of public health services are delivered by LHDs of either county or municipal governments. Although many local governments rely on sales and excise tax revenue, and a few raise revenues from income taxes, by far the most important source of local government tax revenue is the property tax.

Data from the Census Bureau indicate that at a national level, local government property tax revenues have been declining steadily since the third quarter of 2010.⁷ Recent research demonstrates a statistical relationship between changes in housing prices and property tax revenues, with changes in tax revenue lagging changes in housing prices by about three years.^{8,9,10} These results are consistent with national level data, which show that housing prices peaked in the first quarter of 2007.¹¹

After about five years of decline, by early 2013 housing prices are rising in most parts of the country. While this is certainly good news, the lagged response of property tax revenues to changes in housing prices suggest that local government property tax revenues may continue to fall for the next few years. Although there is some evidence that during the post-2001 recession, property tax increases by local governments were able to partially make up for cuts in state aid to local governments, the continued economic uncertainty and the sharp drop in housing prices suggest that this time it will be much more difficult for local government elected officials to prevent cuts in local public services by enacting property tax increases.¹²

In addition to funding from state and local governments, LHDs receive grants from the federal government through programs such as Maternal and Child Health and the Preventive Health and Health Services Block Grant. Future funding levels for these programs, as well as for other sources of federal support for public health are uncertain. However, regardless of what specific budgetary actions Congress chooses to take, it is clear that future federal fiscal policy will be driven by the need to reduce the size of the nation's debt.

While it is possible to paint a picture of the fiscal environment facing LHDs throughout the country, making actual forecasts of the revenue that will be available to LHDs in any given state requires a detailed analysis of the institutional, economic, and fiscal environment in that state. Although the LHD revenue forecasting model we develop in this paper provides specific revenue estimates only for LHDs in Wisconsin, we are confident that the general approach can be applied to revenue forecasting elsewhere.

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¹In part, these lags occur because of delays in reassessing property for tax purposes, with many jurisdictions conducting reassessments on an every two or three year cycle. Some states also phase in over several years any changes in assessed value attributable to changes in market values. In addition, property tax bills are usually based on assessed values in the previous year, thereby adding an additional year to the lag between changes in market values and changes in property tax revenues.

The Funding of Local Public Health in Wisconsin

In Wisconsin there are 68 county health departments, 22 municipal health departments (representing 42 separate municipalities), and two joint city-county departments. As shown in Table 1, in fiscal year 2009 these 92 LHDs had total revenues equal to \$162.6 million, an amount equal to about \$29 per capita. Over 90 percent of revenue comes from just three sources, LHDs' parent governments, grants from the federal government, and fees from services provided.

Revenue Forecasting Methodology

In developing our forecasts we created a forecasting strategy appropriate for each revenue source. Our forecasts are based upon detailed data on revenues by source for each LHD in Wisconsin taken from an annual survey conducted by the Wisconsin Department of Health Services. These data were available for each year from 2002 through 2009.

Like any forecast, our revenue forecasts are based on a series of assumptions. For some sources of revenue we estimate statistical relationships that serve as the basis for forecasts. A statistical approach is difficult for other revenue sources, such as federal grants, where history provide an imperfect guide to future revenue flows. For these revenue sources, we make our best estimate of future revenues and then employ sensitivity analysis to demonstrate the revenue impacts of a set of alternative forecasting assumptions.

Revenue from Parent Governments

In Wisconsin, a parent government of a LHD can be either a county government or one or more municipal governments. Budgetary allocations to LHDs come from the parent governments' general funds. Nearly all revenue in the general funds of both county and municipal governments in Wisconsin come from three sources: property taxes, general-purpose state grants, called Shared Revenues, and in 62 of the state's 72 counties, from a one-half percentage point sales tax. Data collected by the Wisconsin Department of Revenue indicate that on average in 2009, 76 percent of the total revenue came from the property tax, 12 percent from the sales tax, and 8 percent from Shared Revenues. It is important to note, though, that the share from each of these revenue sources vary considerably across counties.

In order to forecast the LHD revenue from parent governments, we first forecast separately the revenues from the property tax, from the county sales tax, and from Shared Revenues for each parent government. We then use historical data on the spending patterns of these parent governments to estimate the share of our forecasted amounts of general purpose revenues that will be allocated to LHDs.

