EXAMINING FEDERAL IMPACT AID'S REIMBURSEMENT FOR LOCAL SCHOOL DISTRICTS

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In 1950, Congress created the Federal Impact Aid Program to compensate local school districts for lost tax revenue or increased burdens resulting from federal activities, including the placement of military bases within school districts. Currently, Impact Aid provides nearly $1 billion per year in subsidies to approximately 1400 local school districts that enroll over 1.2 million eligible children. This current study examines the adequacy of the funding in the Impact Aid program as an example of how the existing public finance literature provides the tools to help policy makers make informed decisions. (*JEL* H0, H7, 12)

I. INTRODUCTION

Currently, there is a large theoretical and empirical literature that has examined the demand and supply of publicly provided goods and services (Bergstrom and Goodman, 1973; Inman, 1978; Bergstrom et al., 1982; Rubinfield and Shapiro, 1989). This literature has formed the foundation for an understanding of the mechanisms of publicly provided goods and services. Intertwined in this literature are evolving theories of intergovernmental relationships and the effect these relationship has on the provision of publicly provided goods and services. Collectively, this research has helped articulate broad themes on the appropriate roles of governments and the efficient provision of publicly provided goods and services. However, this research has been underutilized in determining the appropriate provision of specific services. In this current research, the authors examine a specific federal program, the Department of Education's Impact Aid program, and draw on the existing literature of the provision public services to estimate the adequacy of funding. The results have direct implications for the Impact Aid program, but the analysis also has implications for the provision of other government services and as an empirical example of the effect of intergovernmental aid programs.

Overview of Impact Aid Program

The Impact Aid, originally created in 1950,[1] is a nearly $1 billion program constructed to reimburse local school districts for federal activity within the districts. These activities could include the placement of federal employees and their families on or near nontaxable federal property, which could create two adverse effects for the school district. First, federally connected students may create an additional cost burden for a local school district, and second, the school district may have a reduced tax base. On this premise, the federal government reimburses the school district through Impact Aid for the additional burden

1. Public Law 103–382, sections 8001–8014, codified at 20 U.S.C. sections 7701–7714. See Senate Report 83–714 (1953) for a discussion of the purpose of the initial Impact Aid statute passed in 1950.

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ABBREVIATIONS

ADA: Average Daily Attendance
BSP: Basic Support Payment
CCD: Common Core Data
DOD: Department of Defense
JUSD: Jupiter Unified School District
LOT: Learning Opportunity Threshold
SDDB: *School District Data Book*

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federal activities create within the district. Currently, the program provides funds for 1.2 million children in over 1400 school districts nationwide; as a result, the program not only affects students directly associated with these federal activities, such as children that live on Indian reservations and military bases, but also all other students who attend schools within these districts.

Of the various activities, military bases plays an important role of the Impact Aid program. Impact Aid supports a portion of the education expenditures for 416,000 military-related students attending public schools operated by the local school district. About 37% of these students reside on military bases that are not subject to local property taxes. The remainder resides in local communities and support local schools explicitly through property taxes (if homeowners) or implicitly through rental payments (if renters). Both on- and off-base military residents work on federal facilities and do not contribute directly to the local tax bases through levies on their employment site. Finally, all military members have access to on-base shopping facilities that do not collect local sales taxes. The premise of Impact Aid payments is that military families are not paying their fair share of local school revenues because they are insulated from a portion of the local tax liability.

The primary schooling option for military families assigned in the United States is the local public school system.[2] Most military-related children live in civilian communities and attend nearby schools like their civilian counterparts. Children in on-base residences generally attend an on-base school that is operated by the school district for the nearby community.

The Impact Aid law has received bipartisan support, but there has been continuing debate over whether the program reimburses local school districts adequately. In this current research, the authors draw on the existing literature of publicly provided goods and services to estimate the adequacy of funding for the publicly provided Impact Aid program. The analysis has strong implications for the current debate over the program. The Bush administration, like the previous four presidential administrations, has proposed a change to the eligibility rules and provide impact aid only to those students who live on-base and provide no funding to off-base students (Wear, 2003). The analysis will examine whether the current funding scheme is adequate for both the on- and off-base students.

