Impact of Subsidies Across Alabama Counties: An Econometric Interpretation

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Abstract:

Fixed effect time series effect models are used to analyze the spatial and time series pattern of the effects of subsidies on manufacturing income across twenty counties in Alabama from 1970 to 1999. The results from the fixed effect model indicate that median populated counties performed better than larger and smaller counties while the time series effect model indicates that the impact of subsidies is marginal across the state over time.

Background

State governments have expanded economic incentives to attract firms and made industry attraction part of their basic activity. The issue of whether incentives stimulate output, however, is open to debate. Incentives might be efficient but state agencies might add little value. The question is whether state governments should interfere with private location decisions.

Several dramatic cases have attracted attention. Alabama gave Mercedes Benz $250 million and Hyundai half that, South Carolina gave BMW $100 million, Indiana gave United Airlines $300 million, and Kentucky gave Toyota $125 million. Mississippi gave Nissan cash payments for ten years equal to 4% of gross payroll along with a 50% tax credit for job training.

Economic incentives include direct economic incentives, tax abatements, state grants, loan guarantees, industrial development bonds and guarantees, umbrella bonds, general obligation bonds, customized industrial training, state funded venture capital corporations, privately sponsored development credit corporations, and more.

According to the 2000 Development Report Card for the States (drc.cfed.org) "Alabama continues to lag behind economically with slightly increased poverty rates, a lack of new companies, and low high school graduation rates and college attainment." The Report Card, issued annually by the non-profit Corporation for Enterprise Development CFED, is a broad based rating of economies of the states with more than 70 indicators. Alabama saw a slight downturn in its poverty and income distribution rates, and remained in the bottom 10 percent of the nation in infant mortality, teen pregnancy, and heart disease.

This present paper interprets econometric results in terms of a two-way fixed effect model to evaluate the impact of subsidies on Alabama manufacturing from 1970 to 1999. The paper seeks to evaluate the effectiveness of Alabama's planned economic adjustment policy programs in achieving economic development and regional economic convergence. We ask a cost-benefit question: Does government indebtedness due to subsidies to the private sector matter to the level of development, or is it so insignificant that the observable level of economic development would have occurred in any case?

Alabama's Industrial Policy Program

Given Alabama's high level and sophistication of industrial development planning, its impact on its overall development aught to be significant. Alabama's economic assistance to business has progressed steadily to what most analysts of state economic policy are describing as a *third wave* of industrial policy programming. According to Ted K. Bradshaw and Edward J. Blakely (1999), first wave planned economic adjustment incentives consisted of smokestack chasing, the giving of incentives directly to firms to generate needed jobs and increased earnings. These programs were designed to attract footloose firms from old industrial areas to growing regions, such as the South and West. Several Alabama economic development programs would correspond to first wave incentive programming. The Alabama Business Privilege Tax allows companies doing business in Alabama to accrue up to $15,000 of net worth in Alabama in tax exemption. The

Alabama Corporate Tax allows the corporate tax payer to deduct from its gross apportioned and allocated income, the apportioned amount of federal income tax paid or accrued, creating a net effective rate of approximately 4.42%. The state also gives business approved by the Alabama Department of Revenue a capital credit calculated at five percent (5%) of the total capital cost of the qualifying project. To stimulate business and industrial growth in depressed areas of the State, Alabama offers an Enterprise Zone credit to businesses, which locate or expand within a designed enterprise zone.

The state offers companies who continuously employed for at least 16 weeks for at least 24 hours per week, an Employer Education Credit worth 20 percent of the actual costs limited to the employer's income tax liability. Alabama provides for a deduction for pollution control equipment as defined by, and in conformity with federal income tax laws and regulations. Under its Abatements Program, qualifying industries may abate allof the non-educational portion of construction related transaction taxes associated with constructing and equipping a project. The state also offers a Raw Materials Exemption under which raw materials used by manufacturers or compounders as an ingredient of their manufactured product are specifically exempt from sales and use taxation. Other first wave incentives packages would normally include subsidies applied to the cost of plant facilities or utilities, subsidized loans or direct payments to firms for relocation expenses, bond issues to help with the preparation of local infrastructure, below-market loans, enterprise zones or tax increment financing that enables benefits to be paid for by the recipients, and competitive and expensive industrial recruitment programs.

