

USING FEDERAL TAX POLICY TO
INFLUENCE FIRM LOCATIONS:
TWO EXAMPLES OF THE IMPACT ON
KANSAS COMMUNITIES

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Table of Contents

Motivation for Research	iii
Executive Summary	iv
Part 1: Introduction	1
Part 2: Tax Incentives Affecting Puerto Rico	6
Part 3: Costs of Production, Kansas and Puerto Rico	15
Part 4: A Broader Look at Tax Incentives	28

Motivation for Research

Hays, Kansas faces a problem which is unfortunately common for rural Kansas communities. One of the city's major employers, a pharmaceutical firm, has relocated. During their efforts to attract another pharmaceutical firm to Hays, city leaders have frequently been told that Puerto Rico is a preferred plant location . Pharmaceutical firms cite federal tax policies as a major reason for their locational decisions.

The difficulties which Hays has encountered in attracting another major employer have led the city to contract research on two related topics. First, the city has requested that the Institute for Public Policy and Business Research investigate the tax preferences given to U.S. firms which establish affiliates in Puerto Rico, and the extent to which such tax policies erode the competitive positions of cities such as Hays. The results of the research appear as Part 2 and Part 3 of this report. Second, the city has asked whether federal tax incentives for firms locating in rural communities would significantly increase investment and employment in rural areas. In Part 4 of this report, the costs and benefits of a tax incentive program for rural communities are estimated and assessed.

The city of Hays, Kansas, has provided the major financial support for this research project. Supplementary resources have been provided by the Institute for Public Policy and Business Research at the University of Kansas.

Executive Summary

This report arose from a request for research from the city of Hays, Kansas. City leaders discovered that federal tax incentives affecting U.S. firms operating in Puerto Rico inhibited the ability of Hays to attract new pharmaceutical firms. The city requested a report which would detail the specific tax laws affecting firms which choose Puerto Rican locations and analyze the impact of these tax laws on the ability of Kansas communities to compete. Additionally, the City of Hays wanted to look at broader questions concerning tax incentives. If tax policy had stimulated Puerto Rican development, could similar policies help to revitalize rural communities in the U.S.? If so, what would be the impact of such policies on the federal budget? The following report addresses both the specific issues concerning Puerto Rico and the broader questions of tax incentives for rural communities. The major conclusions of the study are summarized below.

The findings of the first half of the study confirm that the tax treatment of Puerto Rico affects the ability of Kansas locations to compete for particular industries, especially pharmaceuticals and medical instruments and supplies. More specific findings include

* A growing controversy has surrounded the use of tax incentives to attract industries to alternative locations. While the evidence on the effectiveness of state and local tax incentives is mixed, a clear example, that of Puerto Rico, indicates that firms respond to strong tax incentives initiated at the federal level.

* Federal tax law allows qualified Puerto Rican affiliates of U.S. firms to bring a substantial amount of profits into the U.S. without further tax liability.

* The tax treatment of U.S. firms operating in Puerto Rico has been particularly favorable to firms which earn large amounts of income from

intangible assets such as patents and formulas, for example, pharmaceutical firms.

* For 1982, Puerto Rican affiliates of U.S. pharmaceutical firms derived tax benefits amounting to \$69,200 per employee. Affiliates of firms producing scientific and medical instruments derived tax benefits of \$16,545 per employee.

* In the absence of tax credits, rural Kansas communities would have a cost advantage over Puerto Rico of about \$1700 per ton of pharmaceuticals and about \$2000 per ton of medical instruments.

* After accounting for the tax advantages of Puerto Rican locations, Kansas communities are at a cost disadvantage of about \$5900 for pharmaceuticals and \$3800 for medical instruments.

The second half of the study designs a federal investment tax credit for firms which undertake new or expansion investment in rural areas. The conclusions of the study are that investment tax credits would stimulate the growth of jobs and output in rural areas. However, most of the job growth would be shifted from areas not qualifying for the tax credit; the costs of such a program would be paid primarily by urban areas. More specifically,

* A 20 percent investment tax credit would result directly in about 19,000 new jobs in rural Kansas over a ten year period. The indirect effects of the tax credit could create as many as an additional 19,000 jobs.

* The investment tax credit would bring about 35 new firms to Kansas each year for a total of about \$17.5 million in new investment each year.

* Each new job created by the investment tax credit would cost the U.S. Treasury about \$3,500.

* A major reason for the high cost of investment tax credits is that all new investment in the qualified locations qualifies for the credits. It is not possible to target the credits to only those firms whose decisions are actually influenced by the tax policy.

* The costs of the investment tax credits are in part offset by the benefits of preserving rural communities and of avoiding large scale migration from rural areas.

Part 1. Introduction.

A. Focus of the Study

The purpose of this study is twofold. The first part of the study is quite narrow in focus. During their attempts to attract firms to Hays, Kansas, community leaders learned that many of the types of firms they had tried to bring to Hays were choosing locations in Puerto Rico. This led to an inquiry on the part of community leaders into the factors that make Puerto Rico an attractive location. The first half of the study examines the advantages that Puerto Rico enjoys under U.S. tax law. More broadly, the first half of the study looks at Puerto Rico as an example of export based growth. The study further develops a methodology for determining the costs of production at alternative plant locations (for example, Kansas or Puerto Rico). Communities could use this framework to help target the types of industries they try to attract.

The second half of the study moves beyond the special case of Puerto Rico and asks whether financial incentives, particularly at the federal level, could aid rural areas such as Hays in their attempts to revitalize their economies. The study examines tax policies using a cost benefit approach and asks whether tax incentives are a cost effective means of achieving rural development.

B. Overview of Rural Development

Rural communities in Kansas and other states have faced an unfortunately large array of problems in the 1980s. Underlying economic forces such as the decline of agriculture, low prices in oil, gas, and other

energy-related industries, and the shift of the U.S. economy away from manufacturing toward service industries have left many rural residents with little choice but to migrate to urban and suburban communities. In an attempt to preserve and create jobs within their localities, rural community leaders have increased their efforts to stimulate economic development.

Regional economic development is a cooperative effort of community leaders, representatives of government from various levels, and private firms to stimulate growth in income and employment within a locality, state, or even a small country. It involves efforts to attract and retain firms, to increase the utilization rate of regional resources such as land and labor, and to improve the productivity of human resources through training and education. Successful economic development increases the amount of value added within a community, that is, the amount of income of all forms (wages, profits, and rent) which is earned by community residents.

C. How Do Regional Economies Grow?

Economists recognize two major sources of economic growth which help to explain the development of regional economies and of small national economies. Export oriented growth occurs when a region increases the amount of goods and services it is able to sell outside the region. The source of new exports could be a local firm, or an outside firm which has been attracted to the region. In either case, the production of the new exports creates employment and income. The new export earnings circulate within the region and further stimulate employment in firms serving the local community. The total result of this process is referred to as a multiplier effect. Results from the Kansas Long Term Model, a project of the Institute

for Public Policy and Business Research, indicate that each dollar of Kansas exports (to other states or to foreign countries) stimulates approximately one additional dollar of output within Kansas. Hence the multiplier for changes in Kansas exports is approximately 2, although it varies according to the type of export. Multipliers for value added are smaller than those for total output. The multipliers for value added generated by each additional dollar of Kansas exports vary between \$.60 for automobiles and \$1.50 for services.

Import substituting growth occurs when a region produces goods to replace goods which were previously imported. When the production of these goods takes place locally, new jobs are created within the community. Again, some of the earnings from these jobs recirculate inside the community to further stimulate employment. Possibilities for import substitution are more limited than those for export promotion. The number of consumers in a regional economy is generally not large enough to justify production of most manufactured consumer items on a local basis. Consumers will continue to buy items such as televisions and automobiles from large manufacturing firms which are usually located outside their home communities. On the other hand, significant opportunities may exist for input suppliers to set up local manufacturing enterprises in order to serve local users. For example, a parts manufacturer may establish itself near where airplanes are being produced.