The analysis controls for local demand and cost factors of providing publicly provided education and then estimates whether appropriate funding has been provided. More explicitly, the article examines the relationship between expenditures in school districts and the proportion of military children (both on- and off-base) while controlling for demand and cost functions. If the military presence limits the local tax base and the Impact Aid program does not reimburse the school district adequately for the limitation, then the analysis should show a negative relationship between military presence and expenditures per pupil. To test the relationship between military presence and expenditures per pupil, the authors use data from a number of sources, including the Census Bureau and the National Center for Education Statistics' Common Core Data (CCD; National Center for Education Statistics, 2000) and the *School District Data Book* (SDDB; National Center for Education Statistics, 1998).

The study *does not* assess the tax burden that military members may impose on local school districts. The taxing policies of different governmental agencies are complex, and the tax burden across jurisdictions is difficult to compare. In some cases, local school taxes may be low, but a bigger share of school expenses may be borne by the state. In addition, a complete account of the burden of military children on a school district would require an accounting of the economic benefits generated by the military activity in the area. These issues are certainly worthy of analysis, but they are beyond the scope of this research.

The results provide mixed evidence on the adequacy of Impact Aid funding. First, no relationship is found between local expenditures per pupil and the share of on-base military-related children in the district after controlling for district demand and cost factors. On-base students are not straining district spending,

2. This program does not provide funds for schools run by the Department of Defense (DOD). About 34,000 military-related children attend these DOD-run schools as compared with 416,000 military-related children that are schooled in locally run schools. This article examines financial incentives at least partially offsetting the costs of schools run by traditional school districts that educate 92% of children from military families.

and this suggests that the on-base reimbursement may be sufficient to offset the burden of educating these children. Second, a negative relationship is found between the proportion of off-base military children in the district and expenditures per pupil. This finding suggests that the presence of off-base military children are straining district expenditures, so policy makers may want to reassess the reimbursement rate to avoid the pressures on these districts to squeeze school expenditures.

The results of the analysis not only have implications for the Impact Aid program but also provide an example of using the tools developed by the public finance literature to examine the adequacy of funding for a specific public program. The analysis is an illustrative example that could be used as a model to examine other intergovernmental aid programs, especially state and federal education entitlement programs for targeted at-risk and special education students.

II. IMPACT AID FUNDING

In fiscal year 2000, total funding for Impact Aid amounted to $937 million, with an overwhelming majority—$907 million—administered through the Department of Education.[3] The Department of Education Impact Aid program provides funding to a number of districts for the following:

- children of military personnel,
- children of civilian federal employees,
- children living in low-rent housing,
- children living on Native American reservations.

The money received by these school districts is distributed primarily in the form of a basic support payment (BSP).[4] A district is eligible for a BSP if the number of federally connected students is at least 400 or at least 3% of the district's total average daily attendance (ADA) (Section 8003 (b) (1) (B)). This payment is based on the local contribution rate, which is one-half of either the state or national average expenditures per pupil, depending on which is higher. In addition, different types of students are given different types of weights, and thus school districts receive different payments for different students. Below are listed the weights for each of the different students under the basic support payment.

- Children of military parents living on-base = 1.0
- Children living on Native American reservations = 1.25
- Children of federal civilian employees living on federal property = 1.0
- Children of military parents living off-base = 0.1
- Children living in low-rent housing = 0.1
- Children of federal civilian employees not living on federal property = 0.05
- Other children living on federal property = 0.05.