Alabama subsidies to business also show the greater level of sophistication being associated with second wave planned economic development. Second wave planned economic programming normally involves the offering of indirect types of firm-level assistance to promote local firm growth, to accelerate technology transfers, to expand workforce-training programs, to create favorable business climate, and to increase capital for small and medium-size local firms (Ross and Friedman, 1990; Clarke and Gaile, 1992; Hanson 1993). A key component of Alabama's development incentive packages at this stage were the creation of industrial parks in collaborative effort with state universities. The Alabama Technology Network (ATN) is a non-profit organization created by the economic Development Partnership of Alabama, the University of Alabama system and Auburn University to enhance economic development in the state specifically by improving the state's ability to provide technically trained workers in key industry sectors through a coordinated network of education, training and technical assistance.

In response to criticism government incentive-based competition for industrial locations means government is reallocating income to market noncompetitive firms, industries, and localities, Alabama has moved to what are being described generally as third-wave economic development strategies (Bradshaw & Blakely, 1999; Leicht & Jenkins, 1994; Herbers, 1990; Ross & Friedman, 1990). Third-wave industrial programming seeks to supplement incentive and firm-based assistance with cost-benefit-based assistance (Kayne & Shonka, 1994; Osborne, 1989; Pyke, and Sengenberger, 1992). The cost-benefit assessment is in terms of the overall economic development of the state, raising over all standard of living of all citizens rather than the profitability of assisted firms, industries, and localities (Fosler 1992:5). And the method to accomplish this is direct state entrepreneurship though collaborative partnership with private enterprise. "Many of the best examples of collaborative partnerships for third-wave programs are aimed at building institutional capacity in programs areas.... such as high-technology promotion, technology transfers, business development, and job-retention" (Bradshaw and Blakely 1999: 230).

Alabama’s third wave industrial development efforts would include planned state efforts to bring together business, industry, education and training representatives to meet local workforce needs on a county-by-county basis. Alabama is the first state to fund and establish a statewide, high-speed supercomputer network for dual purpose of academic (60%) and industry research (40%). This phase of planned comprehensive development is best illustrated in Alabama’s Community Development Block Grants program that makes grants available to non-entitlement local units of government especially counties that can afford the 20% local matching funds to facilitate the construction of new industry or expansion of an existing industry. Such local development grants have been critical in Alabama successfully winning a number of well-publicized high-technology facilities including operational outlets of four giant foreign auto firms, Mercedes, Honda, Hyundai, and Toyota. Besides the large number of well-paid jobs they create, such high-tech companies held to boost the overall technological capacity of the state as a whole.

The critical question is whether planned economic adjustment has been successful where reliance on the national competitive market has failed to push Alabama into the forefront of development in the nation. We seek answers to two specific questions. Does Alabama’s industrial policy promote regional and county economic growth over time? And is economic growth resulting from industrial policy activity forging a convergence of sub-regional economic development?

Data and Methodology

Because public funding budgeted for economic development and other promotional activity employ multiple strategies and tend to be woven into one another, completely untangling them for specific study of their individual effects is not possible. Besides, as the cited third wave focus would suggest, the development focus of government economic promotional activity today is the overall economic development of the whole state. A comprehensive data covering all the various types of government industrial policy activity is, therefore, adequate to test the effectiveness of industrial policy in the state.

