STATE ECONOMIC DEVELOPMENT:
THE SATURN PROJECT REVISITED

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Abstract

This paper focuses on state economic development efforts with an emphasis on formulating a state economic development strategy. An analytical framework for regional policy analysis is discussed. A second framework is presented that outlines criteria for efficient use of state funds. Economic Base theory is discussed in the appendix, along with Shift-Share Analysis. States, although generally lacking a comprehensive development strategy, are active in economic development programs. The "bottom line" in all regional development efforts is enhancement of the productivity of regional resources, particularly human. To ensure the productive use of state financing, eligible candidates for state assistance are being targeted for export-producing businesses that could not achieve their potential for success without this assistance. These programs should be subject to the criterion that the benefits of programs, measured in increased taxes due to the development, be greater than the total cost of the programs and incentives.
Part I

Introduction and Frameworks

Regional economic development, in one form or another, has been a topic of interest in governmental circles for many years. In fact, one could argue that the initial development of dirt roads in the colonial United States in the late 1600's was one form of regional economic development. Currently, this topic attracts a high level of attention in state governments, although specific definitions of regional economic development and regional economic growth have been elusive. This study will, in part, try to define regional economic development and clarify its focus, as well as a state government's contributions.

This paper seeks to develop a conceptual framework for an effective state economic development strategy. In addition, Minnesota economic development approaches will be examined with a benefit-cost analysis of the incentive package for the Saturn plant proposal.

Definitions

Many scholars, and others who work in the field of regional economics, particularly in state government, fail to distinguish between regional economic development and regional economic growth. For example Edgar Hoover, in his book "An Introduction to Regional Economics" (1975), blends the two concepts as if they were synonymous.

For the purposes of this paper, regional economic
development is defined as an increase in resource productivity, particularly the productivity of the human agent. This is measured primarily with output-per-worker. Though, most commonly, economic development is measured in terms of employment growth. Regional economic growth, on the other hand, is defined as an increase in total economic activity, such as total personal income or gross state product, with or without corresponding increases in resource inputs. Regional economic growth can occur without regional economic development simply through population growth, and a subsequent increase in employment. Conversely, regional economic development can occur without corresponding regional economic growth when productivity increases and employment falls. Economic development may be masked. Without corresponding reductions in output and gross state product, productivity changes might not be caught in standard measures.

Economic development is also concerned with the equitable distribution of the results of the development, which is jobs. Are those who should benefit from development allowed to do so? In addition, equitable distribution of growth in economic variables is desired. Thus, we also seek to correct disparity between areas within a region.

A working definition of the concept of a region is also necessary for an analysis of regional economics. Two types of regions are generally recognized: homogenous regions and nodal regions. An homogenous region is an area that is defined by its
"internal homogeniety". For example, an area where similar crops are grown is an internally homogenous region. A nodal region is defined by nodes of activity, such as a city or a metropolitan area. A nodal area generally is surrounded by a rural peripheral area (Hoover, 1975). The concept of the nodal region is the most appropriate, and will be part of the definition of regions used in this study.¹

Standard Federal Regions are an outgrowth of the nodality concept of regions, as are the Standard Metropolitan Statistical Areas (SMSA), (figure 1 and figure 2). For the purposes of this study, a state is viewed as a region since state economic development efforts are directed only to residents of that particular state. Functional economic areas, in which economic activity takes place, is still another definition of a region. Functional economic areas may overlap and, hence, the effects of state economic policies may spill over into surrounding state border regions. Wisconsin border towns, for example, actually may benefit more from Minnesota's economic development than Wisconsin's. Individual states will serve as the definition of regions in this study, while recognizing that this is a limited definition, and that regions may overlap state boundaries.

A great deal of regional economic development involves the development of lagging regions; hence, the need to develop a working definition of a lagging region. A lagging or distressed region is characterized by below average growth in population and
per capita income, and above average unemployment rates compared to the rest of the nation. Economic development activities seek to correct these disparities. Regional economic development also seeks to help a lagging region "catch up" with the rest of the nation, usually at some cost to the general economy.

Justifications for Intervention

Government intervention is justified by its facilitating role in regional economic development. Also, government intervention is used as a tool to equitably distribute the benefits of national economic growth. Governments, both in the United States and abroad, participate in reducing disparities between and within regions. Governments are also concerned with the health, welfare and the social conditions of its citizens, as is the case in the U.S. where one of the purposes of the government is to promote the health and the welfare of society. Another justification for intervention is to cushion regions against the ill effects of cyclical and structural changes in the national economy. This is particularly true in Minnesota since the Minnesota economy is sensitive to changes in the national economy.

Often cited as a justification for intervention is correction of market imperfections. Governments seek to correct imperfections in labor and capital markets so that the markets operate more efficiently. Labor market imperfections, for example, fail to bring job openings to the attention of
perspective workers. Capital market imperfections, like those cited in Daniels and Kieschnick (1979), prevent small business from obtaining sufficient start-up and expansion capital.

Lastly, a justification for government intervention in regional economic development, is that governments have a responsibility to improve their regional economic climate. They do this in order to: create jobs, promote efficiency, and compete with other states for business relocations.

Conceptual Underpinnings

An underlying conceptual organization for the process of strategy building includes certain essential elements, namely, goals, strategies, programs and policies. The end goal of regional economic development is increased resource productivity. A strategy provides a framework to reach this goal. The programs or policies implement the strategy. Variables affected include target and intervening variables. Instrument variables are the means of affecting the target and intervening variables.

The goals are the first tier of a three tier system, while the strategy provides the framework for the development program or policy. The programs or policies are the last tier of the system.

GOALS

STRATEGIES

PROGRAMS OR POLICIES
The implementation of programs eventually results in the distribution of development funds. Three basic questions must be addressed in fund allocation. Firstly, is the enterprise which receives the funds export producing, that is, does the enterprise sell its products to out-of-state buyers? Secondly, is the enterprise viable? Is the enterprise a "winner" capable of self-sustained growth without continual subsidies even after an initial injection of start-up or expansion capital? Thirdly, would the enterprise develop and grow without the development assistance? If the answer to the third question is yes, than any provision of development funds is a misallocation of state or federal development monies, and provides a "windfall" to the recipient, placing the business at a competitive advantage. The same can be said about communities receiving funds for development projects, such as river basin development or community development. If the project would occur without assistance, then an infusion of funds may provide a "windfall" to the lucky recipient community receiving the aid. This may or may not put the community at a competitive advantage to other communities also competing for industry.

This discussion has posed questions that must be addressed before fund allocation. If these questions are not addressed, then any business seeking development assistance may receive the aid, such as in England (Committee for Welsh Affairs, 1984), thus wasting public money. These funds may have been more efficiently used in the private sector, particularly if tax rates were lowered
as a result. The "bottom line" is that an economic development program must increase the productivity of the resources associated with the program.

Before implementation of a development program, its costs must be taken into account. Economic analysis must identify those programs with benefits greater than costs, which is really the heart of this analysis.