Forecasting Property Tax Revenues—In Wisconsin, local governments can respond to reductions in market and assessed values by raising their property tax rates. However, the ability of both municipal and county governments to increase property tax levies is restricted by a state-imposed limit on annual changes in levies. The budget for the 2011-13 biennium included a provision that limits the percentage growth in property tax levies in every county and municipality to property value increases attributable to net new construction relative to

the (equalized) value of property in the previous year. For example, if last year, the market value of property in municipality “A” totaled \$300 million and the value of net new construction this year equaled \$3 million, then municipality “A” would be allowed to increase its property tax levy this year by only 1 percent. Any larger levy increase would have to be approved by voters through a referendum. Recent experience suggests that in the current economic climate, the probability of successfully passing a levy limit override referendum is small. In fact, override referenda occur very infrequently.

The existence of the levy limit informs our strategy for forecasting property tax revenues through the year 2014. The most recent property tax levy data for municipalities and counties is for 2010 (payable in 2011). Given the tightness of the property tax levy limit and the decline in other sources of local government revenues, we assume that all local governments will levy the maximum amount they are allowed under the levy limit. Thus, to forecast property tax revenues, we need to forecast the rate of net new construction in each parent government through the year 2013.

The Wisconsin Department of Revenue reports data each year on the value of net new construction. The latest available data provide information on new construction in 2010 and the resulting property values for 2011.¹³ We use these data to calculate maximum allowable property tax levies for 2011 (payable in 2012). In order to forecast levies through the year 2014, we develop a model to predict net new construction through 2013. Our model uses data on net new construction for the years 2006 through 2011 for all of Wisconsin’s 72 counties. In equation (1) below, net new construction relative to the total equalized property value in jurisdiction in the previous year is a function of the log of the population growth rate lagged one year, the log of the growth rate of per capita equalized property values (EQV) lagged one year, and a vector of county fixed effects. The county fixed effects account for factors that may influence the rate of net new construction in individual counties, and do not vary over time.

$$\text{Net New Construction}_{it} = \alpha + \beta \ln \text{Population Growth}_{i,t-1} + \gamma \ln \text{EQV Growth}_{i,t-1} + c_i + e \quad (1)$$

As can be seen in Table 2, both independent variables, the lagged growth rate of population and of equalized property values are statistically significant at the one percent level. With an R-squared of 0.674, the estimated equation does a good job in explaining differences in net new construction in Wisconsin’s counties.

To use this equation to forecast net new construction, it is necessary to estimate each jurisdiction’s equalized property value (EQV) and population for 2012 and 2013. Property values in nearly all communities declined between 2010 and 2011. In estimating property values for 2012 and 2013, we assumed that the rate of decline between 2010 and 2011 would be reduced to 50 percent of the actual percentage change in EQV between 2010 and 2011. We constructed our population forecasts using population estimates from 2011 and population projections made by the Wisconsin Department of Administration for each county for the year 2015.¹⁴ To determine the population for 2012 and 2013, we assumed that the forecast population change between 2011 and 2015 would occur at a constant rate over this four-year period.

The forecasted rates of net new construction for 2012 and 2013 provide a ceiling for the growth rate of property tax levies for 2012 through 2014. The data on net new construction for 2011 come from the Wisconsin Department of Revenue and reflect actual data. The numbers for the latter two years are the estimates generated by equation 1. In 2011, the average rate of growth was 0.78 percent. We forecast the average growth in 2012 and 2013 will be 0.62 and 0.84 percent, respectively. These rates of new construction reflect the very slow pace at which the economy is recovering from the Great Recession. In the period before the recession, from 2000 through 2007, the annual rate of net new construction in Wisconsin averaged 2.8 percent.¹⁵

Forecasting Sales Tax Revenues—County governments in Wisconsin have the option to levy a 0.5 percent sales tax as an add-on to the state's 5 percent sales tax. Of the 70 LHDs serving entire counties, 7 are located in counties that do not levy a sales tax. To forecast county government sales tax revenues we relied on data on county sales tax revenue for the years 1998 through 2009. In equation (2), we assume that per capita real sales tax revenue in county i in year t is a function of Wisconsin's real state per capita sales tax revenues in year t , and county fixed effects, c_i .

$$\text{Per Capita Sales Tax}_{it} = \alpha + \beta \text{ State Per Capita Sales Tax}_t + c_i + u_{it} \quad (2)$$

The results, shown in Table 3, indicate that the per capita state sales tax revenue variable is highly significant (at the one percent level). The equation explains 93 percent of the variance in per capita county sales tax revenues.