As the above discussion indicates, regional economic growth in a free market economy depends critically on the decisions of firms to locate, invest, and expand. A discussion of the factors influencing firm locations provides a framework upon which policy suggestions can be made.

C. Factors Influencing Firm Location

The factors which influence firm location are complex and multifaceted. Table 1 lists some of the considerations which a firm manager must take into account in deciding whether to locate or expand at a particular site. Most of these considerations apply equally well to decisions about U.S. locations and about foreign locations.

For each general category in Table 1, it is possible to design policies which would make a region, state, or community more attractive as a firm site. While the concentration of this study will be on tax structures, this is not intended to diminish the importance of the role of government in other development activities.

Table 1. Factors Influencing Firm Location

- I. Market Factors.
 - A. What are the costs of distribution to present markets from the location under consideration?
 - B. What are the possibilities of establishing new markets served by the new plant site?
- II. Resource Factors.
 - A. At what cost can necessary supplies be delivered to the potential plant site?
 - B. Can suppliers be established near the plant site?
 - C. Is financing for the proposed investment available, and if so, at what cost?
 - D. What is the cost of energy?
- III. Labor Factors.
 - A. What are the prevailing wages for various occupations in the area?
 - B. At what wage can new employees be hired? (this may differ from the prevailing wage)
 - C. Does the labor force have a positive attitude toward productivity?
 - D. What are the skills available in the local labor force?
 - E. What is the attitude toward unions?
- IV. Site Factors.
 - A. What are construction costs at the proposed site, including necessary improvements?
 - B. What types of regulations does the state or local government impose on producers?
 - C. What kind of service from utilities is available?
 - D. Will the local government bear some of the cost of site improvements? (roads, sewers, etc.)
- V. Governmental Factors.
 - A. What is the structure of state and local taxes, both on income and on property?
 - B. What kinds of state and local tax incentives are available?
 - C. What types of state and local programs other than tax incentives are available to encourage business?
 - D. Are there any special federal benefits available at this site?
 - E. What kinds and quality of public services are provided?
- VI. Quality of Life Factors.
 - A. What quality of education is available?
 - B. What cultural and recreational opportunities are nearby?
 - C. What is the climate like?
 - D. Is the community safe and attractive?

Source: Many of these factors are discussed in Roger Schmenner, Making Business Location Decisions

Part 2. Tax Incentives Affecting Puerto Rico

A growing controversy has surrounded the use of tax incentives by state and local governments to attract industries. Some of the elements of this controversy are discussed in Part 3 of this study. While the evidence on the effectiveness of state and local tax incentives is mixed, a clear example, that of Puerto Rico, indicates that firms respond to strong tax incentives initiated at the federal level. A summary and assessment of the tax treatment of U.S. based firms operating in Puerto Rico follows in this part of the report.

A. Summary of Tax Treatment of Puerto Rico

The Commonwealth of Puerto Rico has legal status as a possession of the United States. As such, it is entitled to its own system of taxation. The tax laws of Puerto Rico are similar to U.S. tax laws, providing graduated tax rates for corporations and individuals. While Puerto Rico is not directly subject to U.S. income tax laws, the U.S. and Puerto Rico have cooperatively made provisions affecting affiliates of U.S. based firms which locate production in Puerto Rico. Puerto Rico partially exempts many of these firms, particularly those in manufacturing, from income and property taxes. For 1982, it is estimated that all Puerto Rican taxes absorbed only about 5 percent of the profits of U.S. based firms operating in this territory. Furthermore, the firms generally owe no tax on profits reinvested in Puerto Rico. The U.S., for its part, allows much of the profit from U.S. affiliates operating in Puerto Rico to be repatriated to the U.S. without income tax liability. In this respect, the tax treatment

of profits earned in Puerto Rico (and other U.S. possessions) is more favorable than the treatment of profits earned in foreign countries.

B. U.S. Tax Provisions

Special tax treatment of U.S. possessions has been characteristic of U.S. tax law since 1921. The Revenue Act of 1921 provided that a corporation which derived 80 percent of its income from business in a possession and 50 percent of its income from "active trade" such as manufacturing could bring income back to the U.S. without taxation. These provisions were continued until 1976, when they were replaced by Internal Revenue Code Section 936, known as the "possessions corporation system of taxation." Under the 1976 provisions, affiliates of U.S. firms operating in Puerto Rico or other possessions (known as possessions corporations), can bring profits into the U.S. free of taxes if the profits are earned through active business or trade (primarily manufacturing), or from investments of funds originally earned in active business or trade. The purpose of Section 936 is to

assist the U.S. possessions in obtaining employment producing investments, while at the same time encouraging those corporations to bring back to the United States the earnings from these investments to the extent they cannot be reinvested productively in the possession. (U.S. Code Section 936)

C. Treatment of Intangible Assets, 1976 Provisions

The provisions enacted in 1976 left some ambiguity about the treatment of income from intangible assets such as patents and formulas which had been developed and paid for in the U.S. There is clear evidence that many U.S. firms tried to increase the amount of their exempt income by shifting productive assets to their affiliates in Puerto Rico. This was particularly

true in the case of firms producing high technology products. Table 2 shows that the structure of the Puerto Rican manufacturing sector shifted dramatically toward high technology products between 1977 and 1982.

Firms producing high technology based products were growing at much faster rates in Puerto Rico than in the U.S. for the period covered by the data. This suggests that firms which had high profits stemming from the results of research and development were attracted to Puerto Rico by the potential to escape taxes on part of these profits. Other evidence supports the conclusion that the returns on research and development were being shifted to Puerto Rico by shifting plant locations. Table 4 shows that for the Puerto Rican pharmaceutical industry, wages and salaries account for a much smaller percentage of value added than they do in the U.S. Even after adjusting for differences in the wage rate in the two countries, it appears that returns to assets (real property such as machinery and buildings, and intangible property such as patents and trademarks) are larger in Puerto Rico than in the U.S. Assuming that returns to real assets such as equipment and buildings are similar, the difference is due to returns on intangibles.

**Table 2. Value Added in Puerto Rican Manufacturing:
Structural Shifts between 1977 and 1982**

Value Added: \$mil.	1977	1982	% change
total manufacturing	4,097	8,605	110.0
high technology			
machinery	161	542	236.6
electronics	403	1,139	182.3
scientific			
instruments	257	616	139.6
chemicals	1,476	3,713	151.6
{drugs}	1,028	3,276	218.7
other manufacturing	1,800	2,595	44.1

Source: Economic Census of the Outlying Areas, 1982. The U.S. Bureau of the Census surveys the economies of U.S. possessions every five years. 1982 is the latest year for which this important census data is available. For this reason, much of the data throughout this report is based on 1982 statistics.

Table 3. Value Added for U.S. Manufacturing Industries

Value added \$mil	1977	1982	% Change
total manufacturing	585	824	40.9
machinery	67	102	52.2
electronics	50	85	70.0
scientific instruments	19	34	78.9
drugs	10	17	70.0

Source: Census of Manufactures, 1982, U.S. Bureau of the Census

Table 4. Composition of Value Added in the Pharmaceutical Industry (S.I.C. 283) for 1982

	U.S.	Puerto Rico	Puerto Rico (adj. for wages)
Value Added (\$mil.)	16,981	3,276	3,276
Wages and Salaries(\$mil.)	3,965	220	315
Wages and Salaries as % of Value Added	23.4%	6.7%	10.4%
Asset Returns as % of Value Added	76.6%	93.3%	89.6%

Source: Census of Manufactures, 1982, and Economic Census of the Outlying Areas, 1982

D. Treatment of Intangible Assets. 1982 revisions

In 1982, new provisions were added to tax code section 936 to limit the ability of firms to shelter income from intangible assets. A firm operating in Puerto Rico must now meet one of two provisions to prevent full taxation of its income from intangible assets when such income is brought into the U.S. The new provisions test whether the firms have significant business (rather than purely financial) activities in a U.S. possession. The first of the tests requires that a firm incur production costs for resources other than materials equal to at least 25 percent of the total value added of the firm and its affiliates (including its U.S. affiliates). Alternatively, the second test requires that 65 percent of the total labor costs of the firm and its affiliates be incurred in the possession. For firms which satisfy one of these two requirements of "significant business presence", a set of rules has been implemented which reduces but does not eliminate the protection of income on intangible assets from taxation:

Rule 1. The possessions corporation can elect to share in the costs of research and development of assets such as formulas and patents. The equation below summarizes the cost sharing calculation.

