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THE IMPACT OF THE MICHIGAN FARMLAND AND OPEN SPACE PRESERVATION ACT ON LANDOWNER BEHAVIOR IN THE GREATER LANSING AREA

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**THE IMPACT OF
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Andrew E. Frankel and Larry J. Connor*

INTRODUCTION

In recent years, the viability of farming as a contributor to Michigan's economy has been threatened by a variety of sources. According to the State Department of Agriculture, the use of agriculturally suitable lands for nonfarm developments such as shopping centers and condominiums led to a yearly loss of an estimated 20,000 acres of prime farmland between the years 1977 and 1984.¹ While such a conversion may be considered a natural consequence of an expanding economy, there has been concern that the most productive and ecologically fragile lands are often turned over first.

The events that precipitate this conversion have been well documented in earlier studies. Urban residents opt to relieve themselves of the crowded conditions of the city by relocating in adjacent rural areas. They often bid up a parcel of agricultural land by several thousand dollars. The conversion of agricultural land to residential use impacts on the value of surrounding agricultural land.

As the area becomes more intensively settled, property taxes typically rise, as greater revenues are required to provide services, such as sewers and water, schools, and police and fire protection.

Existing landowners are caught in a "tax squeeze"; while their income from farming and the use of their land remain the same, their property taxes increase. The costs from an increasing property tax burden may be such that it becomes impossible to earn a profit from the land itself. In the end, the landowner may be forced to sell his land to increase his liquidity, contributing further to the growth of urban sprawl.

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In response to farmer and public concern over the conversion of farmland to nonfarm use and high property taxes, the State of Michigan in 1974 enacted Public Act 116, the Farmland and Open Space Preservation Act. Designed primarily to reduce the loss of prime farmland that occurs with urban sprawl, the Act provided a program to reduce property tax burdens of agricultural land owners. By reducing the property tax burden and the cost of holding land, it was hoped that the Act would provide incentives to farmland owners to continue farming. The specific means to achieve these related objectives have been the voluntary transfer of development rights of farmland owners to the State of Michigan for a minimum period of ten years.

A transferal of these rights benefits the enrollee in two primary ways. First, he is exempt from all nonfarm assessments for items such as sewers, water, and roads. Second, while he pays the full amount of his property taxes on his land, buildings and other structures as before, he is credited for property taxes which exceed seven percent of his income (from all sources). Upon termination, the income tax credits obtained from the last seven years of the contract are used as a lien against the property and any special assessments made during the period of contract are charged for the use of these services. Finally, for lands contracted according to the open space provision of the Act, property taxes are assessed at current use rather than existing market value.

To qualify, designated "farmland" must be primarily undeveloped and actively farmed. Thus, any enrolled lands must be at least 50% cultivated and/or used as pasture. These holdings must be "unimproved" except for dwellings, farm residences, roads, and all other structures intended for agricultural use. In addition, any one of the following lands may qualify:

- a) a farm of at least 40 or more acres.
- b) a farm of at least five acres but less than 40 acres devoted primarily to agricultural use which has produced from agriculture at least \$200 per year per acre of tillable land.
- c) a specialty farm in one ownership which has produced a gross annual income from agricultural use of \$2000 or more.²

Response to the program has been good, as more than 4 million acres have been enrolled as of 1 January 1986. The program has had definite success in counties which have suffered large decreases in farmland from the period 1969-82.³

Nevertheless, two concerns about the effectiveness of the program prevail. First, much of the land immediately adjacent to metropolitan areas remains nonenrolled. Second, the costs of the program ultimately must be paid by the balance of taxpayers throughout the State.