Forecast state sales tax revenues for 2012 and 2013 are official state government revenue forecasts.¹⁶ We forecast state sales tax revenues for 2014 based on a regression of state sales tax revenues on state personal income.ⁱⁱ

Forecasting Shared Revenues—Shared Revenues provide unrestricted grants from the state government to Wisconsin's county and municipal governments. The 2011-13 state budget reduced the annual appropriation for Shared Revenues by nine percent. The reductions in state aid to individual local governments between 2011 and 2012 were determined by a complex formula, with 46 of the state's 72 counties and many municipalities facing a 25 percent loss in their shared revenue allocations. The state budget specified that after the cuts in 2012, shared revenue allocations to county and municipal governments were to remain unchanged in 2013 and in "subsequent years."¹⁷

Unless the state's 2013-15 budget changes, Shared Revenue allocations for 2014 will remain identical in nominal dollars to actual 2012 allocations. In our revenue sensitivity analysis we will consider the possibility that the state legislature may enact an increase in Shared Revenue allocations for 2014.

Allocating Parent Government Revenues to LHDs—Public health is one of the many functions of county and municipal governments. Each year the legislative body of the

ⁱⁱRegression results are available from the authors.

parent government of each LHD must develop a budget that divides total available revenues, primarily from the property tax, county sales taxes, and state shared revenues, among the various departments and agencies that together define the local government. Using disaggregated data on county and municipal government spending, we calculated the proportion of parent government revenues that have been allocated to LHDs in each year from 2002 through 2009. We expected to find that the share of parent government revenues going directly to LHDs would vary substantially across the state and over time. We hypothesized that public health expenditures would be more stable over time than spending on many other county services. Thus, during an economic downturn, parent governments would make an attempt to maintain core public health services. As a result, one would expect that the share of parent government revenues allocated to LHDs would be counter-cyclical, expanding during recessions and shrinking during periods of economic growth and prosperity.

In fact, we discovered that the share of parental government revenues going to LHDs has been remarkably stable. The average share was 2.84 percent, and that average remained effectively unchanged between 2002 and 2009. The variation in the share of parent government revenue going to LHDs also did not vary much across LHDs, with the coefficient of variation being only 0.2. Given this limited variation across time and space, it is not surprising that our attempt to explain the existing variation using multivariate regression techniques were unsuccessful.

Given the temporal stability in the shares of parent government general fund revenues allocated to LHDs, we make the assumption that during the period between 2012 and 2014, the share of each parent government's general fund revenues allocated to its LHD will be equal to a weighted average of the actual revenue shares for the period 2002 through 2009. The weights are designed so that the shares of the most recent years count more than shares from earlier years.ⁱⁱⁱ

Revenue from Federal Grants

Historically, the federal government has played an important role in the financing of the delivery of local public health services. In general, federal funding of public health is provided through a number of categorical grant programs. In some cases, grants are distributed via "need-based" formulas specified in statute, and in other cases, through competitive grant programs, with states or LHDs applying for a fixed pot of funding.

Data on each LHD's revenue from federal grants are available for the years 2002 through 2009. While these data indicate considerable year-to-year variations in the amount of federal grants received by many LHDs, the general trend over this eight-year period is of rising federal support for LHDs.

ⁱⁱⁱSpecifically a weight of 0.09 was assigned to the share from 2002, with the weight for each subsequent year growing by 0.01. Thus the weight assigned to the 2009 revenue share was 0.16. The weights sum to one. As a test of the reasonableness of these weights, we used a 2002 to 2008 weighted average of shares to predict the 2009 shares. For about three-quarters of the LHDs, the predictions were within 20 percent of the actual 2009 shares.

To estimate federal grant revenues in 2012, we calculated the average annual rate of change of federal grant revenue for each LHD between 2006 and 2009. We then assume that for each LHD, federal grant revenues grew at its calculated average annual rate between 2009 and 2012.