Cost Share Payment = (Sales/Total) x Research

Sales: Sales of goods produced in the possession to parties outside the firm and its affiliates.

Total: Total sales of the firm and its affiliates of goods within the same three digit S.I.C. code to third parties.

Research: Total expenditures on research of the firm and its affiliates on goods within the S.I.C. code of the possession firm's product.

The cost share rule applies to intangible assets developed within the U.S. The possessions corporation would owe no cost share on intangible assets developed solely within Puerto Rico.

Rule 2. Profit Split. As an alternative to sharing the cost of developing assets, the possessions firm may elect to share the combined profits of the firm and its affiliates for tax purposes. Total profits due to sales of products produced in the possession to third parties outside the group (possessions firm and affiliates) would be calculated. These profits would be divided 50/50 between the possessions firm and its U.S. affiliates. The profit split plan give the possessions corporation the opportunity to remit 50 percent of the earnings on intangible assets without U.S. tax liability.

E. Impact of 1982 Changes

The changes enacted in 1982 appear to reduce some of the benefits that U.S. firms derive from locations in Puerto Rico. At this date, data on the taxes paid by possessions corporations and on the deductions they claim is available only through 1982, so it is not possible to fully assess the results of the tax changes (see The Operation and Effect of the Possessions Corporation System of Taxation, Fifth Report, U.S. Department of the Treasury). However, some evidence exists that firms producing high technology products, particularly pharmaceuticals, have continued to expand in Puerto Rico. The chemical industry in Puerto Rico is dominated by pharmaceutical manufacturers. Most of these are affiliates of U.S. based firms. Table 5 shows that over the time period 1981 - 1985, incomes (profits, wages, etc.) produced in the chemical industry continued to expand at a rate outstripping the Puerto Rican economy as a whole. This can be interpreted as indicating continued commitment on the part of the U.S. based possessions corporations.

Table 5. Growth of the Chemical Industry and Growth of All Puerto Rican Industries.

Growth rate from preceding year :					
	1981	1982	1983	1984	1985
Chemicals	12.8	6.8	18.9	10.8	10.1
All industries	7.8	4.0	2.8	8.5	5.6

Data Source: 1987 Statistical Abstract of the United States. Growth rates are calculated as the change in income originating in a sector as a percentage of the previous year's income.

F. Impact of the U.S. Tax Provisions on Puerto Rico

Puerto Rico is a small country with a population of a little more than three million. During the period 1960 to 1985, the labor force of the country has expanded rapidly, by about 54 percent. Employment has increased much less rapidly, by only 37 percent. Private employment has grown even more slowly, only about 20 percent, with the slack taken up by growth in the government sector. Puerto Rico has followed a pattern typical of many developing countries, with declining employment in agriculture and expanding employment in manufacturing and government.

As of 1982, U.S. affiliated firms eligible for Section 936 tax credits employed about 81,000 workers. This amounts to 11.3 percent of employment in Puerto Rico, and an astounding 60.6 percent of employment in manufacturing. Average compensation of these workers was \$14,070 in 1982, 27 percent higher than the compensation of the average Puerto Rican worker. Most of the goods produced by the "936" firms are sold either to the U.S. or to foreign countries; the firms compose a major portion of Puerto Rico's export base. The income of the workers employed in the "936" firms recirculates in the Puerto Rican economy. Data cited in The Operations and Effect of the Possessions Corporation System of Taxation suggests that

multipliers for employment of "936" firms average a little over 2. If a multiplier of 2 is applied to the wages of the workers in the "936" firms, the direct and indirect impact of the firms amounts to over 28 percent of Puerto Rico's labor earnings.

G. Costs of the Tax Provisions

What is seen as a tax benefit from the point of view of a firm is seen as a tax expenditure¹ from the point of view of the Treasury. The U.S. Treasury Department publishes estimates of the tax expenditures due to the possessions system of taxation. The estimates are made under the assumption that in the absence of the Section 936 provisions, production would take place in the U.S. rather than in Puerto Rico. The latest available estimates, for 1982, indicate that these tax costs are substantial. These estimates are reproduced in Table 6. Even if the 1982 provisions on intangible assets reduce the tax benefits to the firm (or costs to the Treasury) by 50 percent, as might be the upper limit for case for a possessions firm choosing to split its profits with its U.S. affiliate, tax benefits for high technology based industries still amount to well over half of the amount of wages the firms generate in Puerto Rico. For pharmaceuticals, the largest of the "936" industries, the tax benefits would amount to at least 150 percent of employee earnings. It appears that the tax incentives which apply to Puerto Rico are a very inefficient way for the U.S. government to encourage economic growth in this possession.

¹ The term "tax expenditure" means that a tax deduction or credit causes the Treasury to forego potential tax revenue.

Table 6. Costs and Benefits of Tax Provisions Governing Affiliates of U.S. Based Firms Operating in Puerto Rico, 1982

	Compensation per Employee	Tax Benefit per Employee	Tax Benefit as % of Compensation
apparel	8,954	3,030	33.8%
chemicals	21,145	62,580	296.0%
drugs	20,765	69,200	333.3%
metal products	14,824	12,157	82.0%
machinery	15,953	22,205	139.2%
electrical and electronic	13,314	13,931	104.6%
scientific instruments	13,862	16,545	119.4%

Source: directly from The Operation and Effect of the Possessions Corporation System of Taxation, Fifth Report, 1985 (1982 data).

Part 3. Costs of Production, Kansas and Puerto Rico

A. Unintended Consequences of Tax Policy: The Link to Kansas

The discussion of the tax treatment of Puerto Rico indicates that U.S. tax policy has brought substantial benefits to Puerto Rico, although at a large cost to the U.S. Treasury and hence the general taxpayer. Less easily quantified effects occur because the tax policy distorts the locational decisions of firms. Areas in which an industry might have grown and prospered lose their natural advantage. In order to find out whether industrial development in a state like Kansas is affected by these tax distortions, two tasks are necessary. First, it is necessary to identify the industries in which Puerto Rico produces a large market share, that is, a large share of the combined U.S. and Puerto Rican output. Second, it is necessary to examine whether any of these industries would otherwise be targets for Kansas development. Whether Kansas could compete in these products in the absence of the Puerto Rican tax credits is an essential question.

On the whole, the Puerto Rican manufacturing sector produces less than .45 percent of U.S. manufacturing output. However an examination of manufacturing industries reveals three industries where the ratio of Puerto Rico output to U.S. output is at least six times the average for all industries (see Table 7). Of these industries, pharmaceuticals has by far the largest market share. Puerto Rico consumes only about 2 percent of its own output in these industries. This means that the bulk of Puerto Rico's output is competing with U.S. firms for markets in the U.S. and in foreign countries.