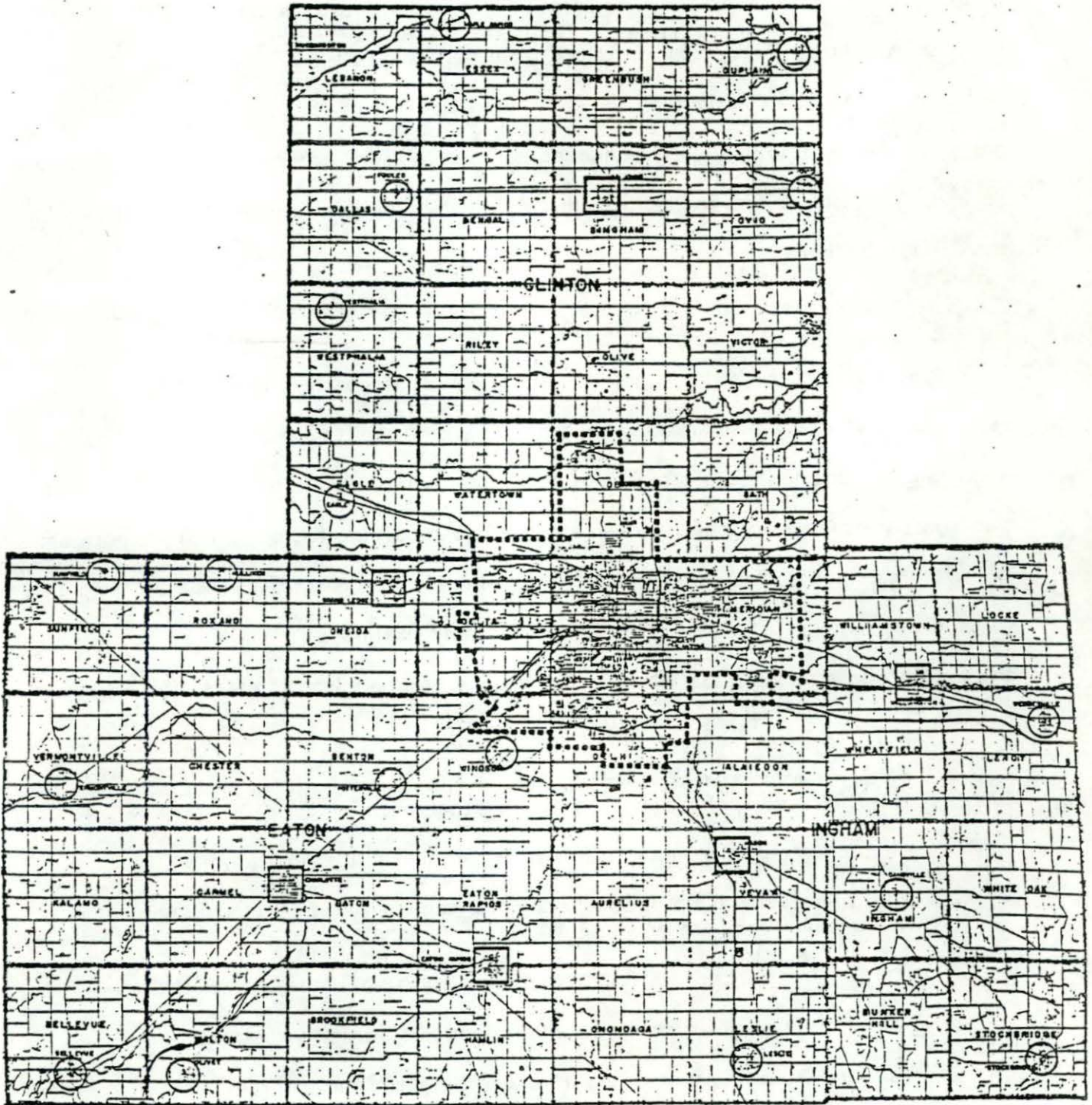
OBJECTIVES

With these concerns in mind, this study investigated the impact of P.A. 116 on individual land use decisionmaking in a growing metropolitan area - greater Lansing, Michigan. It documents the response of these landowners, enrollees and nonenrollees, to the objectives of the program. It also attempts to recognize factors which promote and limit its implementation. Furthermore, the program's effectiveness in delaying nonfarm development among individual landowners is closely examined. Finally, by considering the salient determinants of landowner behavior, the study addresses the following questions:

