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ABSTRACT

Pennsylvania state policymakers have taken steps to address issues of educational equity across school districts by amending the school-finance funding system. Pennsylvania relies on local property tax revenues as a major source of funding. This paper examines the effect of the property-tax-base formula on educational expenditures in the state. Fifteen variables were obtained from three sources--the Pennsylvania Educational Policy Studies database, the 1990 United States Census, and the State Tax Equalization Board. Regression analysis found that the nonresidential component of the property tax base gives rise to significant differences in educational expenditures in Pennsylvania. However, policymakers need information about why the disparities occur. Therefore, a log-linear model based on the educational-demand models of Ladd (1974) and Barro (1972) was developed. This more behavioral approach views educational demand as a function of the income/wealth, perceived tax price, and preferences of the median voter. The educational-demand, or behavioral models, were preferred theoretically, but were not entirely reliable. It is concluded that nonresidential property plays a significant role in explaining differences in educational expenditures. Policymakers must address the composition of the property tax base when considering reforms of the current system and must identify the specific degree of tax exporting that occurs. One method of achieving a more equalized base is to institute a tax-base sharing policy, which removes the nonresidential component variations in the tax base. Under such a system the taxes would be collected over a larger geographic area, possibly the county or the local labor-market area. The choice of the specific area could be determined by the degree of tax exporting. Appendices contain statistical data and models. Contains 33 references. (LMI)

THE EFFECT OF THE COMPOSITION OF THE PROPERTY TAX BASE ON EDUCATIONAL EXPENDITURES IN PENNSYLVANIA

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INTRODUCTION

Social institutions in the United States are generally evaluated on the basis of their adherence to and the promotion of the concepts of equity, efficiency, and liberty. This has certainly been the case regarding educational institutions recently. Among the most intensely debated topics in the United States today are school choice (a question of liberty), the inefficiency of the educational system, and the equity of the way in which schools are funded.

While the Constitution of the Commonwealth of Pennsylvania mandates a thorough and efficient educational system be provided for all residents, many educational policy makers are concentrating their efforts on the equity criterion becauase of a legal challenge to the current method of funding education in the state. While the state maintains the legality of the present system, it has recognized that inequalities across districts do exist and has taken steps to reduce these inequalities by amending the school finance funding system. These attempts, however, have not been successful enough and the legal challenge remains.[1]

The primary source of educational revenues in Pennsylvania is the local property tax. The rationale behind this approach is twofold: first, it adheres to the benefits received principle of taxation and , secondly, it affords local communities the ability to exercise control of the educational system. (Historically, the latter justification may be more explanatory in Pennsylvania.) However, this system of heavy reliance on local property tax revenues as a major source of educational funding gives rise to significant differences in the amount of money spent on education among districts. This has been the source of many of the problems the current funding system encounters.

[1]See Hartman [1990].

While the state does maintain reliance on local districts for the financing of a significant portion of education expenditures, it does recognize that significant inequities may result from such reliance. In order to offset the differences in educational expenditures between districts, the state uses a formula which attempts to minimize these differences. While the original state subsidy program in Pennsylvania was based on the philosophy of the foundation program, the current subsidy for education, the Equalizing Subsidy for Basic Education (ESBE), is comprised of three basic components.

The first component is the Base Subsidy for Instruction which is a function of a district's enrollment, market value of property, personal income, and a fixed educational expense. The second component is the Subsidy for Students from Low Income Families which is based on the number of families in the district which receive Aid to Families with Dependent Children. The final component is the Subsidy for Local Tax Effort and Population Density which is based on population per square mile and the equalized mils of the district relative to the median equalized mils for the state.

By considering a model which incorporates the composition of the property tax base, it can be shown that the differences in spending across school districts in Pennsylvania arise because of inherent flaws in the funding system. More specifically, in the current system the size of the property tax base is considered but the composition of the tax base, an equally important consideration, is neglected. The variability of educational expenditures among school districts may arise because of differences in the type of property wealth held (and taxed) by the district. This would result in a funding formula which is biased against communities which cannot export the tax burden by shifting nonresidential property taxes to people outside the community.

