Health Care Spending By Minnesota’s Cities

Costs, Efficiencies, and the Role of Local Government Aid

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I. Executive Summary

Purpose and Objectives

The rising cost of health care is a major concern for all levels of government. Although most attention is focused on state-sponsored health care insurance programs and health-related human service spending, the rising cost of health care insurance for local government employees is another area of concern. Surveys and research studies have identified health insurance costs as one of the top cost drivers for cities. The cost pressures exerted by employee health care have a major influence on local government budgets, and may trigger property tax increases or reductions in city services.

At the same time, there is significant political and philosophical debate underway regarding local government aid to cities, or LGA. Mayors and other city leaders argue that LGA cuts fundamentally threaten essential city services like public safety. Others suggest cost control measures that do not jeopardize essential services are available. Resolving this debate is difficult since functionally, LGA is indistinguishable from other general fund revenues. Cities can choose to spend their LGA revenue on any number of things – including the possibility of more generous health benefits for employees and/or assuming a larger share of the cost of employee health benefits.

This study examines employee health care benefit spending by Minnesota city governments and examines the extent to which state aids may affect local government health care spending decisions. Specifically, the study explores three questions:

- How much diversity exists in local government employee health care spending and plan features?
- How, if at all, do state aids affect local government health care spending decisions and spending levels?
- To what extent are local governments adopting provisions that increase efficiencies and reduce costs?

Methodology

Our investigation uses self-reported data from the Minnesota Local Government Salary and Benefits Survey for 2008.¹ We focused on cities with populations of 2,500 or more for our research investigation, for two reasons:

- They are classified as “large” cities for the purposes of determining local government aid (LGA) and therefore treated differently for LGA purposes from smaller cities.
- They represent a manageable group of cities for analytical purposes while receiving most of total LGA.

This study analyses Salary and Benefits Survey data from 182 cities, which received 65.8% of total LGA ($318.6 million) in 2008.² We examine health care spending in Minnesota

¹ Coordinated and sponsored by the League of Minnesota Cities, the Association of Minnesota Counties, and the Association of Metropolitan Municipalities.
² 41 cities with population 2,500 or greater were omitted because of incomplete data or response errors in the dataset.
Health Care Spending by Minnesota’s Cities

through survey data analysis and also employ standard statistical methods to determine average effects on city health care expenditures resulting from increases in LGA.

Primary Findings

1. There is considerable diversity among Minnesota city governments with respect to their employee health care insurance plan features.

Health care coverage plans offered to city employees come in many forms. The only reported plan elements or features shared by more than half the cities in this study are: deductibles for insurance coverage, co-pay based prescription drug coverage, medical reimbursement accounts, and an ability to access multiple carriers. The permutations of plan elements are significant, and city employee health care plans are clearly not uniform.

2. City governments differ greatly on the amount of spending on local government employee health care.

In 2008, over half of cities reported spending between $600 and $900 per employee per month for family health care premiums. However, 31 cities reported spending over $1,000 per month and 4 cities spent over $1,500 per month. Conversely, 11 cities reported spending less than $500 per employee per month.

Expressing this spending as a share of family health care premium costs, the average Minnesota city contributed just under 75% of the cost of the average family health care premium. However, 11 Minnesota cities reported covering 100% of the family premium cost and 22 additional cities assumed between 90% and 100% of the family premium cost.

3. On average, cities that receive LGA assume a higher proportion of family health care premium costs.

Cities receiving LGA spent, on average, $103 (12%) more per month, per employee, on family health care premiums; and also covered a greater share of the premium cost. However, the average monthly premiums of both LGA and non-LGA cities were nearly identical; suggesting that the primary source of the spending difference is the amount of insurance cost covered by the employer.

| Table 1: Comparison of LGA and Non-LGA Cities on Employer Health Care Spending |
|---------------------------------------------------------------|-----------------|-----------------|
| LGA Recipients (n=137) |  | Non-LGA Recipients (n=45) |  |
| Mean Employer Contribution | $856 | $753 |
| Median Employer Contribution | $825 | $742 |
| Mean % of Premium Covered | 79% | 70% |
| Median % of Premium Covered | 75% | 69% |
| Average Monthly Family Premium | $1,119 | $1,110 |

4. LGA was a significant enabler of increased spending on employee health care premium contributions statewide in 2008. The influence of LGA on employer health care spending was over twice that of the property tax levy and four times that of other city revenue sources.
Executive Summary

Our analysis indicates that in 2008, for every additional $1 of LGA received per capita, there was on average, holding all else constant, a $1.03 increase in monthly city contributions to family health care premiums per employee. In comparison, a $1 increase in property tax levy per capita increased employer spending on family health premiums on average by $.43 per employee and a $1 increase in other local revenues per capita increased employer spending on family health premiums by $.25 per employee.

When examining only those cities receiving LGA in 2008, the trend relationships between city health care spending, LGA, property tax levies, and other revenue sources persisted. For every additional $1 of LGA received per capita, there was on average a $.94 increase in city contributions to family health care premiums – a much greater influence than either a dollar of property tax levy ($ .37 increase in contributions) or other city revenues ($ .20 increase in contributions).

Among all revenue sources, LGA had the greatest influence on employee health care contributions, both in magnitude and in statistical significance.

5. Efforts by city governments to increase efficiencies in health care spending are clearly being made but higher cost, inefficient plan features remain in existence.

Many cities have adopted strategies which help reduce utilization of high-cost medical goods and services and improve spending efficiencies. However, several costly program design features such as coverage of non-formulary drugs, contributions to retiree health insurance coverage, and the use of health savings account type features as a supplement to, rather than a substitute for, traditional premium based coverage are still common among Minnesota cities.

Conclusions and Recommendations

Our conclusions and recommendations need to be viewed in light of some study data limitations. Although our analysis identifies statistically significant relationships between LGA and employee health care spending, the use of self-reported survey information as the basis for analysis is not ideal. MTA strongly encourages additional research on this issue using audited spending data. In addition, future research should be expanded to include the issue of salary compensation.

Our conclusions and recommendations are based on the perspective that the ability to provide adequate levels of local government services to Minnesota citizens regardless of where they live remains an integral part of Minnesota’s good government ethic. However, state assistance to achieve this policy objective should be strictly limited to compensating cities for spending influences over which they have no control.

Conclusion: The transparency of local government employee health care spending must be improved.

Employee health care spending has been documented as a major cost driver for local governments with significant implications for the local property tax levy. Yet its influence is largely hidden to taxpayers. Current financial and budget reporting practices based on program areas are necessary, but insufficient, for proper citizen understanding of property tax levies and for appropriate levels of local government spending transparency.
Recommendation: Require cities and counties to report expenditures by object code to the State Auditor

Program-based budget reporting can mask influential cost drivers which affect city spending levels and trends. Presenting additional information based on what governments actually purchase with their revenues provides citizens with important additional perspective on how public dollars are used.

Recommendation: Disclose descriptive details of government employee health plan coverage in a prominent fashion.