- * Which characteristics (organization, purpose, motivation, type, and size of operation, and age) are profiled by program enrollment?
- * What are the primary motivations of enrollment in the program?
- * What impact has the program had on new capital investments and improvements such as machinery and equipment?
- * What impact has the program had on one's ability to continue farming?
- * What is the extent of enrollee commitment to contract objectives?
- * What are the primary reasons for nonenrollment in the program?
- * What relationship exists between program enrollment and sales of land?
- * What relationship exists between program enrollment and purchases of land?
- * Is the credit offered sufficient to achieve the desired results of the Act?

Figure 7

TRI-COUNTY REGION GROWTH CENTERS



- PRIMARY GROWTH CENTER
- SECONDARY GROWTH CENTERS
- LOCAL GROWTH CENTERS

A behavioral model was developed to answer these questions. Implicit throughout is the notion that present and future landowner behavior is based on both economic and noneconomic factors. Thus, for certain landowners, behavior will be based on the maximization of income from both current uses such as farming or expected uses such as urban development. For others, intrinsic values derived from farming, recreation, and community responsibility associated with the preservation of open space will overshadow the satisfaction derived from earning income. Thus differences in enrollment and landowner behavior in general can be accounted for by differences in the degree of economic and noneconomic motivations.

THE STUDY AREA

The Greater Lansing, Michigan area including Clinton, Eaton, and Ingham counties, was chosen to examine the relationship between landowner characteristics and enrollment. Figure 1 shows the relation between this area and the City limits of Lansing. For study purposes, the area of potentially high development was defined as all parcels located within the following townships: Alaiedon, Bath, Benton, Delhi, Delta, DeWitt, Meridian, Oneida, Watertown, Williamstown, and Windsor.

This area was chosen because it represents one of the fastest growing metropolitan regions in Michigan. Indeed, among the townships listed above, the population increased at an average rate of 25.55% over the period 1970-82, while the state of Michigan as a whole increased by 2.4%.⁴ Similarly, for metropolitan areas of similar size, these townships are among the highest in the state for new privately owned housing units issued between 1985 and the present.

This trend holds for property values as well. Between 1981 and 1986, the state equalized valuation for these counties increased by 21.0%, while similar values for the state as a whole increased by 15.4%.⁵ Lastly, since the program was adopted to alleviate the conversion of lands suited for agriculture and open space, this area was chosen because approximately 90% of its land can be classified as either prime or unique soils.⁶

METHODOLOGY

The results of the study were based on a number of sources of information. First, names and addresses of enrollees in the program for the study area were obtained from the Michigan Department of Natural Resources. The names and addresses of nonenrollees surveyed were obtained from the equalization directors in each of the effected counties.

Parcels of land for both types of landowners were chosen randomly from official plat maps of the area. In order to assess the impact of potential urban development on landowner decisionmaking, sampling was stratified according to location. These stratifications were based on future land use maps obtained from each of the townships located adjacent to the Lansing city limits. For simplicity, parcels located within the following townships were classified as having high potential development: Alaiedon, Bath, Benton, Delhi, Delta, DeWitt, Meridian, Oneida, Watertown, Williamstown, and Windsor. Parcels of land located in the remaining townships of these counties were classified as having low potential development.

The above landowners were surveyed by mail. A total of 350 surveys were sent out. Given that a lower response rate was anticipated among nonenrollees, 150 of these were destined to enrollees and 200 to nonenrollees. The response rate among enrollees was 52%, while the rate among nonenrollees was 37.5%. Overall, the response rate was 43.4%.

Data received from these respondents were analyzed for measures of dispersions. In addition to frequencies for each of the behavioral variables, chi-square tests were made to determine whether or not the observed differences for these variables among enrolled and nonenrolled landowners were due to chance. As in previous studies on enrollment in preservation programs, this statistic test was used rather than regression analysis because a high degree of multicollinearity among variables was anticipated.