While this paper considers only the degree of tax exporting and relative policy consequences for Pennsylvania, certainly it is quite appropriate in other settings. The problem of establishing an equitable school finance system permeates virtually all regions of the United States (and the world for that matter). This is evidenced by the numerous legal challenges to school finance systems. An important consideration for policy makers to consider is that the funding mechanism must provide not only an equitable means of providing education, but

that it should equally contribute to an efficient educational system. This type of system obviously is much more likely to gain public favor.

ECONOMIC PRINCIPLES

Prior to World War II the study of the economics of the public sector differed considerably from that of the private sector. The transformation which occurred could be summarized as a conversion from public finance to a public choice perspective. The public choice view extends the partial-equilibrium framework of Alfred Marshall to a more general-equilibrium framework. These changes include the development of an analytical structure which recognizes the expenditure side of public finance and the development of a collective decision-making structure.

In a majority rules voting mechanism, if all individuals display a clear preference of one alternative to all others then the ultimate (and efficient) decision reached by the group will be that of the median voter. This concept is observed repeatedly in the political process of the United States as candidates take one position to gain nomination from their party (appealing to the median voter of the party) then shift their view further to the middle in debate with other party candidates to appeal to the middle of the general population.

In the context of a group determination of the amount of a particular good or service provided by the public sector, the amount chosen by the community is that amount demanded by the citizen with the median income.[2] Thus, assuming each citizen is aware of his/her tax price the determination of the quantity demanded is possible. Problems of group decision-making are diminished and the use of a single individual (the individual with the median income) can be used to estimate the community demand.

It has also been shown that such a procedure is empirically justified when a representative political process is employed to determine public spending levels.[3] Successful candidates will be those which have platforms optimal for the median voter so long as voters are informed about costs and benefits of the spending.

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[2]This conclusion follows from the work of Duncan Black {1948} and Bergstrom and Goodman [1973].

[3]See Borcherding and Deacon [1963].

In developing analytical models of the demand for educational expenditure the approach taken is based on the economic theory of constrained maximization behavior.[4] Similar to the more traditional models of consumer demand, it is assumed that consumers attempt to maximize utility subject to their budget constraint. For educational services, the tradeoff is between educational expenditures and the burden of these expenditures.

The utility function imposed assumes that utility is a function of educational expenditures, the burden of the school property tax per household, and preference variables. Note that educational expenditures enters the model as a "good" in the utility function. Theoretically, the rationale for such a technique is that there are no suitable output measures for education. Pragmatically, expenditure usage may be appropriate because the absence of output measures causes decision-makers to actually use expenditures as a proxy for output or quality.

The budget constraint, assuming no borrowing or accumulation of funds, is a linear function of local school property taxes, state grants, and federal grants. The form of the grants can be either lump-sum, matching, or a combination of the two.

Given the utility function and budget constraint, the Lagrangian can be solved for the optimum level of expenditure and real school property tax per household. This result assumes the utility function is known and income and preference variables enter the model exogenously. This latter assumption may be appropriate in the short run but in the longer term there may exist a Tiebout effect.

Analagous to the marginal rate of substitution in consumer theory, the marginal rate of tradeoff between spending and taxes can be examined in this context. This measure is extremely important to policy-makers as it indicates the increase in taxes necessary to achieve an additional dollar of educational spending. The marginal rate of tradeoff is preferred for convenience in analyzing spending and taxing behavior and is expected to be negatively correlated to educational expenditure, the tax burden, and real taxes while being positively correlated to income. Thus education cannot be an inferior good.

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[4]The seminal work in educational demand models can be found in the Rand publication of Barro [1972]. See Appendix I for a formal development of the model.