A weight of 1.0 indicates that the local school district receives the value of the local contribution rate. A weight of 0.1 indicates that the district receives 10% of the local contribution rate. The rationale for the different payments is based on the burden each student represents. For instance, a student of a military parent who lives on a military base receives a weight of 1.0, whereas a student of a military parent who lives off-base receives a weight of 0.1. According to the Impact Aid program, the difference in payments can be explained by the differences in tax revenue generated by each parent. In the case of a parent who lives on-base, very little is paid into the local tax base because the parent lives on nontaxable property. However, military parents who live off-base pay property taxes, but they may

3. Only $30 million is distributed through the independent "supplemental" Impact Aid program operated by the DOD. The DOD supplemental funds are narrowly focused on school districts with a high proportion of military children (including DOD civilian children) and districts that have recently seen large enrollment declines as a result of base closures.

4. Smaller pieces of the funding package are allocated to districts for federally connected special education students ($50 million in FY00), for "heavily impacted" districts with an especially high proportion of federally connected students ($72 million), for facilities maintenance ($5 million), for the acquisition of property ($32 million), and for school construction ($10 million). Special education funds are distributed as follows: On-base military children and children living on reservations are given a weight of 1.0, and off-base military children are given a weight of 0.5. (Children of federal civilians are not counted under this section of the program.) Total funding is distributed to districts in proportion to their weighted numbers of these federally connected special education students. In recent years, allocated funding has been sufficient to provide about $1000 per student for on-base children with disabilities and about $500 for off-base children with disabilities. Unlike the basic support payment, these funds do not go into a district's general revenues; instead, they must be used specifically to provide special education services. Section 8003(d).

not pay local sales tax if they do their shopping on-base, and they often establish official residency elsewhere, which implies that these personnel do not pay local or state incomes taxes where they are actually stationed (Wear, 2003). In the latter case, Impact Aid still reimburses the local school district, but at a much lower rate.

The formula for calculating the BSP may be more easily understood through a hypothetical example. Assume that the Jupiter Unified School District (JUSD) has a total student population of 20,000, including

- 2000 children of military personnel living on-base,
- 200 children living on a Native American reservation,
- 100 children of federal civilian employees living on federal property,
- 3000 children of military personnel living off-base,
- 500 children living in low-rent housing, and
- 500 children of federal civilian employees not living on federal property.

Average per pupil expenditure in JUSD's state is $8000 per year, which is higher than the national average. Therefore, the local contribution rate for JUSD is $4000, half the state average per pupil expenditure. Jupiter's weighted federal student units total comes to:

- On-base military children times 1.0, plus
- Native American reservation children times 1.25, plus
- Federal civilian children on federal property times 1.0, plus
- Off-base military children times 0.1, plus
- Low-rent housing children times 0.1, plus,
- If above threshold, other federal civilian children times 0.05

or

$$(2000 * 1.0) + (200 * 1.25) + (100 * 1.0) + (3000 * 0.1) + (500 * 0.1) + 0 = 2700.$$

Note that the 500 children of federal civilian employees not living on federal property are excluded from the calculation, because their numbers are not sufficient to meet the statutory threshold for that category (1000 or 10% of ADA). Jupiter's maximum allowable BSP therefore amounts to $4000 * 2700, or $10.8 million.

However, in most years Congress does not allocate sufficient funding to cover the maximum allowable BSP allotments for all eligible districts, and therefore payments are adjusted downward through the use of a learning opportunity threshold (LOT) formula. The LOT modifier provides a sliding scale calculation that allocates a larger proportion of BSP funding to districts that are more heavily affected by federal activity. For example, Impact Aid reimbursement for an on-base military student will be higher in a district with a high concentration of federally connected students than it will in a district with few federally connected students.

The modifier is calculated as the sum of two percentages: the percentage of the district's total enrollment of federally connected students, and the percentage of the district's total budget that would be represented by a full basic support payment. The LOT modifier is capped at 100% (and set equal to 100% for districts in which the two percentages sum to more than 100%).