Lastly, because a low response rate was expected, a supplementary survey of planning and zoning administrators and assessing officers in each of the townships in the Greater Lansing Area was conducted before the mailing to strengthen the validity of this response. Patterns of land use and indications of future use were also obtained from these officials as well as county extension directors in each of the counties.

PARTICIPATION BASED ON ECONOMIC FACTORS

It was first hypothesized that enrollment would increase the viability of one's land holdings by decreasing the costs associated with ownership. For most landowners, property taxes comprise the bulk of these costs. Other costs such as vandalism and lawsuits arising from urban encroachment were also recognized.

1. Household Income

Since the base used for the tax credit is derived from one's household income, the extent to which such viability is enhanced (and hence enrollment) depends on the amount of household income earned.

To test this assumption, survey respondents were asked to estimate their household income earned in 1986 before taxes. While more enrollees had household incomes less than \$20,000 than nonenrollees (39% to 22.7%), the overall distribution of income is quite similar among both groups. It can be concluded on this basis that household income is not a factor significantly related to enrollment in the program (Table 1).

Among enrollees, income was related to type of operation. Since the majority of enrollees were cash grain farmers, this result is not surprising. There was no relationship between income and other demographic variables. There was also no relationship between household income and nonfarm income. From these findings it can be hypothesized that landowners of all incomes were able to derive some portion of their earnings from nonfarm sources. Among nonenrollees, household income was highest among cash and feed grains and lowest among hog farms. No significant relationship existed between income and size of holdings.

Table 1. Household Income of Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Household Income	Enrollees		Nonenrollees	
	No.	%	No.	%
0 - \$10,000	8	10.4	3	4.0
10,000 - \$20,000	22	28.6	14	18.7
20,000 - \$30,000	11	14.3	12	16.0
30,000 - \$40,000	13	16.9	12	16.0
40,000 - \$60,000	8	10.4	14	18.7
60,000 - \$80,000	4	5.2	6	8.0
80,000 - \$100,000	1	1.3	3	4.0
Over \$100,000	2	2.6	4	5.3
Missing	8	10.4	7	9.3
Totals	77	100.0	75	100.0

Chi-square level of significance = .3478

2. Nonfarm Income

While both groups appear to have earned income from nonfarm sources, a much greater percentage of nonenrollees (63.5 to 44.3) recorded nonfarm incomes in excess of 50% of their total household income. Therefore, unlike total household income, nonfarm income can be considered a factor that is related to enrollment (Table 2). Larger nonfarm incomes reduce the possible tax credit, and hence, one's incentive for enrollment.

Table 2. The Percentage Nonfarm Income of Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Percentage Nonfarm Income	Enrollees		Nonenrollees	
	No.	%	No.	%
0 - 10%	24	31.2	12	16.0
10 - 20%	6	7.8	7	9.3
20 - 30%	3	3.9	2	2.7
30 - 50%	8	10.4	2	2.7
More than 50%	32	41.6	47	62.7
Missing	4	5.2	5	6.7
Totals	77	100.0	75	100.0

Chi-square level of significance = .0306

As for household income, nonfarm income among enrollees was highest among cash grain and beef, and lowest among dairy farms. For length of ownership, nonfarm incomes less than 10% and greater than 50% were associated with parcels that were held longer than 20 years. Similarly, no precise correlation was seen between size of holdings and nonfarm income, as an equal number of enrollees with holdings in excess of 120 acres had nonfarm incomes above 50% and below 10%.

Not surprisingly, nonfarm income was highest among those nonenrollees who leased their land. Similarly, owners who listed "residential" for motivation earned more than 50% of their income from nonfarm sources. A majority of farms greater than 40 acres had nonfarm incomes above 50% as well.

PARTICIPATION BASED ON OWNERSHIP CHARACTERISTICS

As above, it was hypothesized that the presence of certain noneconomic factors would act to negate the effect of benefits accruing from enrollment among landowners of certain characteristics. Thus, significant differences in these characteristics are expected to exist among both enrollees and nonenrollees.