LADD MODEL

Helen Ladd [1974] developed a model to explain differences in educational expenditures in the Boston metropolitan area in terms of the factors which determine the demand for education. In general these factors are thought to be an income (or wealth) effect, a price effect, and the effect from tastes and preferences. An important contribution of the Ladd research is the distinction between residential and nonresidential property and how each effects educational expenditures. Residential property is thought to affect spending through the wealth effect. However, as Ladd points out, it is improper to assume total property wealth has a wealth effect since the nonresidential property affects expenditures through the price effect. Three effects of nonresidential property on education spending are thought to be tax exporting, indirect externalities, and direct expenditure demands by nonresidential property owners.

Using the neoclassical consumer theory approach, the amount demanded is determined by maximizing utility subject to the budget constraint.[5] The effect of nonresidential property can be more explicitly viewed by considering the budget constraint. The perceived price of the publicly financed service to residents will be a function of the per unit resource cost, the residential fraction of the tax base, and the distribution of housing within the community. Failure to account for the effects of nonresidential property will lead to an underestimated tax price since residents may perceive a shared tax on firms through higher prices charged and/or a lower future tax base.

A log-linear functional form of the estimation equation is selected because of the multiplicative form of the price variables, the fact that the total price variables affect education expenditures in a multiplicative fashion with constant elasticity rather than with a constant marginal impact, and the estimated coefficients are measures of elasticities.

Two basic empirical conclusions are suggested by the Ladd study. First, the omission of the composition of the property tax base did in fact downward bias the true price elasticity of demand. Better results were obtained using the generalized tax price term rather than simply the residential fraction of the property tax base. Secondly, the composition of the nonresidential property tax

[5]See Appendix I for a more formal derivation of the Ladd model.

base is an important consideration in explaining spending differentials through the perceived tax price term. In other words, commercial and industrial property affect the perceived tax price term differently. The results lend support for the more modern theory that suggests industrial property will have a smaller impact on local public expenditures than would commercial property. This is counter to the more traditional theory which suggests that commercial firms are more likely to pass their tax on to local residents.

EDUCATIONAL EXPENDITURES IN PENNSYLVANIA

Given the theoretical and analytical framework discussed above, it becomes possible to empirically evaluate variations which exist among educational expenditures in Pennsylvania. The following will address these spending differences from several perspectives. Traditional linear regression analysis will be considered as well as the more behavioral approach. Both models will be primarily focussed on the effect of the composition of the property tax base on educational spending.

Fifteen variables were identified for consideration in this analysis. These variables were obtained from three sources: the Pennsylvania Educational Policy Studies database, the 1990 U.S. Census, and the State Tax Equalization Board. All variables reflect 1990 values so that comparisons with census data was possible. Values for all variables were obtained for all 500 school districts in Pennsylvania.

A description of each variable and detailed descriptive statistics for each of these variables can be found in Appendix II. However, some interesting points should be mentioned at this time. First, the degree of variability in educational expenditures is fairly obvious. Per pupil expenditures in 1990 ranged from $3334 to $9741 with a standard deviation of $1073.30. Also of note is the fact that some districts have extremely homogenous property tax bases (some districts have no commercial and/or industrial property while residential property accounts for ninety-five percent of the property in one district) while others have a more differentiated tax base (approximately half of the base is either commercial or industrial). Obviously the degree to which tax exporting can occur is varied across the state.

Originally, educational expenditures per pupil were explained as a linear function of all remaining variables. A forward regression technique was employed to establish the explanatory power of each independent variable in explaining expenditures. All coefficients are Ordinary Least Squares estimates. Again the results of this procedure can be found in Appendix II. Most of the variation in spending can be explained by the total property wealth of the district. It is worth noting that the nonresidential components of the property tax base are highly significant explanatory variables. More specifically the percentage of commercial and industrial property are entered in the third and fifth steps respectively. The residential fraction of the tax base is insignificant.

These results lend credence to the belief that the nonresidential component of the property tax base gives rise to significant differences in educational expenditures in Pennsylvania. However, this type of analysis provides little in the way of helping policy makers develop reforms which would reduce the inequities in the funding system. To correct the inherent problems of the funding system policy makers must have some idea why these problems are arising. To do this requires the use of a more behavioral approach.