Given the current state of partisan divisiveness that pervades Congress on fiscal issues, it is nearly impossible to predict the level of federal funding in support of local public health in 2013, 2014, and beyond. Our approach is to base our estimates of LHD funding in 2013 and 2014 on the Congressional Budget Office's February 2013 "baseline budget projections" for total discretionary outlays.¹⁸ The CBO's baseline budget projections are always based on current law.

Thus, projected outlays for 2013 and 2014 reflect both the caps imposed on discretionary expenditures as part of the Budget Control Act of 2011 (BCA) and the cross-the-board cuts, known as *sequestration*, mandated by the BCA because Congress was unable to reach agreement on a plan to reduce the federal debt. The CBO projects that under current law the federal government's discretionary outlays will decline by 5.6 percent between 2012 and 2013 and by a further 3.5 percent between 2013 and 2014.¹⁸ We have applied these percentage reductions to the 2012 federal grant allocation of each LHD. Because of the tremendous uncertainty about future Congressional actions related to federal spending, we will explore how sensitive our LHD revenue estimates are to several alternative assumptions about the future levels of federal grants.

Revenue from Fees for Services

Fees for services are the third most important source of LHD revenue. Fee revenues vary both over time and among LHDs. Fee revenue is determined by (unobserved) policy decisions by individual LHDs, by the size of the population receiving LHD services, and by the underlying costs of service delivery. As a way of forecasting LHD revenues from service fees, we calculated the average rate of growth in the population serviced by each LHD for the period 2002 through 2009. We then make the assumption that the revenue from fees for each LHD increases in every year after 2009 by this average rate of population change and by the annual rate of inflation, measured by the Consumer Price Index.^{iv}

Revenue from State Grants, Private Grants, and Donations

In 2009, LHD revenues from state and private grants, and from donations accounted for eight percent of total LHD revenues. The importance of these revenue sources varies substantially among LHDs, and over time for most individual LHDs, making formal statistical forecasting extremely difficult. Our approach to forecasting each of these revenue sources was to calculate a weighted average of revenue from each source over the years 2002 through 2009, with larger weights assigned to the latter years. These weighted

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^{iv}Although we will have to wait several years to test the accuracy of these forecasts, we calculated the average rate of population change between 2002 and 2006, and forecast service fees in 2009 using this average and the actual inflation rate between 2006 and 2009. The results indicated that the forecast amount of fees in 2009 were within 10 percent of actual fee revenue for about 30 percent of LHDs.

averages were then increased by the inflation rate in order to generate revenue forecasts for the years 2012 through 2014.^v

Revenue Forecast Results

Table 4 presents our base case forecasts of the total revenue available to Wisconsin's 92 LHDs for the years 2012 through 2014, with revenues in 2010 dollars.^{vi} We forecast total LHD revenues in 2012 of \$170.5 million, an inflation-adjusted increase of 3.1 percent compared to LHD revenues in 2009. Given that Wisconsin's population grew by 5.2 percent between 2009 and 2012, real LHD revenue per capita declined by 1.8 percent (53 cents) between 2009 and 2012.

Our model forecasts that in real terms, total LHD revenue will decline in both 2013 and 2014, by 2.7 percent and 2.0 percent respectively. Because Wisconsin's population is predicted to grow at a rate of about one percent per year, in per capita terms, real LHD revenues are forecast to decline in 2013 by nearly 3.7 percent and further decline by 3 percent in 2014.

The results presented in Table 4 are obviously sensitive to assumptions we made about policy choices by the federal government, state governments, local governments, and LHDs. Table 5 lists seven alternative policies and indicates the impact of each policy on LHD total revenues for the year 2014. Each policy simulation is conducted by assuming that all other policies remain unchanged from the base case presented in Table 4. All 2014 revenue changes are presented in 2010 dollars.

The first two alternative policies are legislative changes that the Wisconsin Legislature could choose to enact as part of the next state budget. The first policy would loosen the levy freeze imposed on county and municipal governments and the second policy would increase state government aid (Shared Revenues) to local governments by 10 percent. The impact of both policies on LHD revenues would be quite small. Both policies together would result in less than a one percent increase in LHD revenues in 2014.