Data were collected on state and local government funds budgeted for economic development programs and promotional activities. State and local government budgets for economic development provide a good indicator of what priority these governments assign to plan economic activity in general and where they want these activities to occur. Government assistance to private enterprise typically takes the form of intergovernmental revenue from one branch of government to another charged with the direct implementation of the program. Intergovernmental revenue for business is essentially, therefore, a form of transfer payment, that is, government indebtedness due to subsidies to business and communities. Data on state transfer payments to business has been tabulated consistently since 1967 by the U.S. Census Bureau as state and local intergovernmental revenue to counties, giving us consistency of data across time and place. Each year the Census Bureau samples about 27 to 40 of the 67 Alabama counties on a variety of demographic and economic indicators including intergovernmental revenue which the Census in *Government Finance and Employment Classification Manual* describes as “consisting of monies from other governments, including grants, shared taxes, and contingent loans and advances for support of particular functions or for general financial support; any significant and identifiable amounts received as reimbursement for performance of governmental services for other governments; and any other form of revenue representing the sharing by other governments in the financing of activities administered by the receiving government" (US Census Bureau 2001: ch.7, section 7.22).[1]

Model and Estimation

An economic model is developed to estimate the impact of subsidies on Alabama's manufacturing industry. The model uses both time series and cross-sectional data (panel data) to evaluate the effects of subsidies on manufacturing income (MINC) across twenty counties in Alabama from 1970 to 1999 as depicted by the equation below:

$$y_{it} = \sum_{i=1}^{20}\sum_{t=1}^{30}\alpha_i + \beta\mathbf{X}_{it} + \varepsilon_{it} \qquad \textbf{(1)}$$

where;

y_{it} is the manufacturing income for county i in year t; $_I$ is a dummy variable for the intercept of the ith county; (s) are the parameters for the explanatory variables; X_{it} is a matrix of independent variables for the ith county in year t; $_{it}$ is an error term for the ith county in year t. These are the counties that appear in the annual survey for the period 1970 to 1999 as seen in table 1. The independent variables in the model are total grant, which is the sum of both state and local subsidies given to the industrial sector, population density (PDENS) defined as the number of persons per acre in a county, and annual average wage (WAGES). According to this design, therefore, the amount of state and local government subsidies going to promote private enterprise in the state as a whole and in the various counties – also referred to as county subsidies (CS) -- is the independent variable explaining both state and county economic performance and sub-

[1]Intergovernmental revenue excludes amounts received from the sale of property, commodities, and utility services to other governments. It also excludes amounts received from other governments as the employer share or for support of public employee retirement or other insurance trust funds of the recipient government, which are treated as insurance trust revenue.

regional economic convergence as dependent variables. Economic development is measured both in terms of the overall gross state product (GSP) as well as gross county product (GCP). In the model, county manufacturing income (MINC) in thousands of dollars is used as a proxy GCP in order to target as much as possible the direct intended effect of subsidies on the broad GCP. If planned development assistance (CS) has a positive impact on county economic development measured in terms of MINC, then there should be a high degree of correlation between CS and MINC coefficients. Average of CS and MINC coefficients should give us a sense of the effects of planned economic activity on overall state economic development.

Population density has been used in several industry location studies (Stretesky and Hogan, 1998; Kriesel, Centner, and Keeler, 1996) and is found to be positively associated with industrial location. Manufacturing firms in order to make profits, often locate their businesses in highly populated counties, metropolises, or region for cheaper source of labor. Therefore, in this analysis, it is hypothesized that population density will have a positive significant association with manufacturing income.

Holding wages constant across counties can be interpreted as endogenous as direct investment increases competition of siting manufacturing plants in the state. However, in this model, average annual of counties was allowed to vary and as a result, it exogenously, impacts manufacturing. It is hypothesized that counties with higher average wage may have highly skilled workers and enhances productivity. Therefore, annual average wages might directly impact manufacturing income.

Since these counties are spatially connected, it is expected that business and economic activities in one county will be affected by the other. Two econometric models (the fixed effect and the random or error term models) are developed to test this spatial correlation assumption using the Hausman test. In the fixed effect model, it is hypothesized that an individual county is completely different from the other in terms of resource endowment. For example, we expect a county with higher percentage of college degrees to perform better than the one with a lower percentage, given the same level of grant. Therefore, the intercepts will be different. The random effect model assumes that the differences in the intercepts are due to chance, which is explained by the error term. A third model is also developed to isolate the differences across cross-sections and time (i.e. the two-way fixed effect model).