Table 7. Puerto Rico Output Compared with U.S. Output

Puerto Rico output as % of U.S. output	
all manufacturing	.45%
pharmaceuticals (S.I.C. 283)	13.27%
electronic components (S.I.C. 3679)	3.00%
misc. electrical equip. (S.I.C. 369)	3.44%
medical instruments and supplies (S.I.C. 384)	6.03%

In an article in the Kansas Business Review, (Fall, 1984), Robert McLean identifies industries which are likely to be attracted to Kansas locations. He advises people interested in economic development to concentrate their efforts on industries which already have reasons to find Kansas a good location. Drugs and instruments are two items on his list of potential immigrants, primarily because they use goods produced in Kansas as inputs. The Kansas Economic Development Study published by the Institute for Public Policy and Business Research also addresses the issue of which industries a region should target for development. The study develops a list of about thirty industries which might find Kansas to be a good location. All of the industries in Table 7 are mentioned as good candidates for growth in Kansas. Yet communities such as Hays have had difficulties retaining these industries. For electrical equipment, pharmaceuticals, and medical instruments and supplies, total Kansas employment fell by 744 workers, or 11.7 percent just between 1982 and 1985 (County Business Patterns, 1982 and 1985) Would firms in these industries expand in Kansas locations if they were not put at a disadvantage by federal tax policies?

As a first approach to answering this, the costs of doing business in Puerto Rico and in Kansas have been calculated for two products, pharmaceuticals and medical instruments and supplies.

B. Method for Comparing Production Costs

The primary purpose of this section is to compare the costs of doing business in Kansas and Puerto Rico for two products of particular interest to Hays. However, a few general comments on methodology are in order before the details of the calculations are discussed. The method depends primarily on data published by the federal government. The widespread availability of such data makes it feasible for people interested in economic development to follow a similar approach to get an idea of whether their community has a cost advantage in producing a given type of commodity (for example pharmaceuticals) in comparison to other possible production sites. Additionally, the method presented in this section could be used to provide rough estimates of the size of a tax incentive that a community might need to offer to offset a cost advantage held by some alternative production location.

C. Costs of Production (excluding taxes)

Costs of doing business fall into four categories, labor costs, materials costs (including energy), transportation costs, and capital costs. Estimates of each type of cost can be constructed from government data. A comparison of the basic production costs in alternative locations indicates the firm's most profitable locational choice in the absence of differential taxes or community attributes.

D. Product Differences

In order to assess the relative advantages of Puerto Rico and Kansas as production sites, it is necessary to establish what it would cost to produce the same product in the two locations. However, Part 1 of this report already established that within a product class (for example, pharmaceuticals) the exact nature of output differs between Puerto Rican and U.S. locations. Puerto Rico's production is concentrated in products earning large returns on intangible assets such as patents. To compare production cost data between the two sites, an adjustment is made for the difference in value of a ton of output in the U.S. and in Puerto Rico.

E. Value of Output in U.S. and Puerto Rico

The Commodity Transportation Survey published by the Bureau of the Census provides the best available source of information on shipping weights and the value of shipments. Unfortunately, this survey was last published in 1977. Unpublished data available from the Bureau of the Census update this survey to 1983. Values per ton from 1983 can be adjusted to 1982 values using price indexes from the U.S. Industrial Outlook. Additional data on commodity shipments comes from Department of Commerce publications on imports and exports. Table 8 shows estimates of the dollar value per ton for pharmaceuticals and instruments.

Notice the large difference between the value per ton of U.S. producers and that of Puerto Rican producers in Table 8. The large differences in shipment values substantiate that high value production has been shifted to Puerto Rico, possibly to shelter income on intangible assets from taxation.

Table 8. Value per Ton of Output, U.S. and Puerto Rico

Table 8 A. U.S. Production, Value per Ton.

	1983 value per ton	1982 value per ton
Pharmaceuticals (S.I.C. 283)	\$8882	\$8598
Medical Instruments and Supplies (S.I.C. 384)	\$14771	\$14340

Data Sources: unofficial data from the Bureau of the Census, Survey of Manufactures, 1982, U.S. Industrial Outlook, 1986. These calculations could also be done using information from the less current 1977 Commodity Transport Survey.

Table 8 B. Puerto Rican Production: Value per Ton

	1982 value per ton
Pharmaceuticals	\$35,497
Medical Instruments and Supplies	\$28,972

Data Sources: U.S. Trade with Puerto Rico and U.S. Possessions, 1982, and Economic Census of the Outlying Areas, 1982.

F. Costs per Ton of Output

Once value per ton has been established, it is straightforward to convert the production data in the Census of Manufactures and the Economic Census of the Outlying Areas into cost per ton measures. The 1982 Census of Manufactures suggests that compensation per employee in Kansas is about 98 percent of the U.S. average. However, the wage structure in rural Kansas is considerably different than the U.S. average, with compensation per employee

only 80 percent of that for the U.S. An adjustment for different labor costs was made for the "rural Kansas" calculations in Table 9.

Table 9. Costs per Ton of Output, 1982

Pharmaceuticals: Costs per ton

	U.S.	Rural Kansas	Puerto Rico
Labor	\$1381	\$1105	\$1840
Materials	\$2697	\$2697	\$8228
Total	\$4358	\$3802	\$10068

Medical Instruments and Supplies: Costs per Ton

Labor	\$3289	\$2632	\$4194
Materials	\$5226	\$5226	\$8699
Total	\$8515	\$7858	\$12893

Labor and material costs per ton of production are considerably higher in Puerto Rico than in the U.S. Some of the cost difference may be explained by differences in the types of products in Puerto Rico and in the U.S. The state of the art products produced in Puerto Rico may require higher material costs than for generic products produced in the U.S. But even if adjustments are made for materials costs, it appears that basic costs are actually higher in Puerto Rico than in U.S. locations. Although compensation per employee is lower in Puerto Rico than in the U.S., this is more than counterbalanced by lower productivity.

G. Transportation Costs

Two other major cost components remain to be discussed. Transportation costs and capital costs are both important considerations affecting a firm's profits. Each of these costs will be discussed briefly.

Data on transportation costs are available from the Commodity Transport Survey and from National Transportation Statistics. The transport survey provides data on the location of markets for each of about 1000 commodities. As mentioned previously, this survey has not been completely updated since 1977. However the Department of Commerce, Bureau of the Census, has provided some unofficial data updating part of the survey to 1983. The unpublished data were used to calculate the distribution of markets for pharmaceuticals and for instruments. The consumption shares of each of nine census regions were calculated as percentages of U.S. consumption. The mileage from a central Kansas location to the major city in each of the regions was calculated from the Rand McNally Atlas. The mileage to these cities was weighted by the market shares in Table 10 to find the average shipment distance from Kansas to national markets. Finally, mileages were multiplied by transportation costs per mile to get total shipment costs. Shipment costs per mile were higher for instruments than for pharmaceuticals since a larger percentage of instruments were shipped by air. Similar transport cost calculations were made for shipping goods from Puerto Rico to the U.S. (to the Port of New York) and then distributing the goods to U.S. markets. Tables 11 and 12 show the results of the shipping cost calculations.

Table 10. Consumption in Region as Percent of U.S. Consumption

Region	Drugs	Instruments
New England	2.7	4.8
Mid Atlantic	19.2	21.5
East North Central	14.9	21.9
West North Central (includes Kansas)	9.7	7.7
South Atlantic	12.0	14.8
East South Central	6.2	4.2
West South Central	9.2	8.1
Mountain	4.4	2.1
Pacific	21.7	14.9

Table 11. Average Mileage from Kansas to National Markets and Shipment Costs

	Mileage	Cost per Ton
Pharmaceuticals	953	\$138
Instruments	969	\$198

Table 12. Costs of Transportation from Puerto Rico to U.S. Markets

Pharmaceuticals	\$199
Instruments	\$229

G. Capital Costs

Capital costs are the yearly costs a firm incurs due to using durable equipment and structures. Capital costs include interest charges due to the financing of plant and equipment and depreciation costs due to wear and obsolescence of equipment and structures. Capital costs are generally proportional to the size of a firm's stock of capital. As a first step toward calculating capital costs, data from the Census of Manufactures and from The Operation and Effect of the Possessions Corporation System of Taxation was used to calculate the ratio of capital to labor for selected industries. Data on the capital stocks were measured as the gross book value of depreciable assets. Capital /labor ratios are measured as the

dollar value of capital per worker. Table 12 compares capital/labor ratios for Puerto Rico with those for the U.S.