The contractual details of health plan benefits are important, because different features can have significantly different associated costs. Making these public in a prominent and easily accessible way allows citizens to understand what public dollars are buying and, most importantly, how the health care plans their city offers compare with similar jurisdictions.

Conclusion: Evidence that LGA is subsidizing higher levels of local government employee health care spending raises into question, once again, the practical efficacy of general purpose aids.

If LGA-enabled spending includes assuming a higher proportion of employee health care premiums costs, then LGA does not improve either the quality or cost efficiency of city service delivery to citizens. This subsidization also underscores the continuing difficulty and fundamental challenge of developing a general purpose aid program that delivers on its premise of enabling all cities regardless of property tax wealth to provide adequate levels of basic services to citizens at reasonable tax prices. Instead of fostering greater equity across Minnesota, these findings indicate that LGA is likely introducing greater inequity in public sector employee health care.

Recommendation: Prioritize any necessary LGA cuts by targeting those cities which are significantly subsidizing employee health care plans relative to state averages.

State taxpayer dollars should not be used to enable cities to continue to assume disproportionately large shares of employee health insurance costs or continue to offer very high cost plan features. It is also unfair for cities that have embarked on health care cost containment measures to suffer the same aid cut fate as those cities which have made little or no effort to implement plan design changes or engage employees in greater cost sharing.

Recommendation: Create a health care spending offset in the LGA distribution formula that incentivizes efficiency improvements in city health care plan offerings.

Absent another LGA reform effort to address the issues identified in this report, the legislature should explore the creation of a city health spending offset which would adjust city “need-capacity gap” calculations in the LGA formula to correct for above average controllable spending on employee health care. Such an offset would reduce the calculated “neediness” and aid eligibility of cities that fail to achieve health care cost control measures and encourage them to adopt such practices.
Executive Summary

Conclusion: More effort should be given to improving the efficiency and cost effectiveness of local government health care spending.

Minnesota cities have embarked on a variety of strategies to offer quality health care to employees while better controlling public costs. Yet it is also clear that several higher cost plan features continue to be utilized across the state, such as contributions to post retirement benefit packages, multiple provider offerings, high cost prescription drug coverage, and zero co-pay doctor visits. There appears to be ample opportunity for local property taxpayer cost savings without compromising the quality of health care provided to local employees.

Recommendation: Employee health care plans should be a focal point for any future property tax accountability, value, and efficiency investigations.

Ongoing legislative interest in developing standard performance and benchmarking measures for the efficiency and effectiveness of property tax-supported services should begin with employee health care offerings. Such an initiative could make an important contribution toward the dissemination and adoption of best health care cost control practices among local governments and improve the public transparency of government spending in this area.

Recommendation: Reexamine statutory provisions that mandate higher levels of local government health care spending.

The state should consider modifying or repealing statutory provisions that impose costly health care mandates on local units of government. One area of particular concern is the requirement that local governments continue to allow early retirees and their dependents to participate in employer-sponsored medical care. Even though early retirees frequently, although certainly not always, pay 100% of the associated premium cost; their inclusion in the active employee risk pool elevates the cost of providing health care coverage to active employees. Should the state end that mandate, it could provide a coverage option for early retirees from state and local government by creating a statewide health plan for early retirees with 100% of premiums paid by the retiring individuals, allowing those individuals to obtain the benefits of pooling risk.

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3 Minnesota Statutes § 471.61
II. Background and Policy Problem

Introduction

The rising cost of health care is a major concern for all levels of government. Of the estimated $2.1 trillion spent nationally on health care, 46 cents of every dollar come from government sources, and nationally health care costs grew at an annual rate of 6.7% between 1991 and 2004.\(^4\) In Minnesota, government health care expenditures are increasing at a fundamentally unsustainable rate. The Legislative Budget Trends Study Commission projects that state spending on health care will grow 8.5% per year between 2008 and 2033, while projecting annual revenue growth of only 3.9% over that same 25-year period.\(^5\) The Commission’s report notes that if these two projections hold, then all other parts of the state budget (including K-12 education) would have to remain flat in order to maintain balanced budgets through 2033.

Most of the attention in Minnesota is focused on the state-sponsored health care insurance programs and on health-related human service spending. Less attention is paid to the inflationary pressures of local government purchases of health care insurance for employees. Since government is highly labor intensive, these costs can significantly impact the price of government service delivery. In 2004, the Minnesota Citizens Forum on Health Care Costs compiled data which showed that from 2000-2004, the cost of health care insurance grew 3.5 times faster than the state’s economy and more than four times faster than inflation. Annual membership surveys conducted by the League of Minnesota Cities affirm the significance that rising health employee insurance costs have on local government budgets. Health insurance costs are consistently identified as one of the top cost drivers for city budgets. Property tax increases are a byproduct of these cost pressures.

Policy Problem—Why This Study?

It is important that citizens be able to understand the reasons for property tax increases, and local government health care costs are an increasingly important part of that equation. In theory, the tax price of local government employees’ health care benefits is borne by local citizens, who balance employees’ interests with their willingness and ability to pay for benefits. If plan elements, cost sharing features, or other provisions become too costly and thus put the quality and quantity of local service delivery at risk, taxpayers would express their concern to local officials and perhaps reaffirm their own interests through the voting booth.

In practice, this theoretical ideal falls short in two respects:

- **Public transparency on government employee health care costs is essentially non-existent.**

For all its significance and relevance to budget debates, public transparency on government employee health care costs is extremely poor. Local governments report expenditures to the


State Auditor on a “program” basis (e.g. public safety, parks and recreation, etc.) rather than on an “object” basis (e.g. salaries, health care benefits for employees, fuel, purchased services, etc.). Program-based expense reporting allows citizens to understand how their tax dollars are used but provides no information on cost drivers affecting levels of city spending. Thus, there is no centralized information source to allow citizens to isolate major cost drivers like city health care spending levels or benchmark their city’s spending on employee health care against other communities.

Some local governments do present “object-based” spending information in their own budget documents. However, health insurance expenditures are typically reported as either a part of total employee compensation, or are perhaps segregated from salaries but lumped into an employee benefits line item which includes pensions and other benefit items. Such summary reporting methods fail to provide a comprehensive understanding of how health insurance costs contribute to growing employee compensation expenditures.

Nor are the relevant details of health benefit plans readily accessible to citizens. Benefit plans offered by local governments can differ significantly in scope, features, structure -- and ultimately per employee cost. How the total cost is then divided between employees and employers is another important consideration. With an investment of effort and time, an exploration of local government websites might yield some descriptive information on these issues. But again, taxpayer ability to benchmark plans with respect to generosity, features, and cost-sharing in order to ask relevant questions of local officials about these issues is extremely limited.