Results and Discussions

The first step in our analysis was to test hypothesis that there are no fixed effects in any of the nineteen cross-sectional units (i.e. counties) relative to the 20th county, which is Walker County. This hypothesis is rejected through the Hausman test as the F statistics with 19 and 552 degrees of freedom for the numerator and denominator, respectively ($F_{19, 552}$) has a value 28.58 and the probability that the critical value of F is greater than this value ($F_c > F_{19, 553}$) is less than 0.0001. Therefore, the null hypothesis that there are no fixed effects is rejected. Hence, the error term model was disregarded. All the nineteen counties have intercepts significantly different from 0, relative to the referenced county, Walker as statistically reported in table 1. Madison County, which has Huntsville as the county seat has the most significant t-ratio of 16.50 and significant at $P < 0.0001$. This result came at no surprise. Huntsville is a home to nationally important high technology companies and centers such as Lockie Martin and the National Space Science Technology Center. All the larger counties (population wise) have t-statistics greater 3.0.

The overall model has an R-Square of 0.899, and the three independent variables are all statistically significant and with expected signs, as indicated in table 1. Total county subsidies

(CS), population density (PDENS), and annual average wage (WAGES) have t-ratios of 5.87, 2.51, and 17.29, respectively, and all positively impact manufacturing income (MINC). A thousand dollars spent as a grant to manufacturing yields about $7.00 in additional income, a cost to benefit ratio of 143 to 1. The two-way fixed effect model showed no differences from the one-way fixed effect in terms of spatial effects. The coefficients as well as the t-ratios for the cross-sections are almost the same. The time series effect analysis performed indicates that subsidies are positively impacting all the counties over time but on a declining rate as indicated in table 2. The estimated coefficients started declining relative from 1980 and of course so do the t-ratios. Also, in this model, population density is not significant. The declining rate indicates that the impact of subsidies of over time is marginal statewide.

Conclusion

Over all, local and state subsidies have positive impacts across space and time as revealed in the one-way and two-way fixed effect models. However, the overall statewide impact of $7.00 for every thousand dollars invested is not significant in terms of the stated objectives of planned economic development for the state as a whole. Furthermore, there is no evidence of convergence in the pattern of economic regional development as some counties showed over all greater economic development than others. But important, the differentials are not accounted for in terms of the different levels of subsidies applied. The largest counties, especially, Montgomery and Jefferson receiving the largest subsidies, do not fare economically any better than those receiving smaller amounts. Though, these counties have higher population densities relative to others -- a probable reason they received more of the often politically driven government subsidies than others -- they did not show a higher level of planned economic development impact than the others. That leads to the overall conclusion that significant differentials in overall regional patterns of development must be accounted for by economic factors other than the level of state industrial planning.

Policy Implications

In opting for planned economic adjustment, Alabama has joined the general move away from strict reliance on markets for development and for regional economic convergence as a side effect. Neoliberals interpret severe regional economic disparity as essentially part of national economic development. Given the situation of an inter-regional free flow of investment capital, they argue, distressed areas such as rural Alabama are those, which have been found by market tests to be non-competitive, or to have other competitive disadvantages. For such areas, the good news is that the returns to an additional unit of capital investment are lower in regions with relatively large capital stocks than in regions with relatively small capital stocks, creating an incentive for capital to shift from capital-abundant regions of the national economy to capital-scarce regions (Bernat 1999; Carlino and Mills, 1996; Evans and Karras, 1996; Marlin, 1990). Development would, therefore, spread from capital-abundant regions to capital-scarce regions.

But Alabama's continuing economic problems suggest market forces cannot be depended upon automatically to result in optimal spatial distributions of economic activity. Unfortunately, as our results show, neither has Alabama's planned economic activity done any better in forging manufacturing growth nor regional economic convergence. But economic development has never been an either/or choice between markets and planning; rather, how planning may direct market forces for maximum impact. That leaves the emphasis on planning and on planners to come up with a pattern of distributing subsidies to business and counties that maximizes market potential. The current pattern of distributing subsidies thinly and proportionately according to county population, while politically expedient, is not economically efficient. It does not show any planned departure from pre-existing market patterns.