3. Age

Noneconomic factors such as one's stage in the lifecycle (retirement) were seen to be important in one's decision to enroll, since it was hypothesized that younger landowners would not have the degree of emotional attachment to their land as older landowners. It was also thought that those nearing retirement were more likely to want to sell their land than the middle-aged. Thus large differences in age distribution were anticipated among enrollees and nonenrollees, especially among those ages 65 and over and under 30.

Within the age group 65 and over this subhypothesis is borne out, since fewer landowners of this category were enrolled (Table 3). Also, among middle aged landowners, more enrollees than nonenrollees were represented in the survey

population. Still, for the variable of age as a whole, there is no significant difference between the number of enrollees and nonenrollees among all categories. It can be thus concluded that enrollment is unrelated to age at both the .05 and .1 levels of significance.

Not surprisingly, age was related to length of ownership among enrollees. Similarly, older enrollees were more likely to organize their property in a partnership. They tended to have larger holdings, and a significant portion of them earned more than 50% of their income from nonfarm sources. Likewise, length of ownership was related to age among nonenrollees. Older nonenrollees were more likely to lease their land to others, own their land for residential purposes, and were likely to have earned at least half of their income outside the farm.

Table 3. The Age of Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Age of Landowner	Enrollees		Nonenrollees	
	No.	%	No.	%
25 - 34	8	3.9	3	4.0
35 - 44	9	11.7	10	13.3
45 - 54	18	23.4	11	14.7
55 - 64	24	31.2	19	25.3
65 and over	23	29.9	32	42.7
Totals	77	100.0	75	100.0

Chi-square level of significance = .4379

4. Organization

It was also assumed that the organization of one's property - individual, partnership, and/or corporation would have a bearing on enrollment as well. While the distinction between an individual ownership and a partnership are often indistinguishable, there were considerably more enrollees who listed the organization of their property as a partnership, reflecting the size of their operation (Table 4). Due to this divergence, enrollment and organization can be said to be significantly related.

Table 4. The Organization of Property of Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Organization	Enrollees		Nonenrollees	
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
Family or Individual	56	72.7	72	96.0
Partnership	20	26.0	3	4.0
Corporation	<u>1</u>	<u>1.3</u>	<u>0</u>	<u>0.0</u>
Totals	77	100.0	75	100.0

Chi-square level of significance = .0004

Among enrollees exclusively, partnerships tended to have lower incomes (both household and nonfarm); were located in areas of high potential development; and their owners were typically older - 55 and above.

5. Purpose

In terms of one's purpose for holding land, it was assumed that landowners who held their land for future sale and/or lease to others, would be less likely to enroll in the program than those whose principal purpose was farming since, by definition, those intending to sell land are not likely to be committed personally to preserving open space. The results of the survey support this notion as a greater proportion of nonenrollees, especially cash grains farmers and those located in areas of high potential development, were seen to hold their land for lease to others than enrollees (Table 5). Purpose and enrollment were found to be related at the .011 level of significance.

Table 5. Purpose for Holding Land of Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Purpose for Holding Land	Enrollees		Nonenrollees	
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
Farming	72	93.4	51	68.0
Lease to others	3	1.3	16	21.3
Sale for future development	2	2.6	3	4.0
Other	<u>0</u>	<u>0.0</u>	<u>5</u>	<u>6.7</u>
Totals	77	100.0	75	100.0

Chi-square level of significance = .0005

6. Motivation

Landowners motivated primarily by farming for the acquisition of their land were seen to be more likely to enroll in the program than owners who acquired their land for a residence or for investment purposes. Indeed, 93.2% of enrollees listed farming as the motivation for acquiring their land. And since considerably more nonenrollees listed residential use as their motivation for acquiring land, especially those located in areas of high potential development, it can be concluded that motivation and enrollment are strongly associated, especially since most of those listed as residential had nonfarm incomes in excess of 50%.

