Incorporating State Elementary and Secondary School Funding Formulas in Community

Impact Models

Arun Adhikari
Graduate Research Assistant
Department of Agricultural Economics
Louisiana State University
101 Agricultural Administration Building
Baton Rouge, LA 70803
Phone: (225) 578-2758
Email: aadhik2@lsu.edu

J. Mathew Fannin, Ph.D.
Assistant Professor
Department of Agricultural Economics and Agribusiness
Louisiana State University Agricultural Center
101 Agricultural Administration Building
Baton Rouge, LA 70803
Phone: (225) 578-0346
Email: mfannin@agcenter.lsu.edu

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Introduction

The primary objective of the study is to evaluate how exogenous economic changes (positive or negative) in the labor force and the fiscal module of CCIM impact state financing of local school districts. This objective will be completed by linking key revenue capacity equations from CCIM to Louisiana's MFP formula. There have been no efforts to the authors' knowledge to date that combine a state education funding formula with a Community Policy Analysis System (COMPAS) based model. Our study is an innovative step and a conceptual paper in directly linking a state education funding formula with a COMPAS model. We believe this contribution to be valuable from both a local school district perspective to understand how local economic changes impact their funding as well as state policymakers interested in evaluating the sensitivity of their respective formulas to alternative economic shocks.

The organization of the paper is as follows. First, a background and overview of traditional COMPAS modeling is presented. Of particular focus is the traditional presentation of state transfer revenues, or non-local aid. Then a historical background on the development of state financing formulas for public elementary and secondary education is presented. Next, a conceptual linking of the COMPAS modeling framework with state education funding formulas is discussed followed by a case study linkage between a Louisiana-based COMPAS model and Louisiana's elementary and secondary school funding formula is presented.

Background and Overview of COMPAS Modeling

COMPAS models are regional economic models that combine input-output and econometric approaches to build a conjoined model of economic structure. Input- output models

have long been used in regional level commencing with the work of Isard and Kuene (1953),

Moore and Peterson (1955), and Miller and Blair (1985). These models are simple to construct,

provide easily interpreted results and are available at a high degree of disaggregation for small

units of analysis. Also, input-output models serve as a foundation for other more advanced

modeling approaches. COMPAS models apply the input-output framework to estimate changes

in the labor market and fiscal sector. The overview of Louisiana Community Impact model could

be demonstrated as a flow diagram as follows.

Figure 1. Overview of the Louisiana Community Impact Model (LCIM)
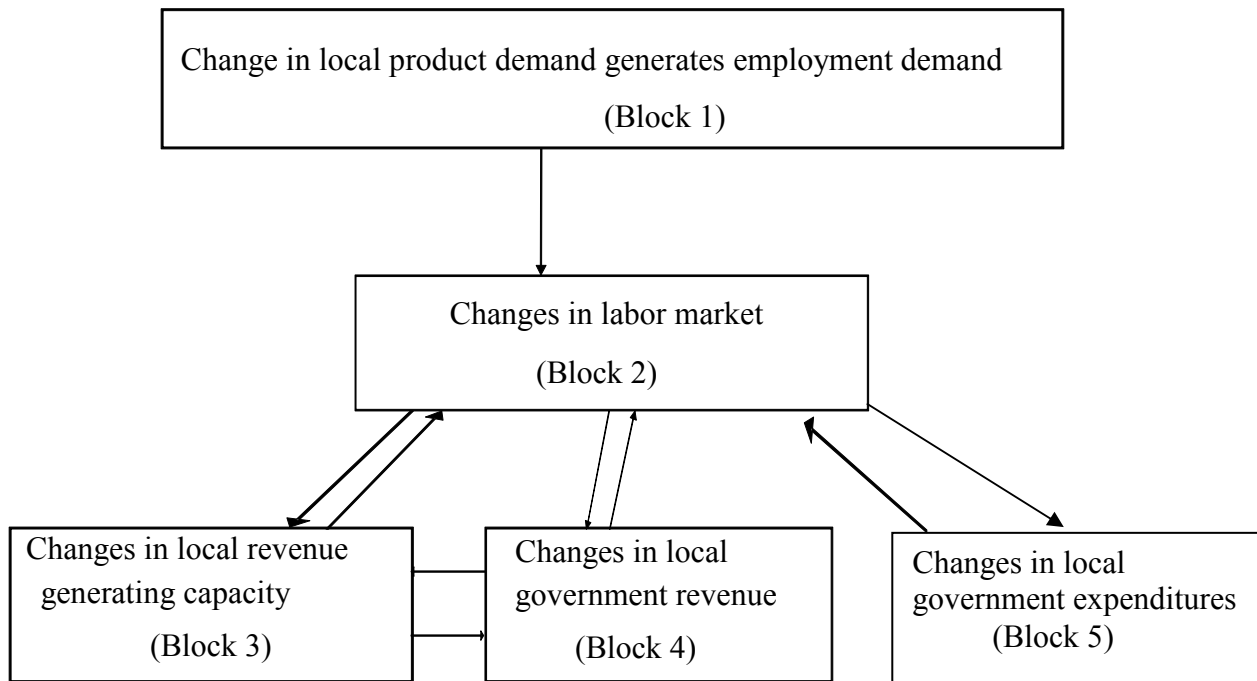
Source: Fannin et al 2008.