The third policy alternative involves a five percent increase in the share of parent government general fund revenues that would be allocated to LHDs.^{vii} Implementation of this policy change would involve separate actions by all of Wisconsin's parent governments. If these increases occurred, LHD revenue would increase by nearly \$3.9 million, a 2.4 percent increase from the base case forecast. It is interesting to note that even with this extra revenue, the total revenue of LHDs in Wisconsin would still be over \$4 million (in 2010 dollars) less than the level of funding in 2012.

^vAs one test of our forecasting procedure, we used a 2002 to 2008 weighted average of revenues from these three sources to predict 2009 revenues. Half of our predictions were within 25 percent of actual 2009 revenue. We believe that this result provides reasonable support for our approach given the great temporal variability in these revenue sources, i.e. the median coefficient of variation over the eight-year period is 0.52.

^{vi}Our inflation adjustments are based on the Consumer Price Index for the Milwaukee metropolitan area. Inflation forecasts through 2014 came from the Wisconsin Department of Revenue. The rate of inflation is predicted to be 2.0 percent between 2012 and 2013 and 2.2 percent between 2013 and 2014.

^{vii}On average, LHDs are allocated 2.84 percent of parent government general fund revenues. A five percent increase would raise the average share 2.98 percent.

As indicated previously, there exists tremendous uncertainty about future federal funding, especially for non-defense discretionary programs. There is certainly a chance that Congress will choose to change current law in ways that reduce the spending cuts now written into law. The Congressional Budget Office points out that even if the spending cuts required under sequestration do not occur, current laws will result in a decline in discretionary spending as a share of GDP by 2023 to a level lower than it has been in the past 50 years.¹⁸ Congress may well decide that such sharp reductions in discretionary spending programs are unwise or not politically viable. On the other hand, there are strong political forces at work arguing that much more must be done to reduce the nation's long-term debt. Also, there appears to be bipartisan opposition to implementing the large cuts in spending on national security required under sequestration. Together these two forces could result in Congress enacting even larger cuts in domestic discretionary programs than under current law. To reflect this range of options, we have analyzed the sensitivity of our LHD revenue forecasts to both reducing the 2014 federal grant reductions by half and doubling the cuts mandated by current law. The results of this analysis show that the smaller cuts in federal grants would generate an additional \$2.2 million, a 1.35 percent increase from the current law forecasts. A doubling of the size of the cuts in federal grants would reduce revenues by an additional \$4.4 million (2.7 percent).

While individual LHDs have no effective impact on federal and state fiscal policies, they do have more influence over setting fees for the services they provide. By more aggressively applying for grants and by pursuing more assertive fund raising, they may be able to increase revenues from these sources. The last two policy simulations reported in Table 5, illustrate that a 15 percent increase in service fee revenue by all LHDs would result in a \$4.3 million (2.7 percent) increase in revenues over the base case and a 10 percent increase in revenues from state grants, donations, and private grants would generate an additional \$1.2 million (0.7 percent). These two actions, although clearly difficult would go a considerable way towards maintaining real LHD revenues in 2014 at their 2012 levels.

Conclusions

The goal of this research project was to produce multi-year revenue forecasts for Wisconsin's 92 LHDs. Our modeling strategy accounts for the institutional arrangements and economic factors that influence each revenue source. Econometric techniques are appropriate in some cases, but less formal approaches were used to forecast other sources of revenue, such as federal grants.

Our forecasts suggest that revenues will decline between 2012 and 2014 for many of Wisconsin's LHDs. Even when revenues do not decline, growing populations will create substantial challenges to LHDs' ability to maintain their current level of public health service delivery. Our forecasts also demonstrate that within Wisconsin the revenue prospects of LHDs differ substantially. In real per capita terms, our 2012 to 2014 LHD revenue forecasts range from a 1.5 percent to a 13.1 percent decrease. This variability is due to different mixes of revenue sources across LHDs and differing fiscal environments faced by LHDs and their parent governments in different parts of the state.

Although our forecasting model is constructed for LHDs in Wisconsin, the basic methodology can be applied to other states. The exact modeling strategy, especially with respect to revenues from the LHD parent governments, will depend on the specific taxes and state grants that are used to finance parent governments. The role of tax limitations and other institutional arrangements that influence the flow of revenues to LHDs will also need to be accounted for. For example, in states where local governments can utilize local income taxes, the forecasting model will need to account for projected changes in income tax revenues.