Table 12. Capital Stock (gross book value of depreciable assets) per Employee

	Capital/Labor Ratio
U.S. (1981)	
S.I.C. 28 (inc. drugs)	\$109,012
S.I.C. 38 (inc. instruments)	\$ 22,160
All Manufactures	\$ 35,000
Puerto Rico (1981)	
S.I.C. 28	\$ 99,735
S.I.C. 38	\$ 17,420
All Manufactures	\$ 45,650

A comparison of the capital/labor ratios in the U.S. and Puerto Rico reveals that U.S. ratios are higher for both products, by 8.9 percent for chemicals and by 24.0 percent for instruments. One possible explanation for this finding is that in response to the difference in wages between Puerto Rico and the U.S., firms operating in Puerto Rico choose production techniques which use relatively more labor and relatively less capital. Nevertheless, the capital/labor ratio for the whole of Puerto Rico's export based manufacturing sector exceeds the average capital labor ratio for manufacturing in the U.S. For 1981, the U.S. capital/labor ratio was about \$35,000 per worker while the capital/labor ratio for U.S. firms operating in Puerto Rico averaged \$45,650. The difference in the average capital/labor ratios is due to the heavy concentration of Puerto Rico's exports in the chemical industry. This industry has one of the highest capital/labor ratios of any manufacturing. The concentration of Puerto Rico's export industry in such capital intensive products fails to take advantage of the

abundant Puerto Rican labor force; unemployment in Puerto Rico has averaged over 20 percent throughout the 1980s.

H. Total Production Costs and Tax Credits

At this point, the total costs of production can be calculated in Puerto Rico and in the U.S. The information in Table 13 illustrates the distortions caused by federal tax benefits given to firms operating in Puerto Rican locations. Production which would actually be cheaper in U.S. locations has shifted to tax preferred areas. Table 14 re-emphasizes this point. The table uses the adjusted cost figures for Puerto Rico and for Kansas locations found in Table 13. In comparison with Puerto Rican locations, Kansas locations clearly have lower basic production costs for the two goods examined. However, the tax benefits received by firms in Puerto Rico put Kansas production at a disadvantage.

The cost estimates in Tables 13 and 14 can be used to give a rough estimate of the size of tax credits a Kansas community would need in order to offset the tax advantages received by U.S. firms operating in Puerto Rico. Offsetting tax credits have been calculated in terms of dollars per worker. The Kansas community would need to supply incentives equivalent to the amounts shown in Table 14 each year. These amounts are very large and clearly outweigh the wages that workers in these industries would be paid.

Table 13. Costs of Production, U.S., Rural Kansas, Puerto Rico

Capital cost estimated as (.2 x Capital Stock). All costs per ton of output. Adjustment for materials cost assumes that cost per ton of materials is the same in both locations.

	U.S.	Rural Kansas	Puerto Rico (not adj)	Puerto Rico (adj.)
<u>Pharmaceuticals</u>				
employee years/ton	.06	.06	.11	.11
Labor Costs	\$1381	\$1105	\$1840	\$1840
Materials	\$2697	\$2697	\$8228	\$2697
Capital	\$1308	\$1308	\$2194	\$2194
Transportation	varies	\$ 138	\$ 199	\$ 199
Total		\$5248	\$12461	\$6927
Basic Production Cost Differences: Puerto Rico and Kansas			\$ 7213	\$1679
Tax Credit		0	\$ 7612	\$7612
<u>Instruments</u>				
employee years/ton	.19	.19	.35	.35
Labor Costs	\$3289	\$2632	\$4194	\$4194
Materials	\$5226	\$5226	\$8699	\$5226
Capital	\$ 800	\$ 800	\$1219	\$1219
Transportation	varies	\$ 198	\$229	\$229
Total		\$8856	\$14341	\$10868
Basic Production Cost Differences: Puerto Rico and Kansas			\$ 5485	\$ 2012
Tax Credit		0	\$ 5791	\$ 5791

Table 14. Cost Advantages Before and After Tax Credits

	Medical Instruments	Pharmaceuticals
Basic Cost Advantage of Kansas Location	\$2012/ton	\$1679/ton
Advantage of Puerto Rican Locations with Tax Credits	\$3779/ton	\$5933/ton
Offsetting Tax Incentives for Kansas Communities	\$19995/worker	\$98883/worker

I. Conclusions and Recommendations

The above analysis has shown the considerable tax advantages that firms producing certain high technology types of products enjoy by choosing Puerto Rican locations. The major source of these advantages is the ability of firms to shelter some of the income derived from intangible assets from U.S. corporate taxes. Although recent legislation at the federal level has attempted to limit the shelter of intangibles, it appears that substantial tax benefits for "936" firms still remain. As a consequence, it is almost impossible for Kansas locations to compete for production of some goods, particularly some types of pharmaceuticals and medical instruments. Ironically, some authors have found that Kansas locations would otherwise be well suited for these kinds of production.

While changes in the tax code would probably benefit cities such as Hays, Kansas communities are unlikely to be able to achieve major revisions of tax laws governing the operation of U.S. firms in Puerto Rico. First, only a limited number of rural communities would be interested in such tax changes; while this issue is of special importance to Hays, very few other communities are faced with exactly the same concerns. It would be difficult for Hays to find a political coalition large enough to effect legislative change. Second, elimination of Puerto Rico's tax advantages would have a profoundly disrupting effect on the island's economy. A large percentage of its export base, and as much as 28 percent of its manufacturing employment, depend on the activities of U.S. based firms. Congress would be unlikely to make such a disruptive change.

Can Kansas communities hope to attract pharmaceutical and medical instruments firms in the face of existing tax laws? Changes in the tax code

made in 1982 may eventually reduce the flow of investment to Puerto Rico. Furthermore, lower corporate tax rates legislated in 1986 reduce the incentives for firms to engage in tax avoidance. Nevertheless, firms will probably retain some ability to shelter income from intangibles. There are still some niches in the markets for pharmaceuticals and instruments that might be filled by Kansas locations. Small operations run by locally or regionally based business people would be unlikely to relocate offshore. Additionally, firms producing generic products may be attracted to Kansas locations, particularly to communities with readily available work forces. These firms derive little income from intangible assets, and hence have less incentive to locate outside the U.S.

Part 4. A Broader Look at Tax Incentives

The first half of this report dealt with the specific problem of tax incentives benefitting Puerto Rico. Although the tax credits have had an extremely beneficial effect on Puerto Rico's ability to attract high technology production, they have severely distorted the locational decisions of firms. The tax credits significantly impede the ability of Kansas communities to compete for firms in certain industries, particularly pharmaceuticals. However, the industries most affected by the tax treatment of Puerto Rico constitute only a small part of the manufacturing base of rural Kansas. Removal of the Puerto Rican tax incentives would help only a small segment of rural communities. Recognizing this, the next section of this report considers more general concerns of rural development. The report looks at whether tax incentives in general are an effective means of encouraging the location of industry in rural areas. The report reviews the literature on state tax incentives and then looks at an example of a possible incentive program at the federal level. The report concludes with some general comments on tax incentives and rural development.