- **State aids to local governments can significantly complicate the benefits package/local tax price relationship**

General purpose state aids to local governments were enacted to ensure that Minnesota citizens, wherever they lived, had access to adequate levels of public services at reasonable tax prices. However, since these aids can be used for any purpose, they also introduce at least the potential for subsidizing higher levels of spending than would otherwise occur – including spending on employee health care. In addition, the introduction of state aids might discourage local governments from pursuing cost improvement provisions and other changes to improve the efficiency of employee health care plans. At its most extreme, if most or all state aid was simply being used to provide more generous health care benefit packages, the theory and practice of general purpose aids would have to be seriously reconsidered.
III. Methodology

Overview

This study explores the nature of health care benefit spending among city governments in Minnesota and examines whether, and how, state aids affect local government health care spending decisions. Our research questions are:

1. How much diversity exists in local government employee health care spending and plan features?
2. How, if at all, do state aids affect local government health care spending decisions and spending levels?
3. To what extent are local governments adopting provisions that increase efficiencies and reduce costs?

We examine local government employee health care spending in Minnesota through a descriptive analysis of survey response data as well as standard statistical methods to determine average effects on local government health care expenditures resulting from increases in LGA, relative to other city revenue sources.

As already noted, there is no public centralized source that quantifies city spending on employee health care benefits either on an aggregate or per-employee basis. Thus, the Minnesota Center for Public Finance Research (MCPFR) purchased self-reported data from the Minnesota Local Government Salary & Benefits Survey⁶ for 2008. While this is not the ideal way to assess city health care spending, it does provide a means for approximating how local governments spend in comparison to each other. Given that this data was self-reported, we took various steps to clean and standardize the data. Appendix A presents a detailed methodology.

This investigation focuses on the 223 Minnesota cities with a population of at least 2,500⁷. We eliminated 41 cities that did not provide complete survey data or had apparent response errors, giving us a total sample of 182 cities. These 182 cities received 65.8% of total LGA ($318.6 million) in 2008.

Data Limitations

There are three key data limitations which affect the interpretation of this study.

- First, this study is based on one year of city government spending and benefit data (from 2008). No time-trend or growth trend information is available. Therefore we cannot use the regressions in this study to estimate future growth in costs or spending.
- Second, since actual city health care spending data is not available, the study uses as a proxy a city’s self-reported average dollar contribution to family health care coverage, per employee. This self-reported data is not audited and may include some reporting error despite our data cleaning efforts. While the use of this proxy enables an

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⁶ Coordinated and sponsored by the League of Minnesota Cities, the Association of Minnesota County, and the Association of Metropolitan Municipalities. The purpose of the salary survey program is to facilitate the exchange of information among elected officials and to assist administrative staff in the management of compensation and benefit plans in participating organizations.

⁷ As estimated by the Minnesota State Demographer’s Office for 2006.
examination of city spending relationships and trends, it cannot be interpreted as a full and complete representation of health care spending by cities. Such a measure would require actual enrollment figures in single coverage and family coverage and associated cost information for all plans offered by the city – neither of which is obtainable from the survey database or in any other public record.\textsuperscript{8}

- Third, health care benefits are part of an employee’s total compensation package. In response to negotiations and employee preferences, some cities may choose to spend more on health care at the expense of salaries and wages. As a result, these findings should not be used to make inferences about the relative generosity of total public sector compensation.

\textsuperscript{8} Employees are given the option of accepting single coverage (coverage just for themselves), family coverage (coverage for themselves and their spouses and dependants), or to waive benefits (which is typically only allowed if they can provide proof of other insurance). Health plan providers indicated that most employees enroll in family plans since most working age adults have one or more dependants. Therefore, the primary analysis in this study will focus on the average amounts spent on family premiums, because they are the more commonly enrolled in health plan.
IV. Analysis and Findings

The findings of this study are reported in three main areas:
- First, we provide an overview of local government health care benefits plans and spending.
- Second, we report on the role of state aids in local government health care spending.
- Finally, we report on the results of our regression analysis.

Overview of Local Government Health Care Benefit Plans and Spending

Health care benefit plans can take on many forms. Plans differ based on a variety of design elements such as drug coverage, preventive and wellness care, retiree access, and existence of supplemental benefits like long-term care insurance and medical care reimbursement or savings accounts. Cost sharing provisions such as co-pays, deductibles, and employer matches add to plan diversity. Administrative elements such as ability for employees to choose among multiple providers or waive coverage also distinguish benefit plans offered to employees.

Our analysis of survey responses indicates there is considerable diversity among city governments in health care programs and plan features provided their employees (Table 2). Nearly all cities contribute to single and family health care coverage but the mechanisms and details of that coverage come in a wide variety of forms.

Table 2: Utilization of Various Health Care Options by Minnesota City Governments

<table>
<thead>
<tr>
<th>Health Plan Benefit Option</th>
<th>Cities Offering Benefit</th>
<th>Number</th>
<th>Share of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribution to single medical coverage</td>
<td>181</td>
<td>99%</td>
<td></td>
</tr>
<tr>
<td>Contribution to family medical coverage</td>
<td>180</td>
<td>99%</td>
<td></td>
</tr>
<tr>
<td>Medical benefits offered to all employees</td>
<td>168</td>
<td>92%</td>
<td></td>
</tr>
<tr>
<td>Medical care reimbursement account</td>
<td>142</td>
<td>78%</td>
<td></td>
</tr>
<tr>
<td>Single coverage deductible</td>
<td>110</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Copay prescription drug coverage</td>
<td>95</td>
<td>52%</td>
<td></td>
</tr>
<tr>
<td>Access to multiple carriers</td>
<td>90</td>
<td>49%</td>
<td></td>
</tr>
<tr>
<td>Long term disability</td>
<td>81</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>Healthcare benefit waiver offered</td>
<td>77</td>
<td>42%</td>
<td></td>
</tr>
<tr>
<td>Copay non-formulary drug coverage</td>
<td>66</td>
<td>36%</td>
<td></td>
</tr>
<tr>
<td>Copay brand name drug coverage</td>
<td>63</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>Post employment health care savings</td>
<td>57</td>
<td>31%</td>
<td></td>
</tr>
<tr>
<td>Health savings account (HSA)</td>
<td>56</td>
<td>31%</td>
<td></td>
</tr>
<tr>
<td>Short term disability</td>
<td>45</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Cash provided in-lieu-of health benefits</td>
<td>42</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>Wellness program</td>
<td>41</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>Consumer driven health plan*</td>
<td>25</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Contribution to post retirement insurance</td>
<td>20</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Long term care</td>
<td>19</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

*Generally considered to be a high deductible plan plus HRA or HSA

The only reported plan elements or features shared by more than half the cities in this study are employer contributions to single and family medical coverage (99%) medical benefits offered to all employees (92%), medical care reimbursement accounts (78%), deductibles for single coverage (60%), and co-pay based prescription drug coverage (52%). The permutations of plan elements are significant and city employee health care plans are clearly not uniform.