Regional Economic Development Framework

Regional economic development has one goal in theory, increasing resource productivity, while in practice several goals exist. They are: maximizing return on public investment, ensuring an equitable distribution of the benefits of development, creating a diversified economic base, creating jobs, maximizing human productivity, maximizing resource productivity, maximizing social welfare through health, education, and living conditions, and maximizing infrastructure productivity. In more detail the achievement of these goals is represented algebraically as follows:

1. Public return on investment.
   Maximize: \( B_t - C_t \)
   Where:
   \( B_t = \) Total benefits
   \( = \) (discounted increased state income taxes)
   \( + \) (discounted increased state sales taxes)
   \( + \) (discounted increased property taxes).

   \( C_t = \) Total costs
   \( = \) (public investment in project)
   \( + \) (private investment in project)
   \( + \) (public cost)
   (public cost is the cost of providing increased public services as a result of increased demand
for public services due to development).

2. Creation of a diversified economic base.
   Maximize: Ideal industry mix for the state

3. Job creation
   Maximize: The number of jobs created per dollar invested = Ec
   Where:
   \[ Ec = \frac{\text{Present value of jobs created by development}}{\text{Present value of jobs lost by removing private funds for development}} \]
   Present value of federal, state, and local dollars.

Subject to: \( E_{cm} = \) maximum dollars invested per job

Thus: \( Ec \leq E_{cm} \)

4. Human productivity.
   Maximize: Output-per-worker
   Subject to: limit on public investment.

5. Resource productivity.
   Maximize: limit on public investment.

   Maximize: social welfare
   Subject to: limit on public investment.

7. Infrastructure productivity.
   Maximize: Infrastructure productivity
   Subject to: limit on public investment.

The goals are usually selected by a legislative body. Ideally, some mix of these goals will be selected that will optimize regional economic development.

Following a framework discussed by Donald Rothblatt in his book "Regional Planning: The Appalachian Experience" (1971), welfare functions that depict choices between two and several goals are represented in figures 3 and 4.

Figure 3 shows the ideal mix of 2 goals. W1, W2, and W3 are isoquants of a welfare function which shows different
Figure 3. Welfare Function for Two Goals

Figure 4. Welfare Function with Three Goals

combinations of goals sought that are equally desired (Rothblatt, 1971). A transformation function, T is defined as "the boundary of the set of contributions each program or project makes to each goal" (Rothblatt, 1971). The line through a,b, is the budget constraint. The optimal point is at c, where the social welfare isoquant is tangent to the budget constraint. Here, the ideal mix between the two goals exists.

With two or more goals, the transformation is represented in multidimensional form, as shown in Figure 4. Now the welfare function is a surface, the transformation function is represented as a half sphere. The ideal point, the intersection of the welfare function, W, and transformation function, T, is at point a.

Regional Development Policy Model

A model of policy planning provides direction for policy planning using the mix of goals shown in figure 5. These goals are the ones discussed earlier. The targets, like output-per-worker, are influenced by policy variables. Intervening variables link policy variables to target variables, for example, education is linked to productivity improvement. An important question is: how closely are the instrument variables linked to the target variables. The linkage can be estimated through regression analysis, using the following equation:

\[
\text{Target variables} = B_0 + B_1 \text{instrument variables} + \text{error.}
\]
Figure 5. Policy Model

Social, Economic goals
End-in-view

Government intervention:
Strategy to attain end-in-view

Benefit-Cost analysis

If $Ct > Bt$

Programs, policies that the development strategy

If $Bt > Ct$

Allocations

Assessment of program results

Criteria for fund allocation

Target variables

Intervening variables

Instrument variables
The last step, which is probably the most important, is an assessment of the results of the development programs. Questions asked pertain to the end results and whether or not the programs achieved the stated goals or objectives, or if the results show that the goals are even still in focus, or are even relevant. A post-facto benefit-cost analysis would analyze whether the benefits were as great as expected, and if the costs of the programs were close to their estimates.

If regional development programs do not achieve the expected goals, then programs may need to be re-evaluated and/or revised. One good example of post facto examination of the effects of programs is the recent Legislative Auditors Report on Economic Development (1985) evaluating the benefits and costs of economic development programs in the state.

A Benefit-Cost Model

Once program objectives are determined, a further task remains in determining program benefits and costs. Direct program costs would include tax expenditures and other subsidies, as well as administrative overhead and other public cost. Direct program benefits would be represented by the net dollar value of the particular objective sought by a program. Direct program benefits also include increased tax revenue to the state treasury brought about by the economic development.

Both costs and benefits are difficult to determine, given the extended time period over which they accrue. If indirect
costs and indirect benefits are included, the calculations of net benefits and net returns on public investment becomes even more tenuous. Some form of trade-off analysis is required to establish the opportunity cost of public intervention in regional economic development for an entire state economy, as well as its special interest groups.

Indirect benefits and indirect costs, because of the difficulty in their quantification, are generally assumed as nonquantifiable or at least are not counted in the first benefit-cost calculation. If a project's benefits and costs are close, then indirect benefits and indirect costs may be brought in to argue one way or another for acceptance or rejection of a project.

Typically, benefits and costs are calculated together at each time period, discounting future benefits and costs, as shown in the form.

\[ B_t - C_t = \frac{(B_1 - C_1)}{(1+r)} + \frac{(B_2 - C_2)}{(1+r)^2} + \ldots + \frac{(B_n - C_n)}{(1+r)^n} \]

Where:

\(B_i, C_i\) are the calculated benefits and costs at time period \(i\), and \(r\) is the discount rate.

It may be easier to calculate costs and benefits separately, and then compare \(C_t\) and \(B_t\), which is the method used in this paper. The equations for \(C_t\) and \(B_t\) then are:
Prediction of future benefits and costs, as well as selection of interest rate, are sources of many difficulties in the use of this tool in policy analysis.

An additional consideration in benefit-cost analysis involves opportunity cost, or what "is foregone as a result of undertaking a project" (Sugden, Williams, 1978). Opportunity cost estimation involves comparing a hypothetical investment that might have occurred in the private sector had the funds not been removed from that sector through taxation. It is especially difficult to determine the interest rate to use since, in general, the private sector requires a higher rate of return than the public sector. Opportunity cost involves calculating an alternative rate of return for the public sector investment. Total direct cost, \( C_t \), would now include the hypothetical alternative investment, \( I_t \). A simple opportunity cost calculation would take the form:

\[
I_t = Io(1 + r^*)^t,
\]

where,

\( Io \) = initial investment

\( r^* \) = the interest rate, different than the discount rate
t = the time in which the investment will mature.

In general, a public project will need a large rate of return to pass a benefit-cost criterion using an opportunity cost. Using an opportunity cost may not be appropriate if projects are perceived to be in the "public interest".