In recent years a number of public health experts have urged LHDs to improve their financial analysis and management practices, and to incorporate tools and strategies more commonly used in the private sector.^{19,20} Such methods were demonstrated to be helpful in greatly improving the financial health of a LHD in a recent case study by Honore, Stefanak, and Dessens.²¹ The multi-year revenue forecasting model developed in this paper offers LHD managers and local government policymakers a new analytic tool to assist them in developing strategic plans to optimize service delivery over a period of several years.

In the current fiscal environment, where many LHDs have experienced reductions in revenues over an extended period, the ability to predict future revenues, long-term planning, and the development of new funding sources, are essential if additional sharp drops in public health service delivery are to be avoided.²² While local public health officials have limited control over the amount of revenues they receive from parent governments and from federal and state grants, they can influence revenue from fees, private grants, and donations. If these revenues can't be enhanced, it is important to begin developing multi-year strategies for maintaining, to the extent possible, the delivery of core public health services.

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Table 1

Revenues of Wisconsin Local Health Departments, by Source of Revenue, 2009

Revenue Source	Total Amount (92 LHDs)	Percent of Revenue	LHDs with Revenue
Parent Jurisdiction	\$81,258,764	50.0%	92
Federal Grants	40,800,788	25.1%	92
Fees for Services	27,698,970	17.0%	91
State Grants	9,744,448	6.0%	89
Private Grants	2,547,972	1.6%	43
Donations	569,276	0.4%	45
Total LHD Revenue	\$162,620,218	100.0%	

Source: Wisconsin Department of Health Services, Survey of Local Public Health Departments, 2012

Table 2

Regression Results for Net New Construction

Independent Variables	Coefficients	Standard Errors
Population growth last year	0.1404***	(0.0135)
Equalized property value growth last year	0.1728***	(0.0084)
Constant	0.0135***	(0.0003)
N = 504	R ² = 0.674	

Note:

***
p < 0.01. Independent variables are measured in logs. The equation includes county government fixed effects, although these results are not displayed.

Table 3

Regression Results for Per Capita County Sales Tax Revenue

Independent Variables	Coefficients	Standard Errors
Per capita state sales tax revenue	0.0570***	(0.006)
Constant	20.2223***	(4.8518)
N = 695	R2 = 0.931	

Note:

***

p < 0.01. The equation includes county government fixed effects, although these results are not displayed.

Table 4

Wisconsin LHD Revenues in 2010 Dollars 2009 Actual and 2012-2014 Forecasts

	Total LHD Revenue	Percentage Change	Total LHD Per Capita Revenue	Percentage Change
2009	\$165,287,703		\$29.02	
2012	\$170,474,774	3.1%	\$28.49	-1.8%
2013	\$165,843,590	-2.7%	\$27.44	-3.7%
2014	\$162,487,581	-2.0%	\$26.62	-3.0%

Table 5

Sensitivity of Model Forecasts to Alternative Policy Assumptions LHD 2014 Revenues (in 2010 dollars)

	<u>Dollar amount</u>		<u>Per Capita</u>	
Base case assumptions	\$162,487,581		\$26.62	
	Change in Total Revenue		Change in Per Capita Revenue	
Alternate Policies	Dollar Amount	Percentage	Dollar Amount	Percentage
Raise property tax levy limit from 0 percent to 2 percent	\$629,647	0.39%	\$0.10	0.39%
Increase Shared Revenue appropriations by 10 percent	\$985,446	0.61%	\$0.16	0.61%
Increase LHD share of parent government revenue by 5 percent over base case	\$3,863,066	2.38%	\$0.63	2.38%
Reduce base case percentage cut in federal aid by half	\$2,194,701	1.35%	\$0.36	1.35%
Double base case percentage cut in federal aid	-\$4,389,402	-2.70%	-\$0.72	-2.70%
Increase revenue from service fees by 15 percent	\$4,329,856	2.66%	\$0.71	2.66%
Increase state revenue, donations, and private grants by 10 percent	\$1,170,088	0.72%	\$0.19	0.72%