Table 6. Motivation for the Acquisition of Land of Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Motivation	Enrollees		Nonenrollees	
	No.	%	No.	%
Farming	72	93.5	54	72.0
Residential	1	1.3	13	17.3
Investment	2	2.6	6	8.0
Nonfarm Development	0	.0	1	1.3
Other	<u>2</u>	<u>2.6</u>	<u>1</u>	<u>1.3</u>
Totals	77	100.0	75	100.0

Chi-square level of significance = .0028

7. Type of Operation

Among those who listed farming as a motivation for acquiring land, significant differences existed for type of operation among enrollees and nonenrollees (Table 7). While nearly the same percentage listed cash grains for type of operation, differences among the groups were most obvious for the categories beef, hogs, and dairy. Indeed, the existence of such a disparity indicates that both pecuniary and nonpecuniary factors are involved. First, 10 out of the 11 dairy farm enrollees and 3 out of 5 beef farmland owners had nonfarm incomes less than 50%. The same pattern was present for nonenrolled hog farmers as well.

Since all of the beef farmers were located in areas of high potential development, it can be hypothesized that the tax costs of urban encroachment were large enough to warrant their participation. The opposite may be true for hog farmers as all were located in areas which do not appear to be threatened by development. Since half of these farmers were over the age of 55, it is rather surprising that a majority claimed that they "weren't interested." In general, as a result of these differences, the relationship between type of operation and enrollment was seen to be significant.

Table 7. Type of Farm Operation of Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Type of Operation	Enrollees		Nonenrollees	
	No.	%	No.	%
Cash Grains	49	63.6	54	72.0
Feed Grains	2	2.6	6	8.0
Beef	5	6.5	0	0.0
Hogs	0	0.0	6	8.0
Dairy	11	14.3	0	0.0
Fruit/Vegetable	2	2.6	0	0.0
Poultry	0	0.0	1	1.4
Other*	8	10.4	4	5.3
Missing	0	0.0	4	5.3
Totals	77	100.0	75	100.0

Chi-square level of significance = .0000
 * The most common responses were hay, alfalfa, and forestry.

8. Length of Ownership

Because of nonfinancial considerations, such as one's attachment to land, it was hypothesized that the length of time which one had owned land would be an important factor in their enrollment. For landowners who had held their land for over twenty years, this assumption was not confirmed by those in the survey population, as an equal number of nonenrollees and enrollees responded (Table 8). Throughout the category as a whole, however, the distribution among groups was fairly nonhomogenous.

Among both enrollees and nonenrollees, the length of ownership was significantly related to the age of the landowner. Nonfarm income's relation to length of one's ownership was somewhat less clear. While all types of nonenrollees of this category typically had nonfarm incomes in excess of 50%, enrollees of all lengths were split between nonfarm incomes less than and greater than 50%. Similarly, while there was a significant relationship between number of acres owned and length of ownership among enrollees, no such pattern existed among nonenrollees. Lastly, no relationship existed between this variable and type of operation among both types of landowners. Due to these differences, it can be concluded that length of ownership can be considered a factor which is related to enrollment.

Table 8. Length of Ownership of Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Length of Ownership	Enrollees		Nonenrollees	
	No.	%	No.	%
Less Than 10 Years	7	9.1	5	6.7
Between 10 and 20 Years	3	3.9	11	14.7
Between 15 and 20 Years	13	16.9	7	9.3
More than 20 Years	52	67.5	52	69.3
Missing	2	2.6	0	0.0
Totals	77	100.0	75	100.0

Chi-square level of significance = .0819

9. Acreage

The relationship between enrollment and size of landholdings was hypothesized to be dependent on one's holding costs, since total property taxes levied would be higher for larger operations than smaller ones. As for length of holding, one's attachment to land was thought to be dependent on size as well. Indeed, the results of the survey confirm this hypothesis, since the vast majority of enrollees have holdings in excess of 120 acres (Table 9). Overall, the relationship between acreage and enrollment was found to be highly significant.