Public Cost

Governments are in the business of providing public services, thus, planning for increased delivery of public services is essential for the increased economic activity that economic development brings to a community. Public costs are inherent in the delivery of these services. The concept of public cost is not new, but it has not received much attention in the literature. Ron Schaffer in his 1979 paper "Local Government Expenditure Impacts of Industrial Development: The case of 23 Smaller Wisconsin Villages and Cities", and F. Larry Leistritz and Steven Murdock in their 1981 book "The Socioeconomic Impact of Resource Development: Methods for Assessment", address this issue. While both deal with rural development, their methods are readily applicable to regional economic development in larger localities. Several other studies on specific localities by other authors are examined next.

A study in Kentucky found that the public costs outweighed the fiscal benefits (C.B. Garrison, 1970). Another study, in Texas, found similar results (L.D. Reinschmidt, 1976). Schaffer
found that in several instances in rural Wisconsin towns, the community experienced negative benefits from the industrial development efforts in the town. Thus, economic development is not always cost free.

Schaffer outlined several public services included in his analysis: water, sewer, solid waste collection, solid waste landfill, streets, police protection and fire protection. (Schaffer, 1979) Leistritz and Murdock went one step further and outline a conceptual approach to deal with public cost. This concept, which they call "fiscal analysis", or the analysis of the impacts of resource development on local economies, is easily extended to regional economic development in general.

Two methods are discussed in Leistritz and Murdock's approach for assessing fiscal impact. In one case, public cost is not difficult to estimate, while the other method is more difficult. The two approaches for assessing public cost are the average unit approach and the marginal unit approach.

The average unit approach assumes that per-capita expenditure on basic public services will be constant. It also assumes that for an acceptable level of public service, as population increases, governments have to increase spending on public services. This assumes that existing facilities are presently used to near full capacity. This assumption weakens the average unit approach, however, this approach is easy to calculate, and provides a basis for initial analysis of this concept. Certainly, with time, better approaches to quantify
public cost will be developed.

The data required to calculate the average public cost, or fiscal impact is readily available. State governments publish expenditure data for cities and towns throughout the state. These data were used to calculate expenditures per-capita. To keep the same level of service with an increase in population, means that the municipal government must increase their spending to maintain previous levels of per-capita expenditure. To calculate the public cost associated with development, one multiplies per-capita expenditure by the population increase.

An alternative method is based on marginal costs. It estimates the marginal cost of providing the additional public services required by the new development project. The increase in project area population is multiplied by the marginal cost of providing the service to obtain an estimate of the public cost of the proposed development. This method is much more difficult because estimates of the marginal cost of public services are not readily available. Several government agencies were contacted, and not one estimated the marginal cost of public services. Conceptually, the derivation of marginal, rather then average costs is the better choice since it would take into account excess capacity, but the average cost approach is more realistic since the needed data are more readily available.

The public services included in a calculation of public cost are:

1. Housing
2. Education
3. Medical and mental health
4. Law enforcement
5. Fire protection
6. Water supplies
7. Water treatment
8. Solid waste disposal
9. Transportation
10. Social welfare
11. Libraries
These are basic public services normally provided by local or state governments. Data are not always available for each part of the above list, but most of the data can be found.

Criteria for Fund Allocation

After questions of costs and benefits have been addressed, implementation of a particular development program still depends on the availability of state development assistance. It also depends on public and legislative perceptions of the efficiency of public intervention in primarily private sector activities. More importantly, development program administration shifts from an overall strategy to the actual allocation of development funds for particular projects. For efficient allocation of development monies and appropriate targeting, specific criteria must be developed that will enable each project to be evaluated
consistently.

For development activities that involve public support of private business enterprise, questions arise like the following that will weed out firms that do not require public assistance to become viable.

1. Does the enterprise contribute to the state economic base, and if so, how much? In short, how much of the enterprise's total employment and income is attributed to out-of-state sales?

2. Is the enterprise likely to be viable with public assistance? Is it a "winner"?

3. If the enterprise is not viable, will it become so with public development assistance? Or, conversely, if the enterprise is indeed viable, does it actually need public economic development assistance?

Other criteria may also be considered in selecting eligible candidates for development assistance. If a program is specifically directed to correcting market imperfections by providing technical assistance as well as venture capital to a small business, then some of these questions may not be appropriate, while others may become controlling in project selection. The question of whether or not the firm is potentially viable remains appropriate regardless of the type of business seeking development assistance. New criteria must be devised and new methods tried in order to pick "winners", and not losers, given the changing structure of business ventures.

The Tools of Regional Policy

Adding to the model of governmental intervention in a
regional economy, are four general tools that governments can use in implementing programs aimed at any of the means to achieve increased resource productivity. The tools which may be used in achieving specific objectives, include:

- Tax expenditure
- Regulation
- Promotion
- Taxation

All governments have these tools at their disposal, and each program uses some combination of the above tools. Thus, programs can also be evaluated with reference to their tools. Tax expenditure, for example, is probably used most often. However, use of these tools can also have net negative effects as well. Specifically, when an enterprise acquires public development capital, or grants that it does not need, or if the firm could easily obtain capital from private sources, then the funds are "windfalls". In order that these tools are used most efficiently, criteria for the dispersal of development monies are necessary.

The first tool, taxation policy, can be used to provide preferential tax treatment for facility development. Alternatively, it can be used as a tax policy that discourages unwanted development. A second tool, tax expenditure, includes expenditure on infrastructure development and other forms of spending which may affect resource productivity. It also includes tax concessions to individual businesses for specific
forms of private expenditure. The third tool is regulatory policy. Through zoning laws, industrial development can either be encouraged or discouraged. An example is the issuance of British Industrial Development Certificates, which are used to direct business growth or expansion to government-appointed distressed areas (Regional Industrial Policy, 1984). Enterprise zones are another example of regulatory policy, though enterprise zones are also associated with tax policy. The fourth tool is promotion of a state's comparative advantage. For example, a state with a highly educated workforce may promote itself as attractive to technology-intensive industry.

The next step in this process is to obtain measures of tool use. This can be obtained by monitoring performance indicators, such as, output-per-worker or number of jobs created. This step is particularly difficult if there is not an adequate performance measure available, or if the effects of a program are not easily quantifiable, like some quality of life measures.
Part II

Analysis of the Saturn Incentives

Introduction

General Motors Corporation, in the early part of 1985, announced that it was planning to create a new subsidiary, the Saturn Corporation. Saturn Corporation will build a new generation of automobiles with a low enough cost-per-car to compete directly with Japanese imports. It also announced that they would construct a new, $3 billion, futuristic plant to build these cars. They also indicated that they had not yet determined the plants location. This statement began an unprecedented competition between the states for the Saturn plant. The "second war between the states" had reached a pinnacle, each vying for what some believed was the richest industrial prize of the last several decades. About 30 states joined the fight with tax concessions, grants and other tax benefits as their weapons.

The Saturn plant location competition offers a golden opportunity to examine job creation efforts at their extremes. This chapter will directly apply the benefit-cost model from the first section to the Saturn incentives.

Minnesota took an early lead in the size of the tax concessions to the company--$1.27 billion, plus other forms of financial aid.²

The Department of Energy and Economic Development released its
analysis February 20, 1985, which formed the basis on which the program was judged. DEED's analysis considered only benefits: it did not analyze potential costs of development. This section will attempt to fill the gap.