A. A Brief Discussion of the Literature on Tax Incentives

During the last decade, the role of government in attracting and retaining industry has been a topic of heated discussion for policy makers and business people alike. Recently, several studies have examined whether tax incentives such as investment tax credits and corporate income tax reductions are effective tools for attracting jobs and industry to a region. Seidman (1987) and Kieschnick (1981) provide excellent summaries of these

studies. The results across studies seem to be fairly consistent. In most cases, state and local tax incentives appear to have little or no effect on business decisions to invest. For example, a survey done by Kieschnick indicates that only 3.3 percent of new firms and 6.6 percent of new branch plants found tax incentives crucial to their locational decisions. The same survey indicated that for expanding plants, tax incentives were insignificant. While most authors have conducted their studies in qualitative terms, asking whether incentives are or are not important locational factors, Bartik (1985) reaches more quantitative estimates of the impact of regional tax incentives. He finds that a 10 percent decrease in a state's corporate tax rate (say from 5 percent down to 4.5 percent) will increase the number of new plants opening within the state by about 2 to 3 percent over a six year period. For Kansas, which attracted 73 new manufacturing plants in 1986 (see New and Expanding Manufacturers), this would mean about two additional firms and about \$400,000 in additional wages over six years. Bartik concludes that tax incentives have a modest impact on firm location.

Several reasons explain why state and local tax incentives are weak or at best moderate influences on a firm's decision of where to locate. First, firms often open branches near their existing plants so that some management and facilities can be shared. A region where manufacturing has been historically weak can expect fewer branch locations than an existing manufacturing center. Second, labor costs and energy costs are usually much larger shares of a firm's budget than are state and local taxes. Hence firms will often be more concerned that a potential plant site provides favorable labor and energy costs and sufficient supplies of these resources

than that the location offers tax incentives. Third, state and especially local taxes may be seen by firms as indirect payments for public services such as sewers, roads, and education. A perceived benefit to a firm in the form of lower taxes may be in part offset by a perceived cost in terms of diminished public services. Fourth, tax benefits which are attached to particular site locations (such as enterprise zones) may become capitalized in the value of land at these locations (see for example Hawkins (1984)). This means that firms which are attracted to an area because of tax incentives bid up the price of land in the area. The increase in land values then makes the site less attractive to other potential migrants, terminating the flow of firms into the area. A final reason for the failure of state and local incentives to create large scale increases in investment and jobs concerns the deductibility of state taxes from federal corporate income tax returns. When state taxes fall, federal deductions also fall, increasing a firm's federal tax liability. Until recently, this meant that most state tax incentives were as much as cut in half, given that the highest marginal corporate income tax rate was 46 percent. Under the recent changes in the federal tax laws, the highest marginal corporate income tax rate has been reduced to 34 percent, meaning that the effect of state and local tax incentives is cut by about one third.

Although evidence shows that tax incentives at the state and local level are weak, or at best modest, the example of Puerto Rico indicates that large tax incentives at the federal level strongly influence firm location. As indicated in earlier parts of this report, the tax incentive virtually amounts to an elimination of the federal corporate income tax on profits generated in Puerto Rico. Tax incentives legislated by the government of

Puerto Rico preserve these tax breaks; most of the profits of U.S. firms producing for export are subject to very low Puerto Rican Commonwealth tax rates. Given the current concern of the federal government with budget deficits, it would be infeasible for similar tax incentives to be extended to economically depressed rural areas. Whether modestly sized federal tax incentives could help stimulate investment and jobs in rural areas is an open question. A major goal of this part of the report is to design an example of such a program and to evaluate its potential impact, both on rural regions and on the federal budget.

B. Why Help Rural Communities?

A recent publication of the Federal Reserve Bank of Kansas City (see Henry, et. al., 1986) notes the large gap in income which exists between rural and metropolitan areas. In 1984, per capita income in metropolitan counties stood at \$14,000; in rural counties, per capita income was \$4,000 less, averaging about \$10,000. The trends of rural and metropolitan income show this gap widening, both nationally and in the Tenth Federal Reserve District, which includes Kansas. For the period 1979 to 1984, real per capita income grew by 1 percent in metropolitan areas of the Tenth District, while real per capita income fell by .1 percent in rural areas. Some of the rural-urban gap is explained by the decline of agriculture and the oil and gas industries in rural areas. But manufacturing, which generates 40 percent of income in rural areas nationally, has also grown much more slowly in rural than in urban areas. Unemployment and underemployment are becoming increasing problems throughout the rural U.S.

In response to rural economic decline, the pace of migration out of rural counties has risen, with about half of rural counties losing population between 1983 and 1985 (Drabenstott, et. al., 1987). But rural residents displaced from their jobs resist migration, as shown by an Iowa study (Otto, 1985). This study showed that 75 percent of farmers forced off their land have remained in rural areas, although with severely lower standards of living. As per capita income in rural counties declines, the ability of local governments to provide essential services such as roads and sewers is strained, reducing the standard of living in these counties even further.

Drabenstott distinguishes two possible approaches to the problem of rural decline. Transitional policies intend to ease the personal hardships caused by the decline of rural areas. Such policies concede that rural areas will continue to lose jobs and income. The policies are intended to help workers, and to a lesser extent, communities, adjust to change. Examples of such policies are retraining programs for farmers, transfer payments to supplement low rural incomes, and support for schools and public health facilities in communities which no longer have a tax base sufficient to provide these essential services. In contrast, rural development policies hope to stimulate economic growth in rural areas so that residents will not be forced to migrate and so that communities themselves can provide appropriate public services. Examples at the federal level include investment in infrastructure such as highways which make rural areas more competitive and education programs which improve the quality of rural labor resources. Tax incentives for business initiation and expansion could conceivably become part of a rural development strategy.

The remainder of this report examines the costs and benefits of a tax incentive for firms in rural areas. Tax incentives may take on many forms. For example, corporate income taxes may be reduced or abolished, property taxes may be rebated, or investment may be granted special tax privileges. This study examines the particular example of an investment tax credit applied to new and expanding rural businesses. A similar methodology could be used to explore the impact of alternative tax incentives.

C. Example of a Tax Incentive: An Investment Tax Credit

An investment tax credit allows firms to take a percentage of their expenditures on new capital as a deduction from their corporate taxes. For the U.S. as a whole, investment tax credits were an important part of federal tax legislation from 1982 to 1986. Under the 1986 federal tax reforms, investment tax credits were eliminated while at the same time, the marginal tax rate on corporate profits was reduced. This section of the report examines the effects of reinstating and expanding federal investment tax credits for depressed rural areas. The credits would apply to machinery, equipment, and structures. The proposed tax credits are similar to suggestions that have been made for the establishment of enterprise zones. Enterprise zones are particular geographic locations that are eligible for special tax considerations.

D. User Cost of Capital

When firms are allowed an investment tax credit, they experience a reduction in the effective cost of capital. Part of the cost of the capital is "rebated" to the firms through lower taxes. A measurement of the impact

of an investment on the cost of capital can be calculated applying the user cost formula elaborated in Appendix B of this report. Table 15 shows the results on the user cost of capital of a 20 percent investment tax credit.

Table 15. User Cost of Capital Before and After 20 Percent Investment Tax Credit

User cost of capital per dollar
of new capital investment:

Before Investment Tax Credit	\$.171
After Investment Tax Credit	\$.125
Change in user cost as % of Average User Cost	-31.1 %

Source: Formulas for calculations and parameter estimates are found in appendix B.

The proposed investment tax credit makes capital cheaper for firms. Intuitively, cheaper capital should encourage more investment activities in the areas eligible for the credits. To estimate the quantitative impacts of cheaper capital, it is first necessary to distinguish the behavior of firms which are already located in rural areas from the behavior of outside firms which might migrate to the area.