The indicators used for the COMPAS model rely on the availability of data, targeted clients of the model and the result of the analysis. Basically, the indicators suggested by Johnson, Otto and Deller (2006) are presented in the table below:

Table 1. Suggested indicators for COMPAS modeling*

Economic	Demographic	Fiscal	Social	Environmental
Employment	Population	Expenditures	Poverty Rate	Water Quality
Unemployment	Labor Force Participation	Revenues	Gini Coefficient	Air Quality
Per Capita Income	School Enrollment	Net Public Service Benefits	Social Capital	Land Use
Regional Product			Health Status	
Retail Sales			Housing Quality	

*The table is a slight modification from the table 1.1 of *Community Policy Analysis Modeling* by Johnson, Otto and Deller, 2006.

The COMPAS modeling framework can be broken down as a way to tweak the model in order to incorporate external sources of income or cost. The first block in the flow chart above starts with employment demand that is generated by changes in local product final demand. The definition of employment demand may vary but the exogenous shock that appears from the changes in employment demand is the basis of the modeling system in COMPAS-based models. Input-Output (I/O) model is a case where the final demand is exogenous but the supply is determined by recursively solving the system to meet the demands. Stated differently, there are no interactions between supply and demand (Beaumont, 1990). In this I/O framework an

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exogenous change in demand for the product and services are interacted through linkages by developing multipliers.

Local and regional labor markets play vital role in COMPAS based models (see Block 2, Figure 1). These models assume that the economic growth is caused mostly by exogenous increases in employment. Conceptually, the labor force module intersects labor force demand and labor force supply or $X_D = X_S$, where X_D is labor force demand and X_S is labor force supply (Johnson, Otto, and Deller 2006). The demand curve for the labor force is a function of the wage rate, or $X_D = f(w)$; where w is the wage rate. We can invert the labor demand equation to obtain $w = g(X_D)$. We can also evaluate the supply as disaggregated into the following components

(1) $X_S = X_{LF} - X_U - X_O + X_I$

where X_{LF} is the total labor force, X_U is the total unemployment, X_O is the total number of out-commuters, and X_I is the total number of in-commuters. We can then evaluate each component of the total labor supply as a function of employment as well as a vector of supply shifters (Johnson, Otto and Deller, 2006).

(2) $X_{LF} = f_L (w, Z_{LF}) = f_L (g (X_D), Z_{LF})$

(3) $X_O = f_L (w, Z_O) = f_L (g (X_D), Z_O)$

(4) $X_I = f_L (w, Z_I) = f_L (g (X_D), Z_I)$

where Z is a vector of supply shifters for labor force, out-commuters, and in-commuters.

The third block of our flow chart deals with the local revenue generating capacity of a region. Basically, to estimate the changes in local government revenue and expenditures, the theoretical derivation of a fiscal module must be empirically specified. A fiscal module could be developed and explained within the greater conceptual framework. The module is important in measuring the effects of labor markets and general economic activity on taxing ability and public

service provisions. Changes in employment are usually accompanied by changes in the tax base

and changes in need for expenditures. Various factors like income, wealth, unemployment, age,

education, assessed valuation and retail sales are responsible for the demands for public services

by residents in a local region.