The first question to be addressed is:

- The benefits of the project must be greater than the cost, and the ratio of these benefits and costs must be greater than the ratio of benefits to costs of any other projects for which state funds are, or can be, used.

This is the only applicable criterion in this case. Since General Motors (G.M.) surely is able to develop the Saturn Corporation without financial assistance, it would immediately fail the non-viability without assistance criterion. The real reason for the assistance is not to help a struggling company, but instead to influence the location decision of a high job creation potential firm. Of course, creating jobs is the main focus of the project. It is not clear that the subsidies will actually influence General Motors decision. The tax breaks are gifts, but the G.M. location decision must consider longrun business development and growth prospects in Minnesota as well as other states. Tax breaks, in such a context, become much less important than fundamental location variables, particularly labor and transportation costs. Since tax considerations eventually run out, the business must locate where it can survive without tax incentives. The location decision must be based, therefore, on largely long-term business concerns, rather than individual state incentives.
Incentives to Saturn

The incentives offered by the state of Minnesota to Saturn are in the form of tax concessions, grants, and other considerations.

State tax and direct expenditures also form a large part of the overall package, and consist of the following:

- The state will grant the company land for the building site in Cottage Grove or Duluth. The Duluth site will not be considered in this study since it is highly unlikely that it will be chosen.
- The state will also develop the site and provide the necessary infrastructure sewer, water, and any additional infrastructure required.
- The state, working with the area Vocational Technical Institutes and the Saturn corporation, will "design, construct, equip, staff, and operate a customized training center for Saturn employees".
- The state, in conjunction with the University of Minnesota, will create and operate a center of Advanced Manufacturing Technologies to meet the advanced manufacturing needs of the Saturn Corporation. The center would fall under the jurisdiction of the University of Minnesota.
- The state will provide relocation expenses to the employees of the Saturn corporation.
- The state would construct and operate a day care service for the employees of the Saturn Corporation.
- Northern States Power would construct a cogeneration power facility at no cost to the Saturn Corporation.

(STATE Summary of Incentives, 1985)

Three different scenarios were calculated for the analysis of the Saturn incentives. The first is based on constant 1986 dollars. In the second scenario, following the model presented in Part I, future benefits and future costs are discounted at a
real cost of money discount rate. In the third scenario, an opportunity cost is calculated. Tables 1 and 2 list tax incentives to the Saturn Corporation in constant and discounted dollars respectively. Tables 3 and 4 list state expenditures for the Saturn Corporation in constant and discounted dollars respectively. The calculations for tables 2 and 4 are found in appendix 3. All tables can be found in appendix 5.

The state proposes to spend about $1.433 billion (table 5) to lure the Saturn plant to the state of Minnesota. In discounted expenditures, the amount is $879 million. There are additional costs associated with this economic development. These are the public costs, and will be discussed in the next section.

Public Cost

Following Leistritz and Murdock, the cost of providing basic public services was determined. The calculation of public cost from the Saturn plant development was carried out using data from individual city expenditures. Five categories were listed:

1. Government
   a. General government
   b. Capital

2. Public Safety
   a. Police: Current
   b. Police: Capital
   c. Fire: Current
   d. Fire: Capital
   e. Other: Current
   f. Other: Capital

3. Streets and Highways
Using the Minnesota State Auditors Report for 1983, on Revenues, Expenditures and Debt of Minnesota Cities, data was obtained for each of these categories. The per capita expenditure figures were calculated.

**Public Cost Calculation**

Employment is projected to increase by a substantial amount. The projections are found in table 6.

Since permanent jobs are the only jobs that will affect long term delivery of public services and public cost, only the jobs created after 1987 are counted in the analysis. Minnesota unemployment is currently very low, about 4.5%, it is therefore expected that these new jobs will increase the population level (Minnesota Department of Economic Security, Feb. 1985). Total population is expected to increase by 14,730 people. Again, only the Cottage Grove site is used for the study since the Duluth site is not realistically feasible.⁴

To determine which areas receive new residents, a circle representing a commuting area was drawn around the proposed
building area, and seven municipalities were within that area. For simplicities sake, only these areas are assumed to gain population from the development. Though this may be unrealistic, it will provide an approximation of the population distribution. The seven municipalities are: Maplewood, South Saint Paul, Cottage Grove, Inver Grove Heights, Oakdale, Woodbury and Lake Elmo. The total population increase, 14,730 new residents, is divided evenly between the seven areas. Each area would receive about 2104 new residents. Government expenditures for the above categories were acquired for each community, along with the population of each community. The average cost method discussed in the first section is the one employed here.

The required result for public cost calculation is a total dollar figure which is necessary for local governments to spend in order to provide additional public facilities and services so that pre-development levels of public service may be maintained. Average per-capita expenditure levels are found by dividing current expenditures by local population level. The average per capita expenditure on the public service is then multiplied by the projected population increase. This gives an estimate of the total increase in public expenditure required to keep the same level of public service brought about by the Saturn development. Tables containing the public cost data used here are found in appendix 4 along with the total public cost figure. The total public expenditure on new public services, as a result of the Saturn development, are estimated to be $2.77 million.
Several problems exist with this method of calculating public cost. This method implicitly assumes that the infrastructure is currently at peak capacity and additional usage would require new facility construction. This may or not be the case in Minnesota. If present infrastructure is not currently used to full capacity, then public cost estimates will error on the side of overestimation. While it is essential to realize the limitation of this method, it should not diminish the importance of public cost calculation.

Overestimation is not always the case. Expenditures on police protection and other public services which require constant outlays must increase with development, if population levels increase, so adequate service levels can be maintained.

There are additional costs external to the above discussion. Costs such as the extra pollution discharged by the plant and increased traffic congestion. These externalities, or indirect costs, are difficult if not impossible to quantify and will not be addressed in this study. Nevertheless, it is important to understand that these costs do exist. They should be considered in the final decision on a project.

Saturn Plant Benefits

The staff of the department of Energy and Economic Development used the REIS model developed by Goerge Treyz which is based on an input output model. This model estimates regional impacts of changes in model variables and projects increased tax
revenue and effects on other industries as a result of the development. The model projects indirect employment, and the associated increase in tax revenue as well. DEED used the 3 billion dollar construction cost of the Saturn plant, and the 6000 jobs created in the manufacturing industry as the driving variables. This resulted in multiplier effects on the economy. The results of the model run has been summarized in table 7. Table 8 has the discounted figures for the increased state income and sales taxes brought about by the development.

DEED forecast several scenarios. The other scenarios are not vastly different from this one, so they will not be presented. One additional problem with this analysis is that jobs created is somewhat of a misleading measure since the 6,000 autoplates jobs would mostly be filled by out-of-state workers, though the effects of their income would be felt in the states economy. Unemployed members of the United Auto Workers have the first chance at the jobs, so the only jobs that will actually be created in the state would be the indirect jobs.