Again, consider the hypothetical example of JUSD. Assume that JUSD has a total annual budget of $150 million. Jupiter's LOT modifier would be:

- the proportion of ADA consisting of federally connected students, plus
- the proportion of total district funding represented by full BSP

or

$$[(2000 + 200 + 100 + 3000 + 500)/20{,}000] + (10.8 \text{ million}/150 \text{ million}),$$

which comes to 0.290 + 0.072, or 36.2%. As a result, JUSD's LOT payment would be 36.2% of its maximum BSP allowable, or $3.91 million. This example highlights the resources allocation effect the LOT formula can have. In general, a school district with a higher concentration of federally connected students would receive a disproportionate share of the Impact Aid total funds relative to other school districts.[5] This emphasis on concentrations of military-related children shifts funds toward isolated military bases with large numbers of on-base children. Therefore, the typical reimbursement for an on-base student is actually 21 times greater than for a typical off-base

5. For a critique of this adjustment mechanism and the distorted incentives it creates, please see Zimmer et al. (2002).

student, as compared with the nominal 10-to-1 ratio specified in the law. This will have strong implications for the local school district spending. In the present analysis, the authors will look at the effect of both on- and off-base military children on a local school district's expenditures.

III. DATA

To carry out the analysis, the authors constructed a national database of 1994–95 and 1995–96 school-year data gathered from the Census Bureau, CCD, and the SDDB.[6] As part of the data cleanup, certain school districts were either eliminated from the data set or dropped during the merge of the 1994–95 with the 1995–96 school-year data. Some districts were eliminated because of the unique nature of their students. For instance, 100% (or nearly 100%) special education school districts, as well as county juvenile detention school districts, were eliminated because of the distinct students they serve. In other cases, certain school districts were dropped because they were not represented in both years of data (e.g., some school districts may have consolidated over the two-year time frame). However, even with the cleaning process, the data are very representative of students and districts nationwide. In total, over 96% of all students and over 90% of all school districts in the United States are represented in the data. This panel database was used to determine variations in expenditures per pupil across school districts at a point in time and within a school district over time allowing the authors to examine factors that affect school district resource decisions.

A complete list of the variables, along with the weighted mean and standard deviations, is provided in Table 1.[7] The table is divided into three vectors of variables and highlights the differences between school districts that have less than 3% military students and those that have more than 3% military students.[8] As the table suggests, military-related school districts generally spend less per pupil.[9] Also noteworthy is the fact that military school districts have fewer owner-occupied homes and a smaller elderly and poor population. On the flip side, military-related school districts tend to have higher family incomes and a higher proportion of African Americans, Hispanic, and school-age population. In terms of variables that may affect the cost of educating students, the military school districts are much smaller and have fewer students who speak English poorly,[10] but slightly more special education students.[11] In this analysis, the authors examine whether there is a relationship between the share of military students and expenditures per pupil while holding the other characteristics constant.

IV. MODEL

Critical to intergovernmental programs is understanding the demand for governmental services (Rubinfield and Shapiro, 1989). This analysis expands on existing literature that estimates the demand of publicly provided goods and services. More explicitly, the authors examine previous articles that estimated the provision of school expenditures, including Borcherding and Deacon (1972), Craig and Inman (1982), Porterba (1997), and Ladd and Murray (2001). The focus of Borcherding and Deacon's work was actually the development of a theoretical model for examining collective decision making in public spending. However, they tested their theory by examining a number of different public service sectors including education. Over the years, empirical research have relied on the theoretical research of Borcherding and Deacon, along with other seminal researchers, to test the provision of government services and intergovernmental aid programs, including education. For example, Craig and Inman (1982) examined funding decisions of local and state spending of education in the era of Reagan's new fiscal federalism and found that changes in intergovernmental aid programs can dramatically affect local

6. The demographic data of the SDDB is actually derived from 1990 census data.

7. The authors used weighted means so that are the analysis reflected a typical student. Without the weighting, students from smaller school districts with very few students would be overrepresented in the analysis.

8. Three percent is one of the criteria for a school district to be eligible for a BSP.

9. The expenditures per pupil variable is current expenditures and does not include capital costs.

10. These are persons over five years old who responded to a question of the English speaking ability from the Census Bureau. They indicated whether they spoke English "very well," "well," "not well," or "not at all."