E. Responses of Existing Firms to the Investment Tax Credit

Economists generally recognize two distinct responses to a decrease in the cost of capital. The substitution effect occurs as firms replace labor with the now cheaper machinery and equipment. The substitution effect causes firms to adjust their capital/labor ratios. The expansion effect occurs as firms increase their output as a result of lower overall costs. Due to the expansion effect, firms tend to use more of both capital and

labor. The substitution and expansion effects are likely to happen simultaneously. The two effects both induce the firms to invest in more capital. The effects work in opposite directions on labor. However, most empirical evidence indicates that the overall effect on the number of workers hired is positive. Estimates of the overall effect of the investment tax credit on rural Kansas firms are calculated in Appendix C. The results are summarized in Table 16.

Table 16. Direct Effects of a 20 Percent Investment Tax Credit on Expanding Firms: Results for Rural Kansas Counties.

Change in Capital Stock:	\$1,365 mil.
% Change in Capital Stock:	46.7%
Change in Number of Workers	11,060
% Change in Employment	15.6%
Change in Output	\$2,790 mil.
% Change in Output	23.1%

Under the assumptions made in appendix C, the effects of the tax credit on rural employment appear large. However, the appendix cautions that the estimates for changes in capital, labor, and output should be considered upper limits on what might realistically occur.

F. Budgetary Effects of the Tax Credit due to Expanding Kansas Firms

While the impact of the tax credit on the eligible region appear to be large, the impact on the entire nation is considerably smaller. Much of the new output will substitute for output being produced in other parts of the country. While output in rural regions will rise, output in urban regions will fall. Only to the extent that the new output of rural regions is sold abroad can it really be considered a contribution to national growth. To

find the impact on the federal budget, only 6 percent (the approximate percentage of manufactured goods exported) is considered a net contribution to output. More optimistically, the amount of output which is a net contribution to national output will probably have a multiplier effect of about two.

To simplify the analysis, it is assumed that the initial impact of the tax policy change is offset by a decrease in federal government spending; this means that sacrifices are made elsewhere in the economy to put the plan into effect. Budgetary impacts of the tax policy are illustrated in Table 17.

Table 17. Budgetary Impacts Due to Expanding Kansas Firms

Tax Cost of Investment Credit	\$ 273 mil.
Tax Collections Due to New Output	\$ 206 mil.
Net Tax Cost	-\$ 67 mil

Tax cost due to investment credit calculated as $20\% \times (\text{change in capital})$.

Yearly tax collections calculated as (average tax rate on all value added (25%)) \times (value added as a percentage of output (37%)) \times (percent of new output which is a net contribution nationally (6%)) \times (multiplier effect (2)) \times change in output (\$2,790 mil.). Tax collections are then converted to present value terms, calculated for 10 years. Discount rate for present value calculations = 10%.

Over a 10-year period, the program would cost the U.S. Treasury about \$67 million in lost revenues as existing Kansas firms apply the investment tax credit. In order to prevent a rise in the federal budget deficit, tax increases or decreases in federal spending would be necessary. The program would significantly increase jobs in rural areas. However, the expanding rural firms would in part displace existing firms in areas not qualifying

for the tax credits. Indirectly, a large number of the new jobs would be shifted from urban areas.

G. Impact on Firm Migrations

In addition to the stimulating local firms, the investment tax credits would have an effect on firm migrations. Some estimate of the magnitude of firm migrations can be calculated from the study done by Bartik (1985). He estimated that a 10 percent decrease in state income taxes increases the number of new plants by 2 to 3 percent over a six year period, or between .3 percent and .5 percent each year. For the time period of Bartik's data, a 10 percent decrease in state taxes corresponded to only about .2 percent decrease in the user cost of capital. The decrease in the user cost of capital brought about by an investment tax credit is about 150 times this much. Extending Bartik's figures, this would increase the number of new plants between 45 percent and 75 percent per year, or, on average, 60 percent per year. In 1985, about 50 percent of new Kansas firms (a total of 57) were located in rural counties. A 60 percent increase in this number would amount to about 35 additional firms per year. New Kansas firms averaged about .5 million dollars each in new capital and 23 workers each in new labor. An additional 35 firms would bring in approximately \$ 17.5 million in new capital and would employ in the range of 800 new workers. This represents a 1.1 percent direct increase in manufacturing employment in rural Kansas. The new employees would cause a regional multiplier effect of about an additional 800 workers. However, the national effect of these new firms will be an employment increase considerably smaller than 800. It is likely that most of additional 35 firms will have been attracted from other

locations; output and employment in other regions will be falling and will be subject to a negative multiplier effect. It is, however, possible that the 92 total migrant firms will be larger than they would have been in the absence of a tax credit. As an upper bound, the study assumes that these firms produce 23.1 percent more output (see Appendix C), hire 23.1 percent more labor, and use 23.1 percent more capital than would otherwise have been the case. As in the case of the expanding Kansas firms, only about 6 percent of this extra output can be considered a contribution to net national production.

H. Budgetary Effects of New Firms

An unfortunate aspect of many types of tax credits is that they fail to distinguish between the firms which actually base their decisions on the tax policy and the firms which would have engaged in the desired behavior (investment) in any case. In the example of an investment tax credit, new rural firms receive an tax reduction regardless of whether their plans to locate in a rural area are actually influenced by the decision. All investing firms benefit equally. Thus the tax cost for the new firms is unnecessarily large. The budgetary effects of the tax credits for new firms are shown in Table 18.

Table 18. Budgetary Effects of a 20% Investment Tax Credit for New Rural Firms: Estimates for Rural Kansas Counties

Cost of Investment Credit (Present value)	\$ 80 mil
Tax Collections Due to New Income (present value, cumulative for 10 years)	\$ 14 mil.
Net Tax Cost	-\$ 66 mil.

Cost of investment credit estimated by the present value of investment for 92 total new firms (base of 57 plus 35 additional firms) times 20%. Investment each year is \$47.7 mil. from 92 firms times an expansion factor of 1.231. Discount rate of 10 % is used for present value calculation.

Present value converts a stream of future dollars into a current year comparison. Present value calculations taken for first 10 years.

The tax collections due to new income each year are estimated by (22.9% expansion of value added for the 92 firms (\$14.8 mil.) x (percentage of output that is a net national increase (6%)) x (multiplier effect (2)) x (average tax rate on value added (25%)).

Value added for the 92 firms is found by taking the average return on capital times amount of capital (\$46.3 mil.) plus the average wage times the amount of labor (\$18.3 mil.).

I. Summary of the Effects of an Investment Tax Credit

The analysis in Part 4 of this study shows that an investment tax credit would have a highly beneficial effect on eligible rural areas. For rural Kansas, direct manufacturing employment is estimated to rise by 11,040 from existing firms and 8000 (over ten years) from additional new firms, assuming that all rural counties qualify for the tax benefit. Applying an employment multiplier of 2, the tax credits could result in as many as 38,080 jobs in rural areas. The cost of such a program is best reflected in the net federal tax cost per new job generated. Under the assumptions made in this report, the 10-year cost of the program is \$133 mil or \$3,489 per new employee. It should be noted that costs and benefits have been calculated in present value terms.

An investment tax credit would be an effective way of retaining and stimulating jobs in rural areas. However, most of the jobs created would be shifted from urban areas. Some urban firms would migrate to rural areas. Furthermore, some urban firms would go out of business as their customers transferred to the new and expanding rural firms. The net cost of the tax incentives would have to be borne by rural and urban taxpayers alike. Partially offsetting the costs of transferring jobs to rural areas are the benefits of preserving rural communities. If rural residents are forced to migrate in order to find jobs, urban areas will incur additional costs for schools, roads, and other public facilities. Meanwhile, existing structures in rural communities will be underutilized.

Appendix A. Kansas Manufacturing Statistics

Some basic data about production relationships in Kansas aid the examination of a tax incentive. The Annual Survey of Manufactures for 1985 contains the most recent data on output, labor, capital, and value added for individual states. U.S. and Kansas statistics from the Annual Survey are reproduced in Table A1; some simple ratios are calculated in Tables A2 and A3. Notice that the tables contain two measures of capital, a book value measure and a measure adjusted for inflation and depreciation.