Government spending on employee health care is a function of both the “generosity” of the benefit plan design and the amount of the premium costs assumed by the employer. Low deductible and co-pay plans which minimize out-of-pocket employee costs encourage health care utilization and are therefore more expensive. Generosity might also include enabling access to a broader array of health care-related services. The health care coverage is priced through a premium which then must be apportioned between employee and employer. Since these premium costs are shared, there is not a direct correlation between a plan’s “generosity” and its cost to a city. For example, it is possible that a more “generous” plan with significant employee assumption of premium costs could be less expensive to cities than a more restrictive plan covered 100% by employers. Importantly, total spending on health care can also include spending on other items beside insurance premium payments such as contributions to health reimbursement accounts.

There is considerable diversity among city governments with respect to the amount of spending on local government employee health care. In the Salary and Benefit Survey, cities reported their monthly contributions toward family health care insurance premiums for full-time employees. Figure 1 presents the spending distribution of the 182 cities included in our analysis and illustrates the diversity of spending among city governments. Over half of the cities spent between $600 and $900 per FTE per month on family coverage. However, 31 cities spent over $1,000 per month and 4 of those cities spent over $1,500 per month. Conversely, 11 cities spent less than $500 for family coverage.

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9 Although most cities offer multiple plan options, the survey asked cities to provide data on only their plan with the highest enrollment. Thus, Table 2 likely understates the number of cities offering various plan features.
Analysis and Findings

Figure 1: Distribution of Monthly City Contributions to Family Health Plan Coverage

Looking at city contributions to family health care coverage as a share of the premium cost provides additional perspective. On average, Minnesota cities contributed just under 75% of the family health care premium cost. From a cost-share perspective, 11 cities were the most generous to employees, paying the entire cost of their family health care premiums. An additional 22 cities assumed between 90% and 100% of the family premium cost. Three cities reported contributions to family health care premiums in excess of the premium’s cost. It is not clear from the survey data what these plans entail although one possibility is a supplemental contribution to a savings or medical reimbursement account in addition to the premium contribution. Six other cities report contributing $500 or more toward family health coverage but did not report an insurance premium amount. This likely reflects the use of some form of health savings accounts.

Cost Reduction Measures and Efficiency Improvements

Given the escalating cost of health care, local governments have an incentive to explore ways of reducing health care costs without sacrificing the quality of health care for their employees. As the League of Minnesota Cities has noted:

Spiraling health care costs are a national issue that is mostly beyond the control of the state cities or private employer. But cities can reevaluate their health care plans to encourage more healthy behavior by employees and to introduce financial incentives that encourage employees to avoid health care choices that are more expensive than necessary.\textsuperscript{10}

The Minnesota Council on Health Plans recommends four primary ways to reduce utilization of high-cost medical goods and services and avoid misuse of healthcare:

- Prevention
- Substitution/use of generic medications
- Health management
- Consumer-driven, high deductible health plans

Prevention means incentivizing health care consumers to seek out preventative care to avoid high-cost hospital visits and long-term care expenses. Low cost or no cost co-pays for generic prescription drugs combined with significantly higher co-pays for "brand name" drugs incentivizes generic drug use. Health management approaches minimize costs by reimbursing health quality rather than procedures or visits by using “pay for performance” measures. Consumer-driven plans come in various forms but typically involve health savings accounts and higher deductibles. The intent is to make consumers (in this case, city employees and their families) aware of the true price of services or medications they use, which should lead them to make more cost-efficient health care choices.

As the list of reported plan elements in Table 2 suggests, efforts by cities to increase health care spending efficiencies are mixed. Roughly 25% of cities reported prevention-based strategies and consumer driven plan designs. However, this likely understates actual usage, since the survey asked only for data on the most-utilized city health care plan option; many cities may also offer consumer-driven plan options as a complement. Conversely, several more costly program design elements appear to still be quite common around the state. For example:

- Non-formulary drugs are those that the insurance carrier does not approve for reimbursement. Yet over one-third of cities reported non-formulary prescription coverage.
- Half of the cities allow employees to choose from multiple insurance carriers, which increases the cost of city health care plan administration. One in ten continues to make contributions to retiree-related health insurance premiums.
- A significant number of cities appear to have adopted HSA-type features as a supplement to traditional premium based deductible/co-pay plans rather than as a substitute for them, reducing overall spending efficiency.

Health cost control measures and efficiency improvements are difficult for governments to implement. Employees highly value benefit security and predictability, and new benefit programs introduce uncertainty in this area. Moreover, from an employee perspective, inertia based on an “if it’s not broke don’t fix it” mentality is quite understandable. State law adds to the challenge since it prohibits reduction of the aggregate value of benefits (like co-pay and deductible amounts) unless the employer and union agree to it.11

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Role of State Aids in City Health Care Spending

Local government aid (LGA) is general purpose aid that cities can use for any purpose. Although the amount of LGA a city receives is less predictable than other city revenues, it is not functionally distinguishable from property taxes or any other own-source general fund revenue. As a result, spending from LGA is indistinguishable from spending from other general fund sources. No practical or functional distinction can be drawn between the notion of using LGA or other general fund revenues to fund a new police officer hire, purchase fuel for city snow plows, or subsidize employee health care insurance costs.

Table 3 presents descriptive statistics regarding contributions to family health care coverage by both LGA and non-LGA cities. Cities that receive LGA spend on average, $103 (12%) more per month, per employee, on family coverage. Likewise, LGA recipients cover a greater share of the family health insurance premium cost. Interestingly, the average monthly premiums of LGA and non-LGA cities are nearly identical, suggesting that the primary source of the spending difference may be the amount of insurance cost covered by the employer (the city).

Table 3: Comparison of LGA and Non-LGA Cities on Employer Health Care Spending

<table>
<thead>
<tr>
<th></th>
<th>LGA Recipients (n=137)</th>
<th>Non-LGA Recipients (n=45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Employer Contribution</td>
<td>$856</td>
<td>$753</td>
</tr>
<tr>
<td>Median Employer Contribution</td>
<td>$825</td>
<td>$742</td>
</tr>
<tr>
<td>Mean % of Premium Covered</td>
<td>79%</td>
<td>70%</td>
</tr>
<tr>
<td>Median % of Premium Covered</td>
<td>75%</td>
<td>69%</td>
</tr>
<tr>
<td>Average Monthly Family Premium</td>
<td>$1,119</td>
<td>$1,110</td>
</tr>
</tbody>
</table>

The question of whether LGA actually enables higher levels of local government health care spending cannot be determined by simple descriptive statistics. Uncontrollable cost factors like the age of the city workforce could be expected to influence city health care coverage costs. Likewise, the availability of property tax revenue and other locally-derived revenues could be expected to have a material effect on the amount a city decides to contribute to employee health care.

Regression Model Description

To explore this relationship, we employ standard statistical methods (regression analysis) to determine the average effect on local government health care spending resulting from increases in LGA, relative to other revenue sources. A regression analysis simply describes how one variable (the dependent variable) is influenced by other (independent) variables. Regression analysis identifies the trend line in the data set showing how the value of the dependent variable is affected, on average, by the values of independent variables. A multivariate regression allows us to account for all known and expected factors that do cause or are expected to cause variation in the dependent variable.