11. Special education rates are higher in districts with military children, but the incidence of special education in the military population is lower than in the local civilian population.

TABLE 1
Variable Means and Standard Deviations for School Districts with Less Than 3% Military Students with School Districts with More Than 3% Military Students

	Less Than 3% Military Students		More Than 3% Military Students	
Variable	**Mean**	**SD**	**Mean**	**SD**
Measures of quality				
Expenditures per pupil	$5,630	$1,654	$5,014	$1,030
Pupil-teacher ratio	18.38	4.14	19.02	3.15
Other sources of district revenue				
Fed revenue per pupil	$363	$237	$381	$216
State revenue per pupil	$2,737	$990	$2,542	$756
Demographics of district				
Median family income	$30,967	$10,671	$33,053	$9,392
% college educated	13.13	7.49	14.16	6.23
% of population between 5 & 19	32.52	5.79	30.69	6.56
% of population 65 and over	13.84	3.33	12.40	3.85
% of families owning homes	59.67	13.83	56.59	10.29
% African American	10.77	15.09	14.60	13.15
% Hispanic	8.77	12.50	9.60	15.79
% below poverty line	13.14	8.20	10.75	5.46
Rural area	0.23	0.42	0.10	0.30
Suburban area	0.54	0.50	0.46	0.50
City area	0.30	0.46	0.36	0.48
Cost factors of district				
Total number of students	65,927	187,127	42,827	43,347
Consolidated School District	0.91	0.28	0.94	0.23
High school School District	0.02	0.13	0.01	0.09
Elementary School District	0.07	0.25	0.05	0.22
Characteristics of students				
% special education	10.19	4.66	11.22	3.25
% poor English speakers	2.26	3.27	1.71	2.20
% from military families living on-base	0.09	0.27	4.19	8.11
% from military families living off-base	0.36	0.51	7.82	6.86
Sample size	27,510		731	

expenditures. Much of the more recent research has focused on how specific characteristics of a jurisdiction's constituents can affect the demand of education. For instance, research conducted by Poterba and Ladd and Murray focused their attention on the demand for local education expenditures by elderly constituents within a district. These studies have provided greater insights into the elasticities of the demand of education, which has implications for intergovernmental aid programs such as Impact Aid, state funding formulas, Title I, and other similar programs.

Although these articles provide a model to estimate the demand of school expenditures, the generally do not consider the cost factors that could vary from school district to school district. As first highlighted by Bradford et al. (1969), cost of public services can vary across jurisdiction, in this case, school districts, due to variations in input prices and environmental factors. For the inclusion of these factors, the authors relied on other articles including Downes and Pogue (1994) and Lankford and Wycoff (1999).

Building on the previous research, the authors estimate the demand for educational expenditures as a function of the district's wealth (median/per capita income and percentage of population below the poverty line),

educational preferences of families (percentage of families with college education), racial composition of adults and students (percentage nonwhite total population and percentage of nonwhite school-age population), the age distribution of the population (percentage of senior population and percentage school-age population), regional characteristics (urban versus rural), outside support (federal aid), and a proxy for after tax price of education spending (percentage of owner-occupied housing).[12] These factors are included in the analysis to control for the demand of education while examining the relationship between the proportion of military students and expenditures.

As noted, the authors also control for cost factors in the analysis. Some costs vary inherently across school districts and are beyond the control of the voting population and school board members. For instance, the district and its voting population have limited control over the number of special education or limited English proficiency students, who require substantially more resources (Lankford and Wycoff, 1999).[13] Other factors, such as the total number of students, can create economies (diseconomies) of scale that can reduce (increase) expenditures per pupil and make it more difficult to reduce class sizes.[14] Finally, because there could be operating cost differences between high schools and elementary schools, the authors also included a control variable for whether the school district is high school only or consolidated (both high school and elementary), or elementary only.