Table A1. Statistics for Kansas Manufacturing, 1985

Number of Employees (thou.)	184.4
Payroll (\$ mil.)	4,219.8
Value Added (\$ mil.)	11,651.6
Cost of Materials (\$ mil.)	19,946.4
Value of Shipments (\$ mil.)	31,629.5
Gross Book Value of Capital (\$ mil.)	7,808.9
Machinery and Equipment	5,133.3
Buildings and Structures	2,675.6

Source: Annual Survey of Manufactures, 1985

Table A2. Ratios for Kansas Manufacturing, 1985

Economic Value of Capital (\$ mil.)	7,652.7
Economic Value of Capital/Labor	41,500.5
Economic Value of Capital/Output	2.44
Labor Cost/Output	.13
Material Cost/Output	.63
Capital Returns/Output	.24

Economic Value of Capital: This adjusts the gross book value measures of capital for inflation and depreciation. A conversion factor of .98 was found by comparing national measures of book value and economic value for 1985.

Sources: Annual Survey of Manufactures, 1985; and Survey of Current Business, August, 1986

Table A3. Rural and Urban Employees and Payroll for Manufacturing, 1985

Kansas Employment (thou.)	185.7
Urban	114.8
Rural	70.9
Kansas Payroll (\$ mil.)	4,247.7
Urban	2,933.4
Rural	1,314.3
Urban/Total Employment	61.8 %
Rural/Total Employment	38.2 %

Source: County Business Patterns, 1985. Note that the employment and payroll figures differ slightly from Table 15. The statistics in the data sources were compiled by two different government agencies.

Under the assumptions of a corporate tax rate of 34 percent and an interest rate of 10 percent, Fazzari calculates the present value of depreciation allowances (tz) for equipment and for business structures. For equipment $tz = 0.877$, for business structures $tz = 0.431$.

The depreciation rate (d) was calculated based on data presented by Charles R. Hulten and Frank C. Wykoff (1981). They estimated depreciation rates for structures of 3.7 percent and for equipment of 13.3 percent. Investment data for Kansas in 1985 (U.S. Department of Commerce, Bureau of the Census, 1985 Annual Survey of Manufactures) show that 34 percent of investment spending went toward structures and 66 percent went toward equipment. Using these figures a weighted average was calculated yielding an overall depreciation rate for Kansas of 10 percent. So, $d = 0.10$.

Appendix B. Calculation of User Cost of Capital

The calculations of user cost of capital (or simply "user cost") are based on a formula presented by Steven M. Fazzari (1987). User cost refers to the tax adjusted cost of capital per dollar of investment spending. This appendix describes the formula used and gives the value of variables in the formula.

notation:

k = investment tax credit rate.
t = capital investment revenue tax rate.
z = present value of depreciation deductions per dollar of investment.
i = nominal interest rate.
n = expected inflation rate.
d = depreciation rate.
L = proportion of investment finance by debt.

procedure:

$$\text{user cost} = \left[\frac{(1 - k - tz)}{(1 - t)} \right] \left[(i - n + d - tLi) \right]$$

values of variables:

Under the new tax laws the corporate tax rate is 34 percent. So, $t = 0.34$.

The nominal interest rate (i) is assumed to be 10 percent. The expected inflation rate (n) is assumed to be 4 percent. So, $i = 0.10$ and $n = 0.04$.

Fazzari assumes the proportion of investment financed by debt is 30.6 percent, based on estimates which he made using the Washington University Macro Model. So, $L = 0.306$.

Appendix C. Responses of Existing Firms to the Investment Tax Credit.

This appendix assumes that production can be described by what is known as Cobb-Douglas technology (see Fazzari, 1987). As a direct consequence of this technological assumption, there is a simple relationship between the percentage changes in labor, capital, and the user cost of capital.

1) $\% \text{ change in capital} - \% \text{ change in labor} = -\% \text{ change in user cost.}$

The problem with this formulation is that it shows only the differences of changes in capital and changes in labor, not the exact magnitude of each change. Nevertheless, this formula is an important start on the calculation of the impact of the tax credit. Using the calculations for user cost from appendix B, an original capital stock estimate for rural areas of \$2,923 million², and an original employment estimate of 70.9 thousand, the equation becomes

2) $(1 + 2923 \text{ mil.}) \Delta K - (1 + 70.9 \text{ thou.}) \Delta L = -\% \Delta u = .311$

ΔK : change in capital
 ΔL : change in labor
 Δu : change in user cost.

As a next step, some Kansas data is examined. The Kansas Department of Economic Development publishes New and Expanding Manufacturers, which provides information on capital expenditures and new employees for expanding

²Since no regional capital stock numbers are available, the total Kansas capital stock has been prorated by the ratio of rural to total employment. Unfortunately, this ignores possible differences in rural versus urban capital/labor ratios.

firms and new firms. Table C1 shows the investment, new employees, and capital/labor ratios for new and expanding firms.

Table C1. New and Expanding Kansas Manufacturing Firms, 1982-1984

	New Firms	Expanding Firms
Capital Expenditures (\$ mil.)	259.4	698.4
New Laborers	8,060	5,652
Marginal Capital/Labor Ratio	32,184	123,566

Source: New and Expanding Manufacturers, 1985. All numbers have been adjusted for inflation using price indexes for fixed investment from Business Statistics, 1984. Marginal capital /labor ratios show additional capital divided by additional labor.

Notice that the capital/labor ratios for expanding manufacturers are much larger than those for new firms. A possible explanation for this is that expanding firms are adjusting their capital/labor ratios at the same time as they are expanding output. New firms, on the other hand, start out with their ideal capital/labor ratios. In comparison to the capital/labor ratio for expanding firms, the capital /labor ratio for new firms is much closer to the Kansas average of \$41,500. Overall, Kansas firms appear to add labor and capital simultaneously.

The relationship between labor and capital changes can be made more precise by returning to equation 2. For the period 1982 to 1984, capital grew by 23.9 percent and labor grew by 8.0 percent. To be consistent with economic theory, a 15.9 percent fall in the user cost of capital is implied.

A further consequence of the assumption of Cobb-Douglas technology allows the calculation of the output change which results from the change in labor and capital:

$$3) \quad \% \text{ change in output} = (\text{capital share}) (\% \text{ change in capital}) + \\ (1 - \text{capital share}) (\% \text{ change in labor}).$$

The capital share measures the returns on capital as a percentage of output. Appendix A estimates this to be .24. The new and expanding firms are estimated to have contributed an 11.8 percent growth in output for the period 1982 to 1984. We can now estimate a relationship between the percentage change in user cost and the resulting percentage change in output:

$$4) \quad \% \Delta \text{ output} = -(11.8 + 15.9) \times (\% \Delta \text{ user cost}) \\ = -.742 \times (\% \Delta \text{ user cost}).$$

Equations 2, 3, and 4 can be used to estimate the impact of the investment tax credit. The credit lowers the user cost of capital by 31.1 percent. This in turn increases output by 23.1 percent or \$2790 mil. using \$12,080 mil. as an estimate of 1985 rural output. Firms increase their work forces by 15.6 percent, or 11,040 workers, and they increase their capital by 46.7 percent or \$1,365 mil.

A Caution about Cobb-Douglas Assumptions

Cobb-Douglas technology carries with it the assumption that the capital stock is highly responsive to changes in the user cost of capital. Some researchers argue that capital is actually less responsive to the user cost than Cobb-Douglas technology would indicate. If these researchers are correct, the estimates for the change in capital, labor, and output will all be lower. The estimates presented should be considered as upper limits to the impact of the policy.

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