The relationships our regression model captures are presented in Figure 2. City health care spending is the dependent variable and is represented by the proxy “average city contributions to family premiums per employee per month.” Three major factors are expected to influence city contribution decisions: revenue availability, plan enrollment (number of people covered) and

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12 Average total dollars contributed per employee per month and share of premium covered.
13 See Data Limitations on page 9 for an explanation of why this proxy is used.
plan utilization. Plan utilization in turn is affected by factors both under city control (plan structure) and outside of city control (age of workforce and economic status of community).\(^{14}\)

**Figure 2: Diagram of Relationship and Model Elements**

![Diagram of Relationship and Model Elements](image)

Health care spending is expected to be a function of revenue availability from the property tax, plus the availability of state aids and other supplemental revenue sources. Plan enrollment and the use of medical plan benefits are also expected to influence how much a city spends. Plan utilization in turn is a function of both plan features and demographic factors.

The relationships can be expressed mathematically as:

\[ HCFP = f(PTL, LGA, OR, WAUP, AHI, FTE) \]

These variables are defined as follows:

**HCFP: Health Care Family Premium Contribution.**
Defined as the city’s contribution\(^{16}\) (in dollars) to family health care coverage, per employee, per month. It is the dependent variable in our analysis and is influenced by the following independent variables:

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\(^{14}\) Many health plan providers and economists note that location can affect health insurance costs, given the influence of the supply of health service providers and related cost-of-living issues on medical care costs. We tested geographic factors in our regression modeling but omitted the regional variable from our analysis because it lacked explanatory power and statistical significance. Including it would introduce irrelevant variable bias into the model, reducing the explanatory power of the other independent variables.

\(^{15}\) Property tax levy and LGA are correlated, in other words, their values have an association. However, the level of correlation does not introduce bias into the model (multicolinearity). Appendix B has multicolinearity test information. The need to control for other areas of spending relative to various revenue sources is eliminated since we have the spending item on the dependent side, rather than the independent side.

\(^{16}\) Most cities reported the contribution for the plan most employees enroll in. Some cities reported contribution data for all plans offered. In these circumstances, we took the average contribution of all reported plans.
Analysis and Findings

City property tax levy is the revenue source of last resort to fill the gap between expenditures and aids and other own-source revenues. We expect a positive relationship between per capita property tax levy and city health care spending—as per capita levy increases, health care spending increases.

LGA: Local Government Aid Received 2008, per capita.
Since LGA is figured into the ability of the city to collect revenue, it becomes part health spending decision making. We expect a positive relationship between LGA receipts and city health care spending;

OR: Other Revenue, 2008, per capita.
Defined as total revenues for 2008, less the property tax levy, less LGA received. There are other miscellaneous sources of city revenue for 2008, such as charges for services, licenses and permits, or federal or state revenues (LGA is obviously not included). As part of total revenue raising capacity, we expect a positive relationship with city health care spending.

In addition to the three revenue-related variables, three other variables are included based on their proven influence on health care spending.17

FTE: Full Time Employees for the City, 2008, per capita.
We expect a positive relationship—more employees entails more health care spending.

WAUP: Workforce Age Utilization Proxy.
Defined as the share of city residents between the ages of 45-64 and derived from 2000 Census data. WAUP is a proxy for the percentage of the city workforce between the ages of 45 and 64. Data from the U.S. Department of Health and Human Service Medical Expenditures Panel Survey confirms that health care and premium costs increase with age due to increased health care utilization. As the share of the workforce in the high utilization age bracket increases, we expect that expenditures will increase.

AHI: Average City Household Income, per capita.
Derived from 2000 Census Data, it is a proxy variable for the economic status of the city’s residents. Most models that attempt to explain spending should include a variable to account for the wealth of the population. We expect a positive relationship between the wealth of city residents and health care spending on city employees.

Our model’s “null” hypothesis is that these variables have no statistically significant impact on city health care spending. The point of the regression is to see if we can reject this null hypothesis and demonstrate that these variables do have a statistically significant impact on health care spending.

Regression Model Results
Figure 3 presents the results from our regression model. The regression model explains 80% of the variation in statewide city spending18 on health care premiums19. All explanatory variables demonstrate high levels of statistical significance and the model itself has a statistically

17 FTE, WAUP and AHI are considered control variables in the vernacular of regression analysis.
18 As indicated by the “adjusted R²” statistic; measures variation around the sample’s average.
19 We stress here that this study identifies statewide trends, not trends for individual cities in the sample.
significant fit. We can reject the “null hypothesis” (that this model is not statistically significant) since the 99% confidence interval means the probability that our findings are due to solely to chance is less than 1%.

Figure 3: Regression Model Results

| HCFP = 0 + 0.43 PTL* + 1.03 LGA* + 0.25 OR* + 2,209 WAUP* + 0.001 AHI*** - 3,476 FTE*** + ε |
|--------|--------|
| Adjusted R2 = 0.8 |
| F Statistic = 130* |

* statistically significant at 99% confidence level
** statistically significant at 95% confidence level
*** statistically significant at 90% confidence level

Interpretation of Independent Variables:

As previously noted, the independent variables in this model allow us to identify and quantify the effect that each independent variable has on the dependent variable (spending). Therefore, the results presented in Figure 3 should be interpreted as follows:

- **In 2008, for every additional $1 in LGA received per capita, there was on average, holding all else constant, a $1.03 increase in monthly city contributions to family health care premium coverage per employee.**

City spending on employee health care contributions in 2008 increased as per capita LGA increased. It’s crucial to note this does **not** mean that all cities in the study spent all their LGA revenues on employee health care -- the regression is only quantifying a trend among all cities. What it does indicate is that LGA significantly **enabled** increased city spending contributions toward employee health benefits.

- **In 2008, for every $1 increase in property tax levy per capita there was on average, holding all else constant, a $0.43 increase in monthly city contributions to family health care premium coverage per employee.**

While city spending on employee health care contributions in 2008 also increased as per capita property tax revenues increased; the relative influence of the property tax levy on employer health care contributions was less than half that of LGA. Although the ability of a city to raise property taxes plays a role in employee health care spending, the role is less both in dollar amount and statistical significance.

- **In 2008, for every $1 increase in other revenue per capita there was, on average, holding all else constant, a $0.25 increase in monthly city contributions to family health care premium coverage per employee.**

This indicates that on average, those cities that had greater access to other own-source revenues also spent more on employee health care plans. However, the statistical influence of other revenues was smaller than that of LGA or property taxes.

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20 As measured by the F statistic. This model’s F of 130 is significant at the 1% level and far surpasses the critical F of 2.17.

21 Statistically, the trend between property taxes levied per capita and employee health care spending was weaker than that of the relationship between LGA per capita and employee health care spending.
The three other independent variables (workforce age or WAUP, household income or AHI, and employee count or FTE) also demonstrated expected relationships and statistical significance at the 90% confidence interval or higher, confirming their importance in this model as control variables. The influence of household income on spending was positive, statistically significant, but very small.