Results of the Analysis

The benefits and costs are calculated two ways. First, no discount rate is used. Second, a discount rate of 4% is used. The discount rate is difficult to determine. Shofield (1976) discusses 6% as a discount rate. Others in the field suggest two rates depending on whether the project is public or private in nature (Sudgen and Wiltran, 1983). Other people have suggested
rates as high as 15%. The rate used in this study, 4%, was meant to avoid the controversy of picking rates. The 4% figure represents a real cost of money. An opportunity cost is better calculated using a rate equal to a long-term United States treasury bill rate of about 9%.

In a third case, an opportunity cost is calculated and included in the other cost figures to illustrate the cost of removing private sector money to fund development. It seems reasonable, in this case, to only consider only the actual direct costs and direct benefits of the project.

The total benefits of the project are then the jobs created by the project, and the additional tax revenue generated by the increased working population. The time span of the incentives is thirty years, so the additional tax revenue generated must be calculated over that time span. The first step is to compute the increased tax revenues. All the tables can be found in Appendix 5.

Increased tax revenue: From table 7, the sum total of the increased tax revenue over thirty years, using no discount rate, is $820.90,

\[
\text{Increased tax revenue: } \$592 + \$228.9 = \$820.9 \text{ million.}
\]

From table 8, the sum total of increased tax revenue over thirty years using a 4% discount rate is $495.6,
Discounted tax revenue: \( \$357.9 + \$137.7 = \$495.6 \text{ million}. \)

Since thirty years is the length of time that the tax incentives have to run, the cost of the tax incentives should be paid back through the increased tax revenue by that time.

Case 1. In the first case, the non-discounted case from table 1 and 3, the results are:

Total cost, include state cost and public cost,

\( \$2.77 + \$1433.0 = \$1.435 \text{ billion}. \)

Total benefits from increased tax revenue from the Saturn development over thirty years:

\( \$820.9 \text{ million}. \)

Thus, total costs are much greater than total benefits.

In addition, \$820.9 million over thirty years yields \$27 million/year. \$1435 million/\$27 million/year = 53 years. It would take about 53 years for the benefits of the development to exceed the costs without discounting.

Case 2. In the second case, at a 4% discount rate from tables 2
and 4, the results are:

Total expenditures - 4% discount rate equals:

$879 + $2.77 public cost = $882 million.

Total tax revenue due to Saturn development discounted over thirty years from table 8:

$495.6 million.

Again, total costs are greater than total benefits. Also, $495.6 million over thirty years yields $16.52 million/year. $879 million/$16.52 million/year = 53 years. It would take 53 years for the benefits of the development to pay back the cost using a discount rate of 4%. This means that there is no net return on the state's investment in the Saturn Corporation for fifty three years.

Case 3. In the third case, the 4% discount rate is used along with the opportunity cost.

Using the procedure discussed in section 2, the opportunity cost is calculated. The investment formula is:

\[ \text{It} = \text{Io}(1+r^*)^t \]

The interest rate \( r^* \) is 9%, the approximate interest rate of a long term treasury bill. The time horizon is thirty years, the same as the tax benefits the Saturn plant would receive. The
up-front capital costs are an investment that could have been invested elsewhere. The costs involved here are: grant of the site, infrastructure development, the plant training center construction cost and the U of M center construction cost. The results are in table 9.

In this third case, total cost including opportunity cost equals:

$882 + $854.66 = $1736.66 million.

Total tax revenue due to the development from table 8:

$495.6 million.

Again, $495.6 million over thirty years yeilds $16.52 million per year. Now with opportunity cost,

$1736.66/ $16.52 million per year = 105 years.

The pay back period would be 105 years. This essentially says that the Saturn development would never pay back the states investment, and the state would be subsidizing Saturn for essentially the life of their plant.

An additional concern also must be raised. That is, there
are no guarantees that the plant will stay open for that long. There is no certainty that the plant will even stay operating for thirty years. Also, in thirty years time, or longer, we cannot even be certain of the role of the automobile in society. According to Lester Brown, head of the World Watch Institute, petroleum production has begun to decline. As supplies of petroleum dwindle, production will probably keep declining (Brown, 1981).

Conclusions

Minnesota was not taken up on its offer to the Saturn Corporation. The exact reasons are unknown, however, the state chosen, Tennessee, has distinct advantages such as better market position, and lower labor cost. If the state would have given Saturn these subsidies, it would not have been using development monies in an efficient manner. As is apparent in the above analysis, the state stood to gain little from the investment, and the Minnesota economy could actually be adversely affected by the removal of the monies from the private sector. The development money could be used in other, more efficient ways.
Appendix 1

Shift-Share

Shift-Share is a simple accounting identity, useful for projecting economic trends and in explaining change in certain variables under examination. It has had many critics, in fact, the procedure should not be used for long range forecasting in the opinion of this author, since the "ceterus paribus" assumption cannot be held assured. One could get two completely different results depending on which side of the business cycle one was on. If the economy was contracting, one would get a much lower forecast then if the projections were made based on expansionary data. One way to overcome this problem is to recompute the \((1+A+B+C)\) coefficient at each new time period. Thus, if long range projections are required, then one may be disappointed in the results of Shift-Share. Several other criticisms are dicussed at length in Fothergill's paper, "In Defense of Shift-Share" (1979), and won't be dicussed here. For the purposes of this study, Shift-Share will be used as a procedure for explaining change.

One can track changes in economic variables like income and employment, by seperating the year to year changes into three components. The first is the national employment effect, the change in the overall national employment level. The second is the industry mix effect. It shows how a specific industry, at the national level, changed in relation to the change in overall
employment at the national level. The third component is the regional share effect. This disseminates the change in the level of industry specific regional employment, compared to the industry specific national level of employment. A negative number would indicate that the regional industry did not grow as fast as that industry at the national level, or it did not grow at all and maybe even declined.

**Illustration of the Procedure**

An illustration of the shift-share model is:

\[
emp_i(t+1) = emp_i(t)(1+A+B+C)
\]

where

\[
emp_i(t+1) = \text{regional employment in the } i^{\text{th}} \text{ industry at time } (t+1)
\]

\[
emp_i(t) = \text{regional employment in the } i^{\text{th}} \text{ industry at time } (t)
\]

The multiplier is \((1+A+B+C)\)

where

\[
A = \left(\frac{EMP(t+1)}{EMP(t)}\right) - 1
\]

\[
B = \left(\frac{EMP_i(t+1)}{EMP_i(t)}\right) - \left(\frac{EMP(t+1)}{EMP(t)}\right)
\]
\[ C = \frac{\text{emp}_i(t+1)}{\text{emp}_i(t)} - \frac{\text{EMP}_i(t+1)}{\text{EMP}_i(t)} \]

where

\[ \text{EMP}_N(t+1) = \text{national employment in all industry at time } (t+1). \]

\[ \text{EMP}_N(t) = \text{national employment in all industry at time } (t). \]

\[ \text{EMP}_i(t+1) = \text{national employment in the } i^{th} \text{ industry at time } (t+1). \]

\[ \text{EMP}_i(t) = \text{national employment in the } i^{th} \text{ industry at time } (t). \]

The regional share effect can be partitioned further into a residentiary effect and a basic effect using location quotients. This has a basis in Economic Base theory which will be discussed in appendix 2. Economic Base theory says simply that export producing industries cause a multiplier effect on several economic indicators, specifically, employment in the non basic or basic sectors of the economy. Thus the basic activities in an economy are defined to be activities which produce for sale in out-of-state or region markets.
Locations Quotients and the C Effect

The location quotient calculates the share of economic activity in employment or income a region exhibits, compared to the rest of the nation. The equation for the location quotient is:

\[
\text{lqi} = \frac{\text{empi}}{\text{empr}} \frac{\text{EMPi}}{\text{EMPN}}
\]

\(\text{emp}_r\) = total employment in the region.