Using the controls, the authors examine the impact of a particular intergovernmental funding program on the provision of local services by analyzing the effect of the federal Impact Aid program, by which is evaluated the adequacy of the program by examining the relationship between the share of military students and expenditures per pupil. The model includes variables that measure the share of military students in the school district who live on-base and off-base, as well as indicator variables for whether the school district has no military students.[15] The funding formula rewards the school district differently for military on-base and off-base children, so changes in these shares will have a differential effect on school district funding.

Formally, the authors examine the relationship between expenditures per pupil and the share of military students through the following conceptual model:

$$Exp/Pupil_j = f(O_j, C_j, D_j).$$

In the model, expenditures per pupil ($Exp/Pupil_j$) for the jth school district is function of a vector of outside revenue sources (O_j) for the jth school district,[16] a vector of cost factors (C_j) for the jth school district, including socioeconomic characteristics that encompass the share of military students, and a vector of demographic characteristics (D_j) of the jth school district. To control for unobservable differences across states and time, the authors use a state-level and time fixed-effect model. The state-level fixed effects can help control for differences in state policies, including differences in funding schemes or statewide reforms, whereas the time fixed-effect controls for changes over time. Additionally, each school district is weighted by enrollment. Finally, all variables in the model are measured in logarithms, so that the estimated coefficients are translated as elasticities.

This model isolates the effect of military children on resource decisions, after controlling

12. The percent of owner-occupied housing can have a number of effects. Poterba (1997) argued that because local and state taxes, including the property taxes of owning a home, can be deducted from federal taxes, owners of homes may have a greater incentive to support their local schools. The authors also argue that districts with a greater share of owner-occupied housing may have a more vested interest in the schools and a more stable population. To be consistent with the literature, the authors wanted to add a measure of tax share for each school district. In the literature, this is typically measured as median house price to average property values in a school district (Borcherding and Deacon, 1972; Bergstrom and Goodman, 1973; Baldson et al., 2002). The data do not allow this analysis to construct this variable. However, the authors did run a model with median housing values. This model did not change the coefficients for the rest of the variables.

13. Cullen (1997) argues that at the margin, school districts respond to incentives when classifying special education students. However, in the general case, the school district has no control over whether a student is a special education student or not. This may also be the case for low English proficiency students.

14. The total number of students can create economies of scale (decreased cost per student) or diseconomies of scale (increased cost per student). In theory, there is an optimal school size in which costs are minimized. More or fewer students than the optimal size will increase costs per student.

15. The indicator variable is included to provide extra flexibility for the model and allow the factor to have some discontinuous effect when the share is zero.

16. The primary sources of outside revenue are payments from federal and state governments.

for the other demographic and cost characteristics of the school districts. Military students may strain resources in two ways. First, if the military presence limits the local tax base, then the school district may be resource poor. Second, local taxpayers may be reluctant to accept educational spending increases (and corresponding tax increases) if many of the beneficiaries of those increases are military children with a transient link to the local community. An important measure of the success of Impact Aid funding is its ability to mitigate these two effects so that school districts' resourcing patterns are not distorted by the presence and share of military children in the district. The results of the analysis are presented in the next section.

IV. RESULTS

Table 2 displays the results of the model. The estimates for the control variables are generally consistent with the existing literature and/or the present expectations. For example, school district expenditures are positively associated with the median family income and the percentage of the population with a college education. Similarly, school districts with more special education students have higher spending rates, because their educational costs are above average.

The results show that resource use is not sensitive to the percentage of military children living on-base, but resource use declines with increases in the percentage of military children living off-base.[17] Table 2 provides the estimated relationship between different military shares and expenditures per pupil while

17. The specifications reported in Table 2 do not account for the percentages of other Impact Aid students in the school district. This parsimonious specification is reported here because the emphasis is on the effect of military children on district resources. In other specifications, the authors also controlled for the percentage of district students living on Indian lands, in low-rent housing, and who were the children of federal employees. These results indicated similar coefficients for military on- and off-base students to those reported in the text. Resource use rose significantly with the share of Indian children in the district but fell as the share of federal employees rose. There was no significant relationship between the share of children in low-rent housing and per-pupil expenditures. Because this study focused on military students, the authors have not fully explored the resource patterns for the other Impact Aid categories. For example, they have not specifically studied districts with a large proportion of Indian children and so are unfamiliar with the unique educational challenges facing these districts or other sources of funding for these districts.