The interpretation of the other two control variables (WAUP and FTE) is complicated by the use of a “per capita model” which standardizes the workforce age proxy and full time employee count by dividing them by the total population. This standardization transforms the magnitude of the coefficients, which makes it difficult to draw conclusions directly from them. However, the strong statistical significance of the WAUP variable demonstrates the influence of an aging workforce, in that as the average age of the workforce increases, so does the cost of government services through increases in overall health care premium costs.

Supplemental Regression Models: LGA Recipients Only and Tax Capacity-Based Analysis
To determine whether the inclusion of LGA and non-LGA cities in the same model biased the results, we repeated the regression analysis using only those cities that received LGA in 2008. Figure 4 presents the findings. The trend identified in the previous model remains strong and highly statistically significant: for every $1 increase in LGA capita, there was on average, holding all else constant, a $0.94 increase in city contributions to family health care premium coverage per employee. Trend relationships were not as strong for property tax and other revenue sources as indicated by their lower levels of statistical significance.

Figure 4: Regression Model Results – LGA Cities Only

| HCFP= 0 + 0.37 PTL*** + 0.94 LGA* + 0.2 OR*** + 2,680 WAUP*+ 0.001 AHI***+ -4,240 FTE***+ ε |
| Adjusted R2= 0.8 |
| F Statistic= 86.1* |

* statistically significant at 99% confidence level
** statistically significant at 95% confidence level
*** statistically significant at 90% confidence level

A third model utilized property tax capacity per capita (PTC) as opposed to levy per capita as an explanatory (independent) variable. This approach attempts to model city decision-making and planning perspectives since city spending levels are determined by a politically acceptable rate of property taxation after accounting for other revenues the city is expected to receive. Figure 5 presents the findings.

Figure 5: Regression Model Results – City Property Tax Capacity

| HCFP= 0 + 0.05 PTC*** + 0.8 LGA* + 0.16 OR*** + 2,174 WAUP*+ 0.0014 AHI***+ 18,506 FTE***+ ε |
| Adjusted R2= 0.8 |
| F Statistic= 127* |

* statistically significant at 99% confidence level
** statistically significant at 95% confidence level
*** statistically significant at 90% confidence level

22 This controls for the effects of population size.
Again, model results indicate a large and highly statistically significant trend for LGA: 80 cents of additional spending per employee for every dollar per capita of LGA received. Interestingly, the trend relationships for other revenue and tax capacity per capita are not as strong and the magnitude of effect not as large – only $0.05 of additional health care spending per every additional dollar per capita of property tax capacity. This suggests that relative property wealth had minimal impact on levels of city health care spending. In other words, the ability to spend more had little effect on the decision to spend more.

**Regression Model Conclusion**

As might be expected, when city revenue increases, so do city contributions to employee health care. However, among all revenue sources, LGA had the greatest influence on employee health care contributions, both in magnitude and in statistical significance. The role of LGA in employee health care contribution increases was over twice that of the city property tax levy and four times that of other revenue sources. We conclude LGA was a significant enabler of increased spending on employee health care premium contributions statewide in 2008.
V. Conclusions and Recommendations

This report has examined the issue of city spending on employee health care, and the potential impacts of local government aid on that spending.

Our conclusions and recommendations are as follows:

1. The transparency of local government employee health care spending must be improved.

Employee health care spending has been documented as a major cost driver for all local governments with significant implications for the local property tax levy. Yet its influence is largely hidden to taxpayers. Current financial and budget reporting actions based on program areas are necessary, but insufficient, for proper citizen understanding of their property tax levies and local government spending transparency.

Recommendation: Require supplemental governmental budget reporting on employee health care.

Mandates on local governments are a continuing source of frustration to local officials, and we empathize with the cost and administrative concerns frequently expressed by representatives of city and county government. However, we recommend that government budget and expense reporting be enhanced in two ways:

• Include expense reporting by object code.

Program-based budget reporting can mask influential cost drivers which affect city spending levels and trends. Presenting additional information based on what governments actually purchase would provide citizens with important additional perspective on how public dollars are used. The Office of the State Auditor has an object code framework that they recommend for local governments. Since this framework is readily available, and since many units of government already use it or something similar, requiring that costs be reported on an object code basis should not be overly onerous.

• Disclose descriptive details of government employee health plan coverage in a prominent fashion.

The contractual details of health plan benefits are important, because different features can have significantly different associated costs. Making these public in a prominent way allows citizens to understand what public dollars are buying, and, most importantly, how the health care plans their city and county offer compare with other similar jurisdictions. With this kind of information, citizens can engage elected officials in a productive conversation about the nature and cost of health care offered to public employees and the overall implications for city and county budgets. Such information should be part of government budget proposal disclosures, and they should also be included on the government’s website.
2. Evidence that LGA is subsidizing higher levels of local government spending on employee health care raises into question, once again, the practical efficacy of general purpose aids.

Although the relative magnitude of LGA’s influence on health care spending may seem surprising, public finance economists are less likely to be startled by a finding that LGA stimulates higher levels of health care spending. It is well-established that lump-sum public grants to lower levels of government have a stimulative effect larger than the size of the aid would indicate. Instead of reducing taxes in order to pass on the benefits of the aid to local taxpayers, the aid-receiving body increases expenditures in order to expand local services in some way. Known as the “flypaper effect” (money tends to stick where it hits), this phenomena has been the focus of over 3,500 research papers according to the National Bureau of Economic Research. This analysis suggests that the flypaper effect with respect to LGA not only exists, but has a disconcerting dimension. The “expanded local services” being enabled by LGA includes assuming a greater share of employee health care premiums, which does not improve either the quality or cost efficiency of city service delivery to citizens.

In theory, LGA has a valid public purpose: to enable all cities regardless of property tax wealth to provide adequate levels of basic services to citizens at reasonable tax prices. In the process, some measure of property tax relief might be provided. Yet, it is difficult to argue that greater subsidization of government employee health care delivers on either of these two objectives.

The subsidization issue highlighted in this study underscores a more fundamental challenge – the continuing difficulty of developing a general purpose aid program that delivers on its premise. This is not a new problem. In February of 1947 the Minnesota Institute of Government Research issued a report entitled The Problem with State Aids. That report’s objections and concerns are remarkably applicable to the events of today, including the following:

It has been very difficult to develop a formula that distributes state aids on any scientific basis thus defeating in large part the objectives of the legislation. In recent years hundreds of surveys and reports have been made to develop better systems for distributing state aids. Few of these proposals have been adopted and, if so, only by increasing the total amount of aid to a point that no existing unit would receive less aid under the new legislation.

The political and technical difficulty in distributing aids on a scientific basis is reflected in recent LGA history. Little has changed since 1947. The 1991 “Ladd Study” on aid design and subsequent changes made to the state’s LGA aid formula (1994, 2003, and 2008) are testimony to the ongoing relevance of MIGR’s conclusions from 1947.

Recommendation: Prioritize any necessary LGA cuts by targeting those cities which are significantly subsidizing employee health care plans relative to state averages.