For our purposes, we focus the revenue capacity equations of the fiscal sector of

measurement. In the LCIM model, and the new Coastal Community Impact Model (CCIM)

under development, two equations measure revenue capacity in our model–assessed property

value and retail sales. These are empirically estimated in the following equations:

(5) Assessed value = *f(*arable land density, out-commuter earnings, resident employed earnings);

(6) Retail sales = *f(*arable land density, in-commuter earnings, out-commuter earnings, resident employed earnings).

These two equations are of importance because they fit both into the fiscal expenditure equations

of the fiscal COMPAS module, but more importantly for our purposes, they impact locally

generated and non local revenues that can be used to pay for public services.

Local and non local revenues are also important basis of COMPAS based models. Local

government revenues are generated from local residents of a region. Sales tax revenue is one of

prime sources for local revenues, and the level of retail sales that generate this revenues stream is

a function of income/earnings derived from the labor market module.

In many cases, some of the same revenue generating capacity variables are also inputs

into the calculation of non-local revenue. COMPAS modeling research has provided directions

to date on how to precisely model such revenue streams. In most cases, local aid formulas are not

used directly because the direct formulas are difficult to obtain or the data to calculate them are

costly to collect and organize. As a result, COMPAS scholars have devised a parametric model

for non local aid that is often applied. Non local revenues are frequently an inverse function of the locality's ability to pay and a direct function of its degree of political influence. As described by Johnson, Otto, and Deller (2006), ability to pay is usually related to per capita income, personal property per capita and real property per capita.

> (7) Nonlocal aid = f(expenditures, income, personal property, real property)
> where,
> Real property = f(income, employment, out-commuters)
> Personal property = f(income, out-commuters).

The downside to this parametric approach is that it aggregates all of the various non local aid formulas that fund local governments into a single equation that, while potentially valuable, does not allow for the precision of non local aid revenue streams when formulas are known and can be calculated.

In the section that follows, we present an alternative approach that incorporate changes from the revenue capacity equations in the COMPAS modeling framework with a direct non local aid formula for school districts. We first introduce the historic background around public school financing. We then introduce how Louisiana's public school funding formula can be integrated with the CCIM model to estimate changes in state aid to local school districts.

Background on Public School Funding:

Elementary and secondary public school funding in the United States has been funded by primarily state and local sources. As of 1999, the federal government only funded approximately 7% of this school funding level. The remaining 93% has been historically split between local and state governments (Ladd, Chalk and Hanson 1999). Most of the public schools in the United States for the past 200 years have been managed by local school districts. These districts, which

may or may not harmonize with political jurisdictions such as municipalities, townships or counties, levee local taxes, typically property taxes, to finance local schools. State governments finance schools through transfers of state aid to the local districts which are then used to fund individual schools.

Historically, school districts that were relatively wealthy, that is, they had sufficient revenue generating capacity (e.g. high assessed valuations to generate property tax revenue) spent more dollars per pupil taught than poorer (less taxable property) districts. A landmark California Supreme Court decision, *Serrano vs Priest*, resulted in states taking efforts to equalize funding for all students in a state – regardless of whether they were raised and went to a school in wealthy or poor school district. The term commonly used in the literature for this equalization is "wealth equity."

Wealth equity in application can take multiple forms. For example, wealth equity can be focused at the pupil level such that each pupil in each school has approximately the same amount of resources spent to achieve a given learning outcome. School funding formulas for many states have typically addressed this challenge through strategies such as adjustment in pupil counts used to finance school districts. That is, states may desire to fund equal levels of funding per pupil for all school districts, but for school districts that have many special needs students, such as those in special education classes, additional pupil "counts" are added to that district's total. Hence, while a traditional track student may be counted as one pupil, a special education student may be counted as three pupils recognizing that the cost of educating the special education student to achieve a given learning outcome may be three times higher than the traditional students. As a result, districts with a higher percentage of special needs students receive higher per pupil funding levels.