TABLE 2
Regression for Factors Affecting LEA Expenditures Per Pupil

	Coefficient	SE
Other sources of district revenue		
Federal revenue per pupil	0.1202*	0.0071
State revenue per pupil	0.0335*	0.0107
Demographics of district		
Median family income	0.1439*	0.0271
% of population between 5 & 19	−0.1171*	0.0171
Indicates no children 5–19	−0.1348	0.0920
% of population 65 or over	0.0101	0.0098
% of families owning home	0.0335	0.0274
Indicates no families owning home	−0.1180	0.1793
% of families with college education	0.1156*	0.0094
Indicates no families with college education	0.3378*	0.0664
% African American	0.0248*	0.0040
Indicates no African Americans	0.0353*	0.0074
% Hispanic	0.0253*	0.0061
Indicates no Hispanics	0.0252*	0.0080
% below poverty line	−0.0133	0.0110
Indicates no families below poverty line	−0.0026	0.0861
Rural area	−0.0335*	0.0121
Suburban area	−0.0128	0.0083
Cost factors for district		
School year 95–96	0.0289*	0.0042
Total number of students	−0.0393*	0.0072
Consolidated School District	0.0437*	0.0124
High school School District	0.2713*	0.0131
Characteristics of students		
% special education	0.0396*	0.0075
Indicates no special education	0.0895*	0.0169
% poor English speakers	0.0360*	0.0101
Indicates no language problem	0.0119	0.0140
% from military families living on-base	−0.0079	0.0094
Indicates no military on-base students	0.0014	0.0202
% from military families living off-base	−0.0301*	0.0068
Indicates no military off-base students	−0.0089	0.0093
Regression constant	6.2557*	0.2623

Note: The dependent variable and independent variables are in natural logarithms except for indicator variables. Data are from 1994–5 and 1995–6 school years. Model adjusts for state-level fixed effects and repeated annual observations. The number of observations is 25,410, and adjusted R^2 is 0.7624. Starred entries are significant at 5% confidence level.

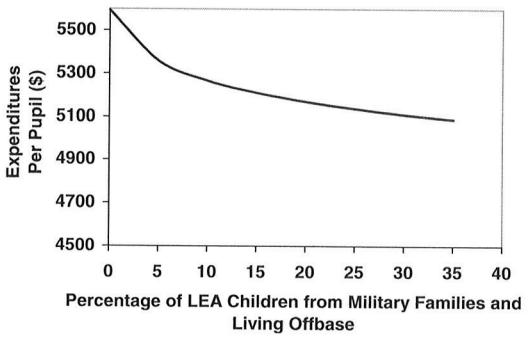
controlling for nonschool district sources of revenue, the demographics of the districts, and cost factors, including the characteristics of the students. The table shows that the percentage of military children living on-base has an insignificant effect on expenditure per pupil. This provides some evidence that Impact Aid funding formula is providing sufficient funding to offset the local education costs of the on-base students.[18]

In contrast, the results for off-base students provides some evidence that these students are straining either the resource base of these districts or the willingness of local taxpayers to finance more educational spending.[19]

18. Multicollinearity between percent of military-related students on- and off-base was a potential concern for the analysis. Some bases have large residential facilities and house most of their members on base. In other locations, most members live off-base in the local community. Bases are sometimes near large communities so the military share of military-related students may be small, even for large bases. These combination of factors are reflected in the fact that the r^2 between percent on- and off-base students in the school district is only 0.24. The authors tried separate specifications with only the percent of on- and off-base students respectively. As might be expected with the low correlation between the percentages of on- and off-base students, these results were similar to those reported in Table 2.