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24 The MIGR merged with the MTA in 1956.
Conclusions and Recommendations

State taxpayer dollars should not be used to enable cities to continue to assume disproportionately large shares of employee health insurance costs or continue to offer very high cost plan features. It is also unfair for cities that have embarked on health care cost containment measures to suffer the same aid cut fate as those cities which have made little or no effort to implement plan design changes or engage employees in greater cost sharing.

**Recommendation: Create a health care spending offset in the LGA distribution formula that incentivizes efficiency improvements in city health care plan offerings.**

Absent another LGA reform effort to address the issues identified in this report, the legislature should explore the creation of a city health spending offset which would adjust city “need-capacity gap” calculations in the LGA formula to correct for above average controllable spending on employee health care. Such an offset would reduce the calculated “neediness” and aid eligibility of cities that continue to whose health care spending due to plan generosity and/or assumption of premium costs exceeds state municipal averages. It would encourage them to adopt cost control practices.

3. **More effort should be given to improving the efficiency and cost effectiveness of local government health care spending.**

Based on our research it is apparent that many Minnesota cities have embarked on a variety of strategies to offer quality health care to employees while better controlling public costs. Yet it is also clear that several higher-cost plan features continue to be utilized across the state, such as contributions to post-retirement benefit packages, multiple provider offerings, high cost prescription drug coverage, and zero co-pay doctor visits. There appears to be ample opportunity for cost savings for local property taxpayers without reducing the quality of health care provided to local employees.

**Recommendation: Employee health care plans should be a focal point for any future property tax accountability, value, and efficiency investigations.**

During the 2009 legislative session, the Minnesota House of Representatives called for the creation of a new state council on “local results and innovation” to develop standard performance measures for evaluating and reporting on the efficiency and effectiveness of providing property tax-supported services within local governments.25 Even though this provision was not enacted into law, it is clear that an initiative such as this could make an important contribution toward the dissemination and adoption of best practices in health care cost control among local governments while improving transparency and visibility of government spending in this area. The influence of health care costs on property taxes and its ability to crowd out spending on city service delivery makes government employee health care spending a priority issue for any statewide performance benchmarking investigations.

**Recommendation: Reexamine statutory provisions that mandate higher levels of local government health care spending.**

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25 House File 2323, 3rd Engrossment, 86th Legislative Session (2009-2010).
The state should consider modifying or repealing statutory provisions that impose costly health care mandates on local units of government. One area of particular concern is the requirement that local governments must continue to allow early retirees and their dependents to participate in employee sponsored medical care.26 Even though early retirees frequently, although certainly not always, pay 100% of the associated premium cost, their inclusion in the active employee risk pool elevates the cost of providing health care coverage to active employees. Should the state end that mandate, it could provide a coverage option for early retirees from state and local government by creating a statewide health plan for early retirees with 100% of premiums paid by the retiring individuals, allowing those individuals to obtain the benefits of pooling risk.

26 Minnesota Statutes § 471.61
VI. Appendix A: Additional Methodological Details

Primary Data Collection and Cleaning

Data for this study is taken from the *Minnesota Local Government Salary & Benefits Survey* for 2008 (coordinated and sponsored by the League of Minnesota Cities, Association of Minnesota Counties, and Association of Metropolitan Municipalities) which annually collects among other items, self-reported qualitative and quantitative data regarding city employee benefits and spending. Since self-reported data typically does not conform to the needs of analysts, we needed to “clean” the data, in order to provide consistency and as much accuracy as possible, while maintaining the integrity of the figures.

Using the *Salary and Benefits Survey* data, we made an Excel table including all Minnesota cities with over 2,500 residents. We removed all data for counties and cities under 2,500 that were not filtered using the survey’s data extraction tool. We removed 41 cities because of various response errors (e.g. qualitative responses to quantitative questions). This leaves 182 cities in the total sample. These cities comprise 73% of Minnesota’s total urban population and received 65.8% of all 2008 LGA. In the event that multiple plans were provided, the data was averaged, to determine one amount for each city, and if not specified, the amount given was assumed the average plan amount, per the League of Minnesota Cities.

Control Variable Data Collection and Cleaning

Control Variable data was collected from both the *Survey* (population, region, and FTE count) and from the Minnesota Department of Administration Office of Geographic and Demographic analysis: Land Management Information Center (WAUP, AHI).

Independent Variable Revenue Data was collected from:

- State Auditor’s Office (2008 Property Tax Levies)
- House Research: Local Government Aid Lookup Tool (2008 LGA Amounts)
- The League of Minnesota Cities (Property Tax Capacity Data 2008)

Excel data was collected or compiled and the non-sample cities were removed.

Using *Medical Expenditure Panel Survey* data and the Administrative Census Data, the percent increase in the highest range of health care expenditures (for individuals age 45-64) was 11% in 2008. We then multiplied the total number of city residents ages 45-64 times 1.11 to account for increased health care utilization (and expenditures) that occurs with this age group. This captures the effect of increased health expenditures due to age and applies this to the portion of the workforce within the highest utilization range relative to the city’s population.

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28 State Demographer’s Office data for 2006, as presented by the League of Minnesota Cities.
29 The same data set was used for calculating the percent of premiums paid by employers; however, some cities were missing data for amount paid by the employee for one or both categories (single and family).
Irrelevant Variables

Health care providers recommended the inclusion of regional variables in anticipation that geographic differences in premium costs and thus local spending would exist. When tested, the regional variables had no statistical significance.

Since including regional variables would have created irrelevant variable bias, thus distorting the coefficients of the other variables, we eliminated them from the final model used in the report.

Bias

Some self-selection bias is inherent in a data set based on completeness of survey responses. Our final data set of 182 cities is a large sample, which should significantly reduce bias. Similarly there is inherent potential for some self-reporting error, both in accuracy of answering the questions (data entry), and interpretation of the questions being asked (correctly answering the question being asked). We did not use some survey data, which could have added considerable robustness to the study, because of the vagueness of the survey questions.
VII. Appendix B: Overview of Regression Analysis in this Study

Regression Basics

A regression analysis describes how one variable depends on another by developing a trend line based on the average value of Y for each corresponding value of X.

Simple Regressions involve identifying the trends between two variables. One of which is hypothesized (expected) to be dependent on the other.

- **Y**= The dependent variable, the variable that we want to explain changes in relative to X
- **X**= The independent variable, we assume that this variable causes changes in the Y
- With the simple linear regression equation being: \[ Y = \beta_0 + \beta_1 X + \epsilon \]
  - With \( \beta_0 \) signifying the point at which the line crosses 0 (the X intercept), and \( \beta_1 \) signifying the slope of the line (slope being the change in rise/run) relative to the independent variable X. The \( \epsilon \) in this equation is the “error term” which quantifies and controls for all the unaccounted error in the model.

Regressions can be used either as a means of explaining existing trends (single year data) or using data from multiple years to develop a trend line, from which future values can be predicted from.

This study uses a single year of data (in other words, in a technical term, this is not a time-series regression or study), but rather an observational study, thus the coefficient provided describes trends in the sample of data for one year, and should not be extrapolated from to predict future years.