The other form of wealth equity that is practiced by school funding formulas when distributing state aid can be classified as "taxpayer equity." This form of equity insures districts that are poorer receive a higher level of state aid per pupil than school districts that are wealthier. The approach to measure wealth is often based on the metrics that drive local district funding. Local districts with higher assessed valuation and retail sales (metrics that drive property tax revenue and sales tax revenue) may receive less state aid per pupil than school districts than those districts that have lower wealth capacity. This potentially allows for poorer school districts to avoid requesting prohibitively high taxes to meet per pupil spending recommendations of the state.

For regional economists, it may be very easy to explain the differences in taxing capacity based on the structure of a given local district. In some cases, a district may have a solid industrial base from which businesses pay a high percentage of property taxes. Similarly, a local district may be a "desired" location for residents to live increasing the value of residential property and increasing tax capacity. Furthermore, a local district may sit inside a regional trade center where residents from many districts come to a central shopping hub (e.g. mall) and add to the taxing capacity of that district through retail sales. In some cases, the quality of the local school system with a given tax base can have an induced effect on the taxing capacity. A quality school district can be an "attractive force" that increases the number of residents moving into that district increasing the value of residential property as well as retails sales. The opposite can also be true with a real or perceived low performing school district.

While regional and public finance economists have been good at explaining why a school district may be wealthy or poor, scholars in the discipline have been less helpful in providing these local districts tools to help forecast their financial resources from the state. Demographers

have been very helpful to school districts in providing school enrollment projections that have aided those districts that see measurable changes (either positively or negatively) in their pupil counts and the resulting changes in state aid that comes from these enrollment changes.

However, it is more difficult for school districts that have stagnant enrollment counts to project changes in state aid that result from changes in taxing capacity. This has been a challenge in Louisiana due to the wealth creating activities of the oil and gas industries (Fannin et al 2008). These industries (both off-shore and on-shore) quickly ramp-up exploration and production and increase both property values as well as sales tax revenues through business input purchases. In many cases, this increase occurs without a measurable increase in the permanent population of the parish (and resulting school-age children that follow) since the industry uses many employees that commute long distances and are less likely to be residents of the local district where the exploration and drilling activities are occurring.

We address this issue through the embellishment of the COMPAS modeling system CCIM for Louisiana. In particular, we focus on using the revenue capacity equations to forecast changes in assessed valuation and retail sales that change the per pupil funding state aid for local districts in Louisiana.

Incorporating COMPAS into Louisiana School Funding Formula

Louisiana funds elementary and secondary education through its Minimum Foundation Program (MFP) (Louisiana Department of Education 2009). The two main funding categories with which the formula uses to fund education are Level 1 and Level 2. Level 1 of MFP targets $3,855 be spent on each pupil in this funding level with the state contributing approximately 65% and local districts 35%. To address the taxpayer equity issue, MFP creates a formula for

Level 1 funds and the 35% local share increases for districts with greater taxing capacity and reduces for those with lower tax capacity.

Local share is basically determined by subtracting the projected local costs the state calculates each district to provide. This is provided in Equation 8.

(8) Local School System Share = Property Revenue Contribution + Sales Revenue Contribution +Other Revenue Contribution.

The formulas for property revenue contribution, sales revenue contribution, and other revenue contribution are presented in Equations 9-11.

(9) Property Revenue Contribution = School System's Net Assessed Property Value * State Computed Property Tax Rate (18.l77 mills in 2009-10)

(10) Sales Revenue Contribution = School System's Sales Tax Base * State Computed Sales Tax Rate (0.90%)

(11) Other Revenue Contribution = .50 * Earnings on Property + 100% of State Revenue in Lieu of Taxes + 100% Federal Revenue in Lieu of Taxes.

A few notes should be mentioned regarding these formulas. In Equation 8, the state computed property tax rate is a weighted average of the property tax rate of all school districts in Louisiana. Similarly, the state's computed sales tax rate is a weighted average of the sales tax rates of all districts in Louisiana. Since the local system share is simply calculated by taking the state mandated level one spending ($3,855 multiplied by the weighted pupil account) and then subtracting the local school system share, the property and sales revenue contributions are the contributions a school district would receive if they were charging the "average" property tax millage and sales tax rate in their district. The formula then increases the local share requirement if the net assessed value is high and/or the sales tax base is high. It should be noted that school

districts who tax themselves above the weighted average rates are typically generating more local revenue than the state requires; in this case, a second level of funding, Level 2, is provided. This level is more of an incentive level of funding where the state "revenue shares" with the local district a bonus payment for the additional revenue they generate above the minimum local share up to a capped limit. While we won't go into the details of Level 2 here, it does increase the total contribution to the state; however, it does not measurably change the distribution of local versus state funding to the degree of Level 1.