Drawing from the theoretical and empirical work of Barro and Ladd an educational demand model was employed. Two models were estimated - the first neglecting the nonresidential property base while the latter incorporated it to allow for partial tax exporting. In other words, the tax price term in the former model is the residential fraction of the tax base while in the latter a more general tax price term. Educational demand is therefore a function of the income/wealth, perceived tax price, and preferences of the median voter.

A log-linear model is estimated yielding coefficients which represent elasticites. Of particular interest is the income elasticity of demand and, more importantly, the price elasticity of demand. The estimated coefficients are consistent with those expected both theoretically as well as previous estimates. That is that education is considered to be a normal good and an inelastic with respect to price. Detailed results are reported in AppendixII.

DISCUSSION

Clearly a case can be made for government support of the production of education in our society due to the tremendous external benefits associated with education - particularly with respect to primary education. Whether or not education should be treated as a public good or not is beyond the scope of this paper and will be left for the advocates and opponents of school choice. Government subsidization of education can be used to insure that both an efficient as well as equitable production be sought.

The particular educational finance reform to be utilized in Pennsylvania must surely measure up to both of these standards. How to handle the inequalities of education spending throughout the state most assuredly requires policy makers to understand how the level of spending is determined. Thus, a behavioral modelling approach is preferred from a purely academic position. However, policy makers must often abandon the theoretical environment for a more pragmatic approach which is empirically feasible.

With respect to the models estimated in this work, this suggests that the replicated models of Ladd be preferred theoretically. The conclusions which can be drawn from a comparison of the two educational demand models would seem to suggest that Pennsylvania residents perceive that they bear no burden of nonresidential property tax. This result follows from the fact that the best explained model is the one which ignores the composition of the property tax base and employs the Residential Fraction of the Tax Base (PCTRES) as the tax price term ($AdjR^2$=0.7386916). No partial tax exporting model can boast an $AdjR^2$ of that magnitude.

However, it should be noted that the parameters, alpha and beta, are not technically estimated in this model. While Ladd claims to have estimated these parameters it is, statistically, impossible to do so. The parameters occur really as a combination of two coefficients (those associated with RB* and PCTCOM and PCTIND respectively). This can be illustrated by simple algebraic manipulation of the regression equation.

Thus, perhaps a different alpha / beta combination could have been selected which yielded more explanatory power. This is not explicitly clear from the table of regression estimated elasticities for various degrees of tax exporting since it does not appear that the elasticity of demand is a purely linear function of

alpha and beta. In fact, the most explained variation of the partial exporting models appears to be where alpha = beta = 1. This implies that residents perceive that they bear all of the burden of nonresidential taxes. This is clearly counterintuitive to the previous two regression models as well as the expected change in the price elasticity of demand estimate. Closer observation of the table suggests that the "true" alpha / beta measures may lie in the neighborhood of the value of 0.25 or values greater than one.

Since the results of the educational demand model with the more generalized tax price term are not entirely reliable, it must be concluded that the nonresidential property plays a significant role in explaining differences in educational expenditures. It appears taxpayers perceive that they in fact do not pay the full price of education, they tend to be supportive of policies which buy too much education, i.e., a greater quantity will be demanded at the lower perceived price. This results in not only an inefficient level of spending, but also one which puts undo burden on those upon which the tax is exported.

Policy makers in Pennsylvania need to address the composition of the property tax base when reforms of the current system are considered. Until the specific degree of exporting which occurs can be identified, policy prescriptions can be addressed only in general terms. Any potential solution to the problems with the current system must address the inate gross variations in the tax base across local school districts. One method of achieving a more equalized base would be to institute a policy which has the effect of removing the nonresidential component variations in the tax base.

This could be accomplished by a tax base sharing policy. This is a particularly appealing recommendation since the state has already shown a willingness to experiment in this area with a regional sales tax. Not only is this policy appealing from a political perspective, but it also has merit from an economic standpoint. Tax base sharing of the nonresidential property tax base would adhere to the basic principles of public finance that equity goals are best accomplished at larger governmental units, while efficiency goals are more likely to be achieved if the service is provided at lower levels.