In many cases, a simple regression is subject to significant error and bias because of something termed “3rd factor error” which simply means that changes in Y are dependent on more than one variable. Therefore multiple regression analysis can and should be applied.

The Equation for Multivariate Regressions: \[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \epsilon \]
When multiple known independent variables are affecting a single dependent variable, one attempts to explain the multivariate causation occurring through an econometric technique called multivariate regression, or a regression involving more than one independent variable and which is based on economic theory. This method identifies and controls for confounding variables or “hidden 3rd factor error” by adding in variables that help to explain the affects of the independent variables whose effects you are attempting to quantify. This relationship can be seen below:

**Figure 7: Understanding How a Multivariate Regression Works**

(Independent variable 1) \( X_1 \)  

(Independent Variable 2) \( X_2 \)  

\( Y \) (dependent variable)  

Hidden 3rd Factor Error (which should be \( X_3 \))

In order to quantify the effect of each independent variable, the values of each independent variable are plotted on the \( X \) axis (horizontal axis) and the values of each dependent variable are plotted on the \( Y \) axis (the vertical axis) relative to the independent variables. Each point on the graph below identifies one data combination which can be expressed as either (\( X, Y \)) or (independent, dependent). When considered together, for an entire sample, a trend line, or common slope value can be fitted to the data, so as to identify a common relationship between the variables. A trend line is linear when there is a constant slope, but not necessarily constant elasticity in the variables.

**Figure 8: How Regression Analysis Plots a Trend Line**

In order to achieve the correct specification, a sensitivity analysis was completed, including the use of correlations and simple linear regressions to confirm association and causation between variables, all results are available upon request. In addition, several multivariate models were proposed using revenue sources as the dependent variable and health care cost proxies as the independent variables, with health care cost factors included as control factors. In order to reduce potential biases and to improve the specification, the model was flipped so that health care spending was being explained via revenue sources, rather than revenue sources being explained via health care cost proxies. This data is available upon request.
Other Potential Issues to Address For All Multivariate Models Presented

A linear specification was chosen because this study is based on the theory that there are constant slopes in the relationships, rather than constant elasticities. Therefore, the ordinary least squares method was chosen and utilized. Moreover, these models should have no serial correlation because this is not a time series model, and the order of observations does not matter in the calculation. Several variables were determined irrelevant based on initial sensitivity analyses. Although the region in which a city is located was suggested to affect the cost of health care, during the sensitivity analysis for this model, the regional dummy variables were determined to irrelevant, and after looking at the raw descriptive statistics from the data set, although some differences do exist, there are no statistically significant linear trends related to health care spending by cities, therefore indicating that there is no irrelevant variable bias. Omitted variable bias can be an issue when, at least, one important explanatory variable is left out of the model and therefore, some of the other coefficients pick up part of that variables explanatory power, which has the potential to result in biased coefficients. Due to the use of sound theory behind the specification of this model no significant variables were left out of the model, and therefore coefficients should not be biased. The theory behind this model is sound because all past and theorized variables are included, or have a proxy variable to represent their value. Obviously, not all of the variation in this model is explained, which would suggest that omitted variable bias is an issue; however, because of the use of proxy variables, there will be some loss of explanatory power.

Multicolinearity exists in every regression model, to some degree; the question is to what degree is multicolinearity present in this specification. There are a few ways of identifying “severe multicolinearity” but in the end, it is important to keep in mind that the majority of the times, the effects of multicolinearity are not so extreme as to merit the removal of variables or re-specification of the model. When you have multicolinearity in the model, there are some consequences, computed t-scores will drop, standard errors will increase, and thus variance will increase, and estimates become sensitive to changes in specification; but at the same time, overall the estimates will remain unbiased and the overall fit of the equation and estimation of the coefficients will remain largely unaffected. There are several options for identifying multicolinearity; one is to find the correlation between each of the independent variables, if higher than 0.8 then there is severe multicolinearity. The other approach is to assess the VIF (or variance inflation factor) of each variable, and if greater than 5 (the generally accepted VIF) you have multicolinearity. For this study, because of the limitations of regression analysis in excel, a simple correlation function was run to check for correlations between the variables. None of the variables are highly correlated or approached or passed the 0.8 threshold. Keeping these issues and limitations in mind, this study offers the following conclusions on large city spending trends in Minnesota.

Regressions can be used either as a means of explaining existing trends (single year data) or using data from multiple years to develop a trend line, from which future values can be predicted from. This study uses a single year of data (in other words, in a technical term, this is not a time-series regression or study), but rather an observational study, thus the coefficient provided describes trends in the sample of data for one year, and should not be extrapolated from to predict future years.

What this study does do is identify how much the average employee health care premium contribution changes for each additional dollar of revenue received from the three revenue sources for cities in Minnesota: Local Government Aid, Property Taxes, and Other Revenue.
By identifying these trends we are able to explain how spending changes relative to revenue received in large cities in 2008.

Why weren’t other spending variables included? This study is looking at the relationship between the various revenue sources of a city compared to changes in average employee health care contributions. This means we are taking actual data on average contributions for each of the 182 cities, and plotting these against the various revenue sources in order to determine if there is a constant linear relationship between contribution amount and revenue received. This means that we are isolating the effect of the various revenue sources relative to employee health care contributions, thus removing the need to control for other spending areas.

Understanding Tests of Significance

The Adjusted $R^2$: The adjusted $R^2$ is a measure of the goodness of fit of a model and is also referred to as the coefficient of determination, in that it determines the overall fit of the model, and how much of the variation in $Y$ that the model can explain. In simpler terms, the adjusted $R^2$ is a means of assessing how well the model specification fits the dependent variable, and provides a figure for how much of the variation in the sample’s $Y$ can be explained as a percentage of total variation, adjusted for degrees of freedom (which is the sample size less the number of independent variables less 1).

T-tests:
T tests indicate the significance of the individual independent variables in their ability to explain variation in the data set. This basically quantifies whether or not a variable helps to explain the dependent variable or not.

F tests:
F tests on the other hand look at the combined significance of the independent variables to determine the combined significance of the specified independent variables. The F-score quantifies the ratio of error the model can explain relative to what it cannot explain, in other words, how much of the variation in the dependent variable is explained by this combination of independent variables.

The specific calculation of the F-score can be simplified to:
The Total Sum of Squares = The Estimated Sum of Squares ÷ Residual Sum of Squares

TSS = ESS/RSS, which means:

The variation in Y around its average = The error accounted for in the model ÷ The Unexplained or Unaccounted for Error in the model

Therefore for an F-test, the F score = \([\text{ESS} ÷ \text{the number of independent variables}] / [\text{RSS} ÷ \text{sample size} - \text{the number of independent variables} - 1]\)

For purposes of interpretation, one must calculate the appropriate critical F dependent on the number of independent variables and the size of the sample, from the Critical F Table. If the f score surpasses the critical F statistic then the model is statistically significant, in that the ratio of what can be explained to what can’t be explained is appropriate for the sample size and number of independent variables.