19. A possible factor confounding the estimates is the endogeneity of the military presence in a school district. For example, parents may choose to live in a school district that is remote from the military base because the school district has relatively high expenditure per pupil. The authors tested for this endogeneity in supplemental specifications and found that it was not a problem for these estimates. The endogeneity issue was potentially important for off-base children but not for on-base children. The stock of military housing is stable and fully occupied at all locations (Buddin et al., 1999). The parents in on-base housing send their children to base schools that are run by the local school district, so the percent of on-base children is exogeneous. The analysis did a specification test for the endogeneity of the variable indicating the percentage of off-base students (Hausman, 1978; Wooldridge, 2002). A reduced-form regression for the percentage of off-base students was estimated where the exogenous variables included other variables in the model as well as information on the distance between the school district and a military base and the size of the military population within forty miles of the school district. The r^2 for the reduced-form equation was 0.55. Other things equal, the percentage of students living off-base was inversely related to the distance between the base and the nearest school district and positively related to the number of military families at the base (i.e., bigger bases tend to have a larger share of families living off-base). The effects of distance and family size were both statistically significant. The residuals from these reduced-form estimates were added to the district-level expenditure per pupil equation. The t-test for the coefficient on the residuals from the reduced-form equation was only 1.72. The result means that the percentage of off-base children is not endogenous in the expenditure per pupil equation, so the reported regression parameters are consistent and efficient.

FIGURE 1
Relationship between Percentage of Children from Military Families Living Off-Base and Expenditures Per Pupil



Expenditures per pupil fall with the percentage of students who are off-base military children. Districts with off-base military children spend systematically less per student than other districts with comparable populations, wealth, and costs. They spend increasingly less as the share of off-base military children increases. More specifically, the estimated elasticity of −0.0301 indicates that for every 1% increase in military students who live off-base, the expenditures per pupil will decrease by 0.0301%. To clarify the implications of the elasticity, Figure 1 demonstrates the relationship between different shares of military students and expenditures per pupil. The graph shows that as the share of military students increases, the less the school districts will spend per pupil. For instance, an increase of the share of military students from 0% to 5% will decrease the expenditure per pupil from $5594 to $5357, over a $200 difference. The figure suggests that substantial changes in shares of military students within a school district can affect the expenditures per pupil.

IV. CONCLUSIONS AND IMPLICATIONS

At the outset of this analysis, the authors suggested that the current public finance literature has been underutilized as mechanism of evaluating public service programs. This article highlights how this literature has formed the foundation for examining a number of public service programs, including the Federal Department of Education's Impact Aid program, which provides payments to school

districts for lost tax revenue or increased financial burden resulting from federal activities. These activities may bring additional federally connected students to the district without proportionally expanding the local tax base. One of the primary activities is the placement of federal military bases within a school district's geographic boundary with military personnel and their children living on or near the bases. In this study, the authors examine the adequacy of the current Impact Aid program by examining the relationship between expenditures per pupil and military students living on- and off-base. The results show that expenditures per pupil do not vary significantly with the district's share of on-base military students. In contrast, the analysis shows that expenditures per pupil decline with increases in the district's share of off-base military students.

These results have two major implications for the Impact Aid program and has broader implications for all public service programs. First, it provides no evidence that Impact Aid is not providing sufficient funding to school districts for on-base military students. Second, and in contrast to the first implication, the analysis provides some evidence that off-base students *are* straining school district resources. This strain may ultimately affect the quality of education available not only to military students but to civilian children as well. Thus, the analysis suggests the current administration's position of cutting aid to off-base students would only exasperate the burden placed on these districts.

However, the analysis also has broader implications because it provides an example of using the current public finance literature to help inform policy debate. This body of literature has identified major factors that affect the demand and supply of pubic services and provides a mechanism for evaluating a broad range of public service activities.

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