Under such a system the taxes would be collected over a larger geographic area. The choice of the specific area again could be determined on the basis of the degree of tax exporting. Two possible considerations would be county level

(since a collection mechanism is already in place) or based on the local labor market area which covers several counties. The latter choice is justified by the benefits received principle since employers are receiving the benefits of a well educated labor force (many times nonresidents of the school district in which they work). This policy would have the effect of providing not only a more efficient system but a more equitable one as well.

Clearly more research needs to be conducted before policy makers attempt radical reform of the tax system. A better understanding of why variations in educational expenditures occur must be established to gain support of the populace for any change. This may be particularly true when the reform really effects two highly controversial government programs - the educational system and the tax system used to finance it.

APPENDIX I

A. DERIVATION OF THE BASIC DEMAND FOR EDUCATION MODEL

Define: $e = E / p_e A$ = real educational expenditures per pupil

$t = T / p_x N$ = real school property tax per household

$y = Y / p_x N$ = real personal income per household

$s = S / p_e A$ = real state aid per pupil

$f = F / p_e A$ = real federal aid per pupil

where: A = number of pupils

N = number of households

Y = personal income

E = educational expenditures

T = local school property taxes

S = state grants

F = federal grants

p_e = price index of educational inputs

p_x = index of prices of all other goods

z = preference variables

=> <u>The Utility Function:</u> $U = U[e, b(t, y), z]$

where $b(t, y)$ = burden of school property tax per household and is a "negative" good (yielding disutility)

ASSUME: $\partial U / \partial e > 0$, $\partial U / \partial b < 0$, $\partial b / \partial t > 0$, $\partial b / \partial y < 0$, $\partial^2 U / \partial e^2 < 0$, $\partial^2 U / \partial b^2 < 0$, $\partial^2 b / \partial t^2 > 0$, $\partial^2 b / \partial y \partial t < 0$, and additive separability of preference function

=> $U = U_1(e, z_1) + U_2(t, y, z_2)$

where $\partial^2 U / \partial e \partial t = \partial^2 U / \partial e \partial y = 0$

=> <u>The Budget Constraint:</u> $E = T + S + F$

or alternatively, $p_e Ae = p_x Nt + p_e As + p_e Af$

ASSUME: f is a lump-summ grant but s may be part lump-sum and part matching grant => $s = g + (1 - \alpha)(e - f - g)$

where g = state lump-sum grant and α = local share of matching grant

=> $p_e Ae = p_x Nt + p_e A[f + g + (1 - \alpha)(e - f - g)]$

$\Rightarrow \quad t = (p_e / p_x)(A / N) \propto (e - f - g)$

LET: $p = p_e / p_x$ = relative price of education and $a = A / N$ = pupils per household

$\Rightarrow \quad t = \propto pa(e - f - g)$

THEREFORE, given y, z, f, g, and :

$L = U[e, b(t, y), z] - \lambda [\propto pa(e - f - g) - t]$

Utility maximization $\Rightarrow dU / de - \propto pa = 0 = (dU / db)(db / dt) +$

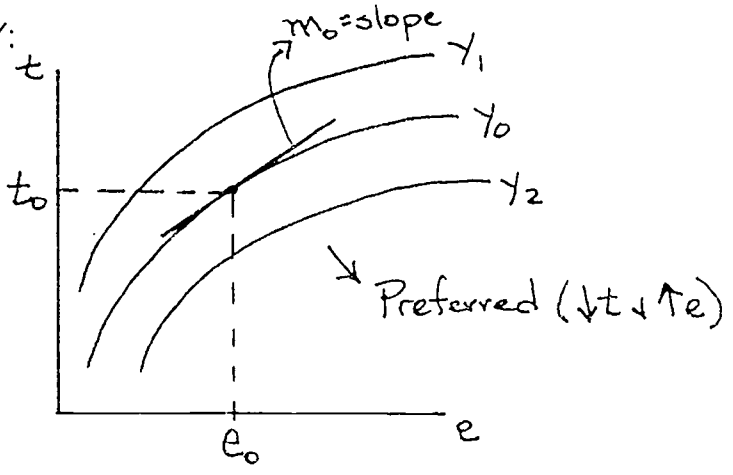
$\Rightarrow \quad pa = [-(dU / de)] / [(dU / db)(db / dt)]$