One can then partition the regional share effect, \(C\), into the residentiary and differential or basic effects.

\(\text{rempi}\) = residentiary effect.

\(\text{dempi}\) = differential effect.

\[
\text{rempi} = \frac{\text{empi}}{\text{lqi}}.
\]

\[
\text{dempi} = \text{empi}(1-1/\text{lqi}).
\]

The residentiary effect is "the employment found in the ith industry in the region if the distribution of industrial employment were the same in the region as the nation" (Maki, 1982). The basic employment is the total employment minus the residentiary employment. The basic effects are the effects of business out-of-state sales. The partitioning of the regional share effect eliminates the instability of the regional share effect caused by its lack of independence from the industrial mix effect. The basic employment effect is then either positive or negative. If the basic component is positive then the industry
is a net exporter, and therefore is a basic industry. If it is negative, then the region is a net importer in this industry.

The partitioning of the regional share effect would give an estimation of the amount of basic employment in an industry. If one ascribes to Economic Base theory then basic employment creation is what one is interested in since residentiary employment will be created through the multiplier effect.

This is not to say that non-basic jobs are not important, they are. There are other methods to aid industry then funneling grants and subsidies. These small non-basic firms generally face financial constraints because of capital market imperfections and their high risk of failure. Up to 70 percent of small businesses fail the within the first year. Thus, some form of government intervention in the capital market is necessary. A national development bank such as the one proposed by Daniels and Kieschnick in 1979 would assist in doing this. Part of their proposal would provide venture capital and small loans to small non-basic enterprise. The Small Business Administration also performs this function. This should be done on a limited scale since this type of assistance does place other enterprise who did not get a SBA loan or other help, at a competitive disadvantage.

The Shift-Share procedure is an adequate tool when used to explain year to year change in certain variables. However, due to its simplistic assumptions, it should not be used for long range forecasting. Short range forecasting is acceptable, but the coefficient, \((1+A+B+C)\), should be recalculated each period.
Appendix 2

Economic Base Theory

Economic base theory says, in short, that certain industries in a region provide a vehicle for economic growth the region experiences. The economic base of a region is "defined as its export-producing activity in both location quotient and economic base approaches to regional employment and income forecasting" (Maki, 1982). Out-of-state sales by firms generate income in a region through the multiplier effect. A region's economic base can be determined with a community economic base survey (Teibout, 1962). The survey "identifies the key economic activities of the community" (Teibout, 1962).

An economic base study examines income flows between regions, and the rest-of-U.S., using export sales as a basis for comparison. Income flows are a result of direct and indirect sales to an export market. Direct sales are those in which a product, either intermediate or final, is sold directly to an out-of-region purchaser. Indirect sales are those in which a product is sold to an in-region purchaser, and is subsequently resold, or used in a manufacturing process, and then sold to an out-of-region purchaser.

Several sectors constitute an economic base. Household, business, and government sectors are predominant. The sectors are set up in a table form, with multiplier coefficients in the matrix cells.
Multipliers are derived from the survey data. The multipliers are demand multipliers and are of the Keynesian form:

$$\Delta Y = M(\Delta X).$$

Where

- $\Delta Y =$ change in total income
- $\Delta X =$ change in basic income
- $M =$ income multiplier.

The multiplier is

$$M = \frac{1}{1 - \sum p_i c_i}$$

Where

- $p_i =$ total income spent for the $i$-th item.
- $c_i =$ total income created per dollar of total sales of the $i$-th item. According to Maki:

The income multiplier focuses on the demand side of regional growth and change. Use of the individual spending propensities to derive the multiplier is qualified, however, by a supply-related coefficient (i.e., the amount of local income created per dollar of total sales).

(Maki, 1982)

Through the multipliers, any income a region derives from outside sources increases individual incomes in the region. Thus, an increase in export sales will increase regional income by the amount increased times the multiplier, $M$.

Economic base theory implies policy options for governments. A government interested in economic growth should attract export producing firms to increase local incomes, and tax base.
Appendix 3

All figures are in millions of dollars.

The calculations for table 2 are:

Property tax Abatements-

\[
\frac{2.5}{(1+.04)} + \frac{2.5}{(1+.04)^2} + \frac{6.5}{(1+.04)^3} + \frac{6.5}{(1+.04)^4} + \ldots + \frac{6.4}{(1+.04)^{30}}
\]

= $103.49

Additions to the Property Tax-

\[
\frac{15.1}{(1+.04)^3} + \frac{15.1}{(1+.04)^4} + \ldots + \frac{15.1}{(1+.04)^{30}}
\]

= $232.63

Sales Tax Abatement -

\[
\frac{3.6}{(1+.04)^1} + \frac{3.6}{(1+.04)^2} + \ldots + \frac{3.6}{(1+.04)^{30}}
\]

= $62.25
Corporate Income Tax Abatement -

\[
\frac{4.0}{(1+.04)^1} + \frac{4.0}{(1+.04)^2} + \ldots + \frac{4.0}{(1+.04)^{30}}
\]

= $69.17

The calculations for table 4 are:

Grant of Site -

\[
\frac{13.0}{(1+.04)} = $12.5
\]

Infrastructure Development -

\[
\frac{17.0}{(1+.04)} = $16.35
\]

Initial Construction of the Training Center -

\[
\frac{20.0}{(1+.04)} = $19.23
\]
Operation of the Training Center:

\[ \frac{11.1}{(1+.04)^3} + \frac{11.1}{(1+.04)^4} + \ldots + \frac{11.1}{(1+.04)^{29}} \]

= $166.75

Training Costs:

\[ \frac{18.0}{(1+.04)^2} = 16.64 \]

U of M Center -

Construction:

\[ \frac{17.0}{1+.04} = 16.34 \]

Operation:

\[ \frac{3.0}{(1+.04)^3} + \frac{3.0}{(1+.04)^4} + \ldots + \frac{3.0}{(1+.04)^{30}} = 46.22 \]
Other-
Relocation Expenses-
\[
\frac{4.0}{(1+.04)} + \frac{3.0}{(1+.04)^2} = $6.62
\]

Additional Relocational
\[
\frac{6.0}{(1+.04)^2} = $5.55
\]

Subsidized Mortgages and Relocation-
\[
\frac{4.5}{(1+.04)} = $4.33
\]

Day Care Center-
\[
\frac{1.0}{(1+.04)} = $.96
\]

Cogeneration Heat Facility-
\[
\frac{100.0}{(1+.04)} = $96.15
\]
Calculations for Table 9.