Future Work

We will try to expand the model to include other important explanatory variables such as the average county wage rate, college graduates, presence of unions, etc. These factors are likely to explain the greater overall level of development of some of the large counties while showing no significantly different response to economic planning activity than the smaller ones. We also plan on doing similar studies for Georgia and Florida to enable us to do a comparative analysis of planned economic activity of the three states to unearth any significant disparities.

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Table 1-Results of the Fixed or Cross-Sectional Effect Model

County	DF	Estimated Coefficient	t-Value	Prob.
BALDWIN	1	107,017	3.86	0.0001
CALHOUN	1	118,710	3.82	0.0001
CULLMAN	1	99,223	3.60	0.0003
ETOWA	1	174,360	5.65	0.0001
HENRY	1	80,749	2.77	0.0058
HOUSTON	1	89,788	3.19	0.0015
JACKSON	1	89,040	3.03	0.0026
JEFFERSON	1	702,465	8.80	0.0001
LAUDERDALE	1	100,225	3.58	0.0004
MADISON	1	605,299	16.50	0.0001
MOBILE	1	434,057	10.37	0.0001
MONTGOMERY	1	131,706	3.58	0.0004
MORGAN	1	249,567	8.55	0.0001
PICKENS	1	64,843	2.20	0.0282
SHELBY	1	71,817	2.55	0.0110
ST. CLAIR	1	62,701	2.20	0.0279
TALLADEGA	1	151,943	5.51	0.0001
TALLAPOOSA	1	157,167	5.08	0.0001
TUSCALOOSA	1	183,024	6.59	0.0001
INTERCEPT	1	**-258,557**	**-10.81**	**0.0001**
PDENS	1	**223,906**	**2.51**	**0.0123**
CS	1	**6.61**	**5.87**	**0.0001**
WAGES	1	**16.17**	**17.29**	**0.0001**
R^2		**0.90**		
Hausman Stat.	**19, 552**	**F = 28.58**		**0.0001**

Table 2-Results of the Time Series Effect Model

Year	DF	Estimated Coefficient	t-Value	Prob.
1970	1	1,439,496	19.23	0.0001
1971	1	1,410,276	19.15	0.0001
1972	1	1,381,036	19.11	0.0001
1973	1	1,345,680	19.07	0.0001
1974	1	1,304,098	18.76	0.0058
1975	1	1,263,239	18.61	0.0015
1976	1	1,212,357	18.52	0.0026
1977	1	1,167,488	18.75	0.0001
1978	1	1,122,678	18.46	0.0004
1979	1	1,058,736	18.63	0.0001
1980	1	988,370	18.04	0.0001
1981	1	908,745	17.92	0.0004
1982	1	834,844	17.17	0.0001
1983	1	776,640	16.58	0.0282
1984	1	741,930	16.73	0.0110
1985	1	681,713	16.15	0.0279
1986	1	642,166	15.85	0.0001
1987	1	610,077	15.62	0.0001
1988	1	575,074	15.17	0.0001
1989	1	556,253	14.88	0.0001
1990	1	503,697	14.10	0.0001
1991	1	442,948	12.99	0.0001
1992	1	380,881	12.10	0.0001
1993	1	351,077	11.48	0.0001
1994	1	301,453	10.30	0.0001
1995	1	247,023	8.75	0.0001
1996	1	196,020	7.16	0.0001
1997	1	133,186	5.01	0.0001
1998	1	80,178	3.06	0.0024
INTERCEPT	1	**-990,854**	**-9.65**	**0.0001**
PDENS	1	**50,291**	**0.75**	**0.4541**
CS	1	**3.5112**	**3.95**	**0.0001**
WAGES	1	**81.8105**	**23.62**	**0.0001**
R^2		**0.57**		
Hausman Stat.	**3**	**m = 34.70**		**0.0001**