LET m = marginal rate of tradeoff between spending and taxes

$\Rightarrow m[e, b(t, y), z] = \propto pa$

where (given previous assumptions): $dm / de < 0$, $dm / db < 0$, $dm / dt < 0$, $dm / dy > 0$

GRAPHICALLY:



$\Rightarrow$ As spending increases each additional increase becomes less urgent and, therefore, less increases in taxes will be traded off willingly

As taxes increase each additional increase becomes more burdensome and, therefore, more reluctance to increase tyaxes even more

As income increases a lower tax burden is observed and increased willingness to impose spending increases

B. INCORPORATING THE COMPOSITION OF THE TAX BASE INTO THE MODEL - THE LADD APPROACH

Ed Expenditures=f(income/wealth, share of cost/tax, education preferences)
Determination of cost (or price) effect can best be seen by analysis of the budget constraint:

$$Y_M = P_X X_M + (t + d)H_M$$

where: Y_M = income of median voter

P_X = composite price of nonhousing goods and services

X_M = amount of nonhousing goods and services

t = community tax rate

d = fraction of the value of housing stock spent annually

H_M = value of housing stock of median family

=> $d \times H_M$ = annual cost of housing services

and $t \times H_M$ = annual cost of education to median voter

Thus $t = (P_E \times E \times n) / (n \times H_A + NR)$

where: P_E = resource cost per unit of education

E = educational services per family

n = number of families in the community

H_A = average value of housing stock in the community

NR = value of nonresidential property in the community

Thus total expenditures on education= $t \times H_M = (P_E \times E \times n) / (n \times H_A + NR)$

Differentiating with respect to E:

=> marginal tax price of education to median voter

$= (P_E \times n \times H_M) / (n \times H_A + NR) = (P_E \times n \times H_M \times H_A) / [(n \times H_A + NR) H_A]$

$= P_E \times RB \times (H_M / H_A)$

where RB = residential fraction of tax base = $(n \times H_A) / (n \times H_A + NR)$

Thus, the perceived price = f(P_E (per unit resource cost), RB (residential fraction of tax base), H_M / H_A (within community housing distribution component))[6]

Note that RB is the key component for analyzing the expenditure effects of nonresidential property. Increases in RB => decreases in cost to residential voters => increases in amount of education demanded. The amount of increase depends on the price elasticity of demand for education.

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[6]Note the similarity of the results of Barro and Ladd. While the symbols are different (α, p, and a as opposed to P_E, RB, and H_M / H_A) both indicate that the perceived price is a function of the cost, tax share, and housing distribution.

But, if residents perceive sharing business taxes, RB underestimates true tax price.

DEFINE: RB* = 1 - C - BI

where: C = commercial fraction of tax base

I = industrial fraction of tax base

= fraction of commercial taxes not shifted to residents

B = fraction of industrial taxes not shifted to residents

THE EDUCATION EXPENDITURE MODEL:

E = f(Y, WR, RB or RB*, LS, SBG, FG, PUP, PRIV, POV, PROF)