Grant of Site:  \[ I_t = 12.5(1 + .09)^{30} \]
               \[ I_t = 165.8 \]

Infrastructure Development:  \[ I_t = 16.35(1 + .09)^{30} \]
                                \[ I_t = 216.93 \]

Initial Construction Cost:  \[ I_t = 19.23(1 + .09)^{30} \]
                               \[ I_t = 255.14 \]

U of M Center Construction Cost:  \[ I_t = 16.34(1 + .09)^{30} \]
                                    \[ I_t = 216.79 \]
### PUBLIC EXPENDITURES 1983

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<tr>
<th>CITY</th>
<th>MAPLEWOOD</th>
<th>SOUTH ST. PAUL</th>
<th>COTTAGE GROVE</th>
<th>INVERGROVE</th>
<th>OAKDALE</th>
<th>WOODBURY</th>
<th>LAKE ELMO</th>
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<td>20880</td>
<td>20120</td>
<td>17920</td>
<td>13000</td>
<td>11660</td>
<td>5660</td>
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1. **GENERAL GOVERNMENT**
   - A. $692223.00
   - B. $6618.00

2. **PUBLIC SAFETY**
   - A. POLICE: CURRENT $1851836.00
   - B. POLICE: CAPITAL $166925.00
   - C. FIRE: CURRENT $899008.00
   - D. FIRE: CAPITAL $2815.00
   - E. OTHER: CURRENT $116770.00
   - F. OTHER: CAPITAL $3531.00

3. **STREETS AND HIGHWAYS**
   - A. CONSTRUCTION $1984431.00
   - B. CAPITAL $1514.00
   - C. MAINTENANCE $825696.00
   - D. LIGHTING $89474.00

4. **SANATION**
   - A. CURRENT $0.00
   - B. CAPITAL $0.00

5. **RECREATION**
   - A. PARKS: CURRENT $443530.00
   - B. PARKS: CAPITAL $352589.00

**TOTAL**
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<th>MAPLEWOOD</th>
<th>SOUTH ST PAUL</th>
<th>COTTAGE GROVE</th>
<th>INVERGROVE HEIGHTS</th>
<th>OAKDALE</th>
<th>WOODBURY</th>
<th>LAKE ELMO</th>
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<td>20880</td>
<td>20120</td>
<td>17920</td>
<td>13000</td>
<td>11660</td>
<td>5660</td>
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### Projected Increase in 1983 Government Expenditures

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<th>City</th>
<th>Maplewood</th>
<th>South St. Paul</th>
<th>Cottage Grove</th>
<th>Invergrove Heights</th>
<th>Oakdale</th>
<th>Woodbury</th>
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<td>$2861.44</td>
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<tr>
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<td>$5028.56</td>
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<td>$0.00</td>
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<td>$0.00</td>
<td>$0.00</td>
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<td>5. Recreation</td>
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<td>A. Parks: Current</td>
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<td>$35263.04</td>
<td>$3324.32</td>
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<td>$10099.20</td>
<td>$33369.44</td>
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<td>$548092.00</td>
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Appendix 5
Table 1. **Financial Incentives to the Saturn Corporation 1986-2016.**

**Constant 1985 dollars (1). Millions of Dollars.**

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Tax Abatement</td>
<td>$2.5</td>
<td>$2.5</td>
<td>$6.5</td>
<td>$6.5</td>
<td>$6.4 x 26 years</td>
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<td>Additions to Property Tax</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$15.1</td>
<td>$15.1</td>
<td>$15.1 x 26 years</td>
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<td><strong>Total</strong></td>
<td>$2.5</td>
<td>$2.5</td>
<td>$21.6</td>
<td>$21.6</td>
<td>$559.0</td>
<td>$607.2</td>
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<tr>
<td>Sales Tax Abatement (2)</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$108.0</td>
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<tr>
<td>Corporate Income Tax Abatement (3)</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td>$5.0</td>
<td>$5.0</td>
<td>$21.6</td>
<td>$21.6</td>
<td>$559.0</td>
<td>$835.2</td>
</tr>
</tbody>
</table>

1. **Source:** Department of Energy and Economic Development.
2. Estimated 60 millions dollars in state transactions x 0.06 = 3.6 million dollars per year. 3.6 x 30 years = 108 million.
3. 4.0 million dollars per year x 30 years.
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Property Tax Abatement</td>
<td>$2.4</td>
<td>$2.3</td>
<td>$5.78</td>
<td>$5.55</td>
<td>$87.46</td>
<td>$103.49</td>
</tr>
<tr>
<td>Additions to Property Tax</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$13.42</td>
<td>$12.90</td>
<td>$206.31</td>
<td>$232.63</td>
</tr>
<tr>
<td>Total</td>
<td>$2.4</td>
<td>$2.3</td>
<td>$19.2</td>
<td>$18.45</td>
<td>$293.77</td>
<td>$336.12</td>
</tr>
</tbody>
</table>

| Sales Tax Abatement (3)  | $3.46| $3.33| $3.2  | $3.07| $49.19    | $62.17|
| Corporate Income Tax Abatement (4)| $3.8 | $3.7 | $3.56 | $3.42| $54.68    | $69.17|
| Grand Total              | $9.66| $9.33| $25.96| $24.94| $397.64   | $467.54|

2. The discount rate used is the real rate of interest.
3. Estimated 60 million dollars in state transactions x 0.06 = 3.6 million dollars per year.
4. 4.0 million dollars per year.
Table 3. **Financial Incentives to the Saturn Corporation 1986-2016.**  
Constant 1985 dollars (1). Millions of Dollars.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant of site</td>
<td>$13.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$13.0</td>
</tr>
<tr>
<td>Infrastructure Development</td>
<td>$17.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$17.0</td>
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<tr>
<td><strong>Training Center:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Construction Cost</td>
<td>$20.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
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<tr>
<td>Operation of Center</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$11.1</td>
<td>$11.1</td>
<td>$11.1 x 26 years</td>
<td>$310.8</td>
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<td>Training Costs (2)</td>
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<td>$0.0</td>
<td>$18.0</td>
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<tr>
<td><strong>U of M Center:</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
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<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$17.0</td>
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<tr>
<td>Operation (3)</td>
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<td>$0.0</td>
<td>$3.0</td>
<td>$3.0</td>
<td>$3.0 x 26 years</td>
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</tr>
<tr>
<td><strong>Misc.</strong></td>
<td></td>
<td></td>
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<tr>
<td>Relocation</td>
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</tr>
<tr>
<td>Relocation</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>$0.0</td>
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</tr>
<tr>
<td>Relocation</td>
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<td></td>
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</tr>
<tr>
<td>Day Care</td>
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<tr>
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<td>$0.0</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Heat Facility</td>
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<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
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</tbody>
</table>