To integrate the CCIM model with the MFP formula, we take the two revenue capacity equations, assessed valuation and retail sales, and forecasted changes in the respective capacity variables. We can compare a baseline forecast from historical growth trends in the two variables and then compare against an employment scenario generated by the input output and labor market modules of the CCIM model. Assessed valuation and retail sales are then applied to the local share equations in the Louisiana MFP formula. Assuming stagnant or trend line changes in average millage and sales tax rates, total local share and finally state aid contribution to the local school district is calculated.

Next Steps

Sensitivity analysis is currently being performed for the CCIM model. Final parameter estimates for labor market module and revenue capacity equations are being finalized. Once completed, baseline scenarios will be generated and applied to CCIM and then linked to the Louisiana MFP formula. Projections for state share contributions will then be estimated. School district state aid estimates will be a valuable additional to the parish (county) government revenues and expenditure estimates currently generated as part of the CCIM framework.

Conclusion

This research sets out a strategy for incorporating direct non-local aid formulas into the COMPAS modeling framework. In particular, we show how to link the revenue capacity equations with formulas in a state education funding program to identify the level of state aid that will be made available to local school districts. This research extends the COMPAS modeling framework by moving the traditional non-local aid parametric estimation and forecasting techniques to one that increases precision in forecasting for a specific state transfer formula.

One of the main limitations of this research is its partial equilibrium framework. That is, in many cases, specific economic scenarios that impact an individual parish's economy do not impact that parish independently of another parish's economy. Hence, factors such as statewide average and sales tax rates used in state school funding formulas are not independent of the changes to and individual parish's economic condition. Second, many school districts in the United States do not follow parish (county boundaries) like school districts in Louisiana. Hence, data collection and analysis becomes more difficult when school districts are smaller subdivisions within individual counties, or worse, split across multiple counties.

This paper has the potential to add to the pragmatic value of COMPAS modeling through its extension into additional local government jurisdictions (school districts). We also believe that the tool has potential to improve the budgeting activities of local school districts as well as motivate increased discussion about optimal strategies for funding public schools to maximize effectiveness.

References

Beaumont, P. 1990. "Supply and Demand Interaction in Integrated Econometric and Input-
   Output Models." *International Regional Science Review* 13(1-2): 167-181.

Fannin, J.M., D.W. Hughes, W. Keithly, W. Olatubi, and J. Guo. 2008. "Deepwater Energy
   Industry Impacts on Economic Growth and Public Service Provision in Lafourche Parish,
   Louisiana." *Socio-Economic Planning Sciences*. 42(September): 190-205.

Isard, W. and R. Kuene. 1953. "The Impact of Steel upon the Greater New York-Philadelphia
   Urban Industrial Region." *Review of Economics and Statistics* 35(2): 293-301.

Johnson, T.G., D.M. Otto, and S.C. Deller. 2006. *Community Policy Analysis Modeling*. First
   Edition. Ames, IA: Blackwell Publishing.

Ladd, H.F., R. Chalk, and J.S. Hansen. Eds. 1999. *Equity and Adequacy in Education Finance:
   Issues and Perspectives*. Washington, D.C.: National Academy Press.

Louisiana Department of Education 2009. Minimum Foundation Program, 2009-2010
   Handbook. Online at http://www.doe.state.la.us/LDE/uploads/15221.pdf. Accessed
   01/21/2010.Miller, R. 1957. " The Impact of Aluminum Industry on the Pacific North-
   west: A Regional Input-Output Analysis." *Review of Economics and Statistics* 39(2):
   200-209.

Miller, R., and P. Blair. 1985. *Input-Output Analysis: Foundations and Extensions*. Engelwood
   Cliffs, NJ: Prentice –Hall Inc.

Moore, F., and J. Peterson. 1955. "Regional Analysis: An Inter-industry Model for Utah."
   Review of Economics and Statistics 37(3): 363-383.