where: E = education expenditures per pupil

Y = median family income

WR = market value of residential property per pupil

RB = residential fraction of assessed property base

RB* = generalized tax price term

LS = local tax share

SBG = state aid per pupil

FG = categorical state and federal grants per pupli

PUP = public school pupils as a fraction of population

PRIV = private school pupils as a fraction of population

POV = fraction of families in poverty

PROF = professional, technical, and kindred workers as a fraction of population

APPENDIX II

A. VARIABLES

Variable	Description	Source
EPP	Educational Expenditures per Pupil	PEPS
MEDDI	Median Income	Census
MVRESPP	Market Value of Residential Property per Pupil	PEPS
ESBEPP	State Educational Subsidy per Pupil	PEPS
CATPP	Categorical Aid per Pupil	PEPS
PCTRES	Residential Fraction of Property	STEB
PCTCOM	Commercial Fraction of Property	STEB
PCTIND	Industrial Fraction of Property	STEB
PCTAG	Agricultural Fraction of Property	STEB
PCTOTHER	Lots and Vacant Land Fraction of Property	STEB
PCTPUB	Fraction of Students Attending Public School	Census
PCTPOV	Fraction of Families in Poverty	Census
PCTPROF	Fraction of Families which are Professionals	Census
PCTSEN	Fraction of Population Senior Citizens	Census
PCTRENT	Fraction of Families which Rent	Census

B. DESCRIPTIVE STATISTICS

Variable	Mean	Std Dev	Minimum	Maximum
EPP	5074.4	1073.3	3334	9741
MEDDI	29260	8969.3	15010	68570
MVRESPP	86706	55907	21710	482600
ESBEPP	1589.5	497.40	389.8	2635
CATPP	574.54	170.57	234.0	1393
PCTRES	66.78	10.66	10.53	95.28
PCTCOM	14.83	8.51	0.72	53.14
PCTIND	5.01	5.47	0	52.29
PCTAG	8.69	9.51	0	49.02
PCTOTHER	4.70	5.70	0	64.62
PCTPUB	88.80	8.11	55.35	100
PCTPOV	9.82	5.51	1.68	27.58
PCTPROF	51.12	12.27	29.36	88.16
PCTSEN	15.61	3.87	6.07	29.79
PCTRENT	24.56	8.47	7.21	57.97

C. STEPWISE LINEAR REGRESSION ESTIMATES

Variable	Coefficient	t-value	Adj R^2	Δ Adj R^2
MVRESPP	0.01183	16.670	0.56957	0.56957
CATPP	1.84574	12.384	0.64440	0.07483
PCTCOM	20.78961	5.560	0.72391	0.07951
PCTPROF	20.29886	6.312	0.74001	0.0161
PCTIND	23.45407	5.343	0.75390	0.01389
PCTOTHER	21.32914	4.722	0.76059	0.00669
PCTPUB	-14.63500	-3.928	0.76848	0.00789
PCTRENT	9.66846	2.780	0.77160	0.00312
Constant	2486.807	5.790		

D. EDUCATION DEMAND MODEL WITH TOTAL TAX EXPORTING

EPP=0.25921 MEDDI + 0.29155 MVRESPP + 0.14872 ESBEPP + 0.24366 CATPP
(8.400) (12.553) (5.995) (14.025)

- 0.32050 PCTRES + 0.20432 PCTSEN - 0.05847 PCTPUB
(-9.802) (9.575) (-1.195)

+ 0.93143 PCTRENT + 0.18403 PCTPROF
(5.983) (5.851)

All variables are natural logs. Values in parentheses are t-values. PCTPOV is not included as it was shown to be not significant. AdjR^2=0.7386916

E. EDUCATIONAL DEMAND MODEL WITH PARTIAL EXPORTING

Upper values represent estimates of price elasticity of demand for various degrees of exporting the commercial (alpha) and industrial (beta) tax. Lower values are corresponding values of the adjusted R^2.

		BETA				
		0	0.25	0.5	0.75	1
ALPHA	0	N/A	-1.2859	-0.62788	-0.40675	-0.29417
			0.69616	0.69645	0.696762	0.6971
	0.25	-1.1063	-1.1937	-0.74434	-0.48416	-0.34064
		0.69676	0.70587	0.704822	0.703105	0.70202
	0.5	-0.53471	-0.64144	-0.56703	-0.4429	-0.33739
		0.69728	0.70398	0.706794	0.706774	0.70591
	0.75	-0.34281	-0.39994	-0.39891	-0.35634	-0.29918
		0.69787	0.70276	0 706272	0.707892	0.70817
	1	-0 24542	-0.27713	-0.28694	-0.27532	-0.24896
		0.69855	0.70235	0.70565	0.70796	0.70923

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