**Grand Total** $176.5 $27.0 $14.1 $14.1 $366.6 $598.3

1. Source: Department of Energy and Economic Development
2. Cost for each employee to attend training session, up to $3000 per employee. 6000 x 3000 = 18 million.
3. $3.0 million per year operating cost.
4. Data for cost of operation past 1986 was not available.
Table 4. Financial Incentives to the Saturn Corporation 1986-2016.  
Discounted at 4% (1) (2). Millions of Dollars.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant of Site</td>
<td>$12.5</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$12.5</td>
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<tr>
<td>Infrastructure Development</td>
<td>$16.35</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$16.35</td>
</tr>
<tr>
<td>Training Center:</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Initial Construction Cost</td>
<td>$19.23</td>
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<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$19.23</td>
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<tr>
<td>Operation of Center (3)</td>
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<td>$0.0</td>
<td>$9.87</td>
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<td>$171.01</td>
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<td>Training Costs (4)</td>
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<td>$16.64</td>
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<td>$0.0</td>
<td>$16.64</td>
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<td>U of M Center:</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Construction</td>
<td>$16.34</td>
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<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$16.34</td>
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<td>Operation (5)</td>
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<td>$2.67</td>
<td>$2.56</td>
<td>$40.99</td>
<td>$46.22</td>
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<td>$0.0</td>
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<td>$0.0</td>
<td>$5.55</td>
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<td>Subsidized Mortgages and Relocation</td>
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<td>$0.0</td>
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<tr>
<td>Day Care</td>
<td>$96</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$96</td>
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<tr>
<td>Cogeneration Facility (6)</td>
<td>$96.15</td>
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<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$96.15</td>
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<tr>
<td>Heat Facility</td>
<td>$12.54</td>
<td>$12.54</td>
<td>$12.04</td>
<td>$12.04</td>
<td>$12.04</td>
<td>$12.04</td>
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<td>Facility</td>
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<td>$169.71</td>
<td>$169.71</td>
<td>$169.71</td>
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<tr>
<td>Grand Total</td>
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<td>$192.65</td>
<td>$192.65</td>
<td>$192.65</td>
<td>$192.65</td>
<td>$192.65</td>
</tr>
</tbody>
</table>

2. The discount rate, 11%, is the real rate of discount.
3. Operation costs are estimated at 11.1 million dollars per year.
4. Cost for each employee to attend training session, up to $3000.
5. 3.0 Million per year operating cost.
6. Data for cost of operation past 1986 was not available.
Table 5.
Total Financial Incentives to the Saturn Corporation 1986-2016 From Tables 14-17. (1).

<table>
<thead>
<tr>
<th>Incentive</th>
<th>Total $ Millions.</th>
<th>Total $ Millions. (2).</th>
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<tbody>
<tr>
<td>Tax Abatements</td>
<td>$835.00</td>
<td>$467.54</td>
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<tr>
<td>State Expenditures</td>
<td>$598.30</td>
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<tr>
<td>Total</td>
<td>$1433.30</td>
<td>$879.44</td>
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</table>

1. Source DEED
2. Discounted at 4%

Table 6. Employment Projections (1)

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Employment</th>
<th>Indirect Employment</th>
<th>Total Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>13,769</td>
<td>15,582</td>
<td>29,351</td>
</tr>
<tr>
<td>1987</td>
<td>16,178</td>
<td>18,734</td>
<td>34,912</td>
</tr>
<tr>
<td>1988-2016 (2)</td>
<td>6,000</td>
<td>8,730</td>
<td>14,739</td>
</tr>
</tbody>
</table>

1. Source: DEED Projections.
2. 6,000 total jobs for 1988-2016.
Table 7.

Economic Effects of the Saturn Project on the Minnesota Economy (1). Millions of Dollars.

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Jobs Created</th>
<th>Indirect Jobs Created</th>
<th>Personal Income</th>
<th>State Income Tax</th>
<th>State Sales Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>13,769</td>
<td>15,582</td>
<td>$744.0</td>
<td>$43.0</td>
<td>$13.4</td>
</tr>
<tr>
<td>1987</td>
<td>16,178</td>
<td>18,734</td>
<td>$926.0</td>
<td>$42.0</td>
<td>$16.7</td>
</tr>
<tr>
<td>1988</td>
<td>6,000</td>
<td>8,730</td>
<td>$393.0</td>
<td>$18.0</td>
<td>$7.1</td>
</tr>
<tr>
<td>1989-2016</td>
<td></td>
<td></td>
<td></td>
<td>$489.0</td>
<td>$191.7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>$592.0</td>
<td>$228.9</td>
</tr>
</tbody>
</table>

1. Source: DEED.

Table 8.

State Income and Sales Tax Discounted at 4%. (1)

<table>
<thead>
<tr>
<th>Year</th>
<th>State Income Tax</th>
<th>State Sales Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>$41.35</td>
<td>$12.88</td>
</tr>
<tr>
<td>1987</td>
<td>$38.8</td>
<td>$15.4</td>
</tr>
<tr>
<td>1988-2016</td>
<td>$277.8</td>
<td>$109.4</td>
</tr>
<tr>
<td>Total</td>
<td>$357.9</td>
<td>$137.7</td>
</tr>
</tbody>
</table>

1. Source: DEED
### Table 9. (Millions of dollars) 1.

<table>
<thead>
<tr>
<th>Project</th>
<th>Capital Cost</th>
<th>It</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant of Site</td>
<td>$12.5</td>
<td>$165.8</td>
</tr>
<tr>
<td>Infrastructure Development</td>
<td>$16.35</td>
<td>$216.93</td>
</tr>
<tr>
<td>Initial Construction Cost</td>
<td>$19.23</td>
<td>$255.14</td>
</tr>
<tr>
<td>U of M Center Construction Cost</td>
<td>$16.34</td>
<td>$216.79</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$64.42</strong></td>
<td><strong>$854.66</strong></td>
</tr>
</tbody>
</table>

1. Capital cost are from table 4.
Footnotes

1. For a complete discussion of the definition of a region, see Hoover, 1975, chapter 7.

2. The final package approved by congress was of slightly less value than the original proposal, but it is essentially the same as the original proposal thus the original proposal will be the base of the analysis.

3. DEED is not at fault in not analyzing the costs, they simply were asked to analyze the positive impacts of the development.

4. Certain criteria were needed for the Saturn plant, and Duluth did not fit the criteria.

5. Discussion with DEED staff.
Bibliography


Committee of Public Accounts, Regional Industrial Incentives, Department of Trade and Industry, Welsh Office, 1984.


Fonkert, J.H., (1976): "Regional Development Patterns in Minnesota: A Discussion of Growth Center Strategies in South Western Minnesota," School of Public Affairs, University of Minnesota, MN.


*Intergovernmental Perspectives*. Spring 1982 Vol. 8, No. 2.