Among enrollees, size of holding was not related to any of the other demographic variables except for motivation. Nonetheless, as expected, cash grains and dairy farms had the largest holdings. Among nonenrollees, size of holding was found to be related to length of ownership, age, and development expectations. Also, it is worth noting that a significant number of nonenrollees with holdings greater than 120 acres claimed that they didn't enroll because they "wanted to keep development options open."

Table 9. Size of Landholding of Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Size	Enrollees		Nonenrollees	
	No.	%	No.	%
21-40 acres	2	2.6	6	8.0
41-80 acres	4	5.2	22	29.3
81-120 acres	13	16.9	19	25.3
More than 120 acres	57	74.0	28	37.3
Missing	1	1.3	0	0.0
Totals	77	100.0	75	100.0

Chi-square level of significance = .0000

10. Enrollment based on landowner expectations

Next it was hypothesized that expectations would influence one's plans to sell land and, hence, their enrollment in the program. Among the survey population, this assumption was found to be correct (Table 10). Most obvious is the fact that none of the enrollees surveyed expected the conversion of their land "from agricultural to developed (nonagricultural) use" in less than ten years, while 13.6% of the nonenrollees anticipated development within this period. At the other end of the scale, nearly twice as many enrollees expected development in twenty years. Therefore, development expectations can also be considered to be important in the decision to enroll.

Table 10. Development Expectations of Enrollees and Nonenrollees
Michigan Farmland and Open Space Preservation Act, 1987

Development Expectations	Enrollees		Nonenrollees	
	No.	%	No.	%
Less than 10 years	0	0.0	12	14.7
Between 10 and 15 years	7	9.1	9	12.0
Between 15 and 20 years	2	2.6	3	4.0
More than 20 years	30	39.0	17	22.7
Don't know	38	49.4	34	46.7
Totals	77	100.0	75	100.0

Chi-square level of significance = .0044

Also, as expected a significant difference (among enrollees, chi-square = .1121; nonenrollees, chi-square = .0151) existed for responses given by landowners of both types of development potential as well.

MAGNITUDE OF FACTORS

Beyond a description of the factors which help determine enrollment, a secondary objective of this study was to understand the relative magnitude of these factors as well as potential development and their effect on future land use in the area. For enrollees, an inquiry of this sort requires an analysis of one's present and future commitment to the program. For nonenrollees, the magnitude of these factors was considered by eliciting one's reasons for not enrolling, and determining the point at which the economic benefits of enrollment become attractive enough to counteract those factors which have been previously outlined.

11. Reasons for Enrollment

Participants were asked to rank eight factors in terms of their importance as an impetus for enrollment. Among them it is clear that the program's reduction in taxes was important. Love of farming and protection of farmland were cited as the next most important reasons respectively. The frequency response table shown on the next page outlines the relative magnitude of all these factors.

Table 11. Reasons for Enrollment
Michigan Farmland and Open Space Preservation Act, 1987

Rank	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
Tax benefit	68.8	10.9	15.6	1.6	--	--	1.6	1.6
Love of farming	25.0	43.2	18.2	9.1	4.5	--	--	--
Protection of farmland	20.0	43.3	26.7	3.3	5.0	--	1.7	--
Protection of natural habitat	3.1	6.3	25.0	34.4	9.4	12.5	3.1	6.3
Not ready to develop	--	11.5	19.2	11.5	26.9	7.7	15.4	7.7
To avoid special assessment	--	5.2	7.8	2.6	2.6	11.7	1.3	5.2
To discourage purchase offers	--	3.8	26.9	3.8	15.4	7.7	34.6	7.7
Threat of Urban Expansion	8.0	4.0	8.0	32.0	8.0	8.0	4.0	28.0

12. Portion of land enrolled

The portion of one's total holdings which are enrolled in the program was suggested to be a test of program commitment. Interviews with Extension agents in the area of study revealed that withholding of land from a contract was quite common, and even encouraged by local officials, to enhance the owner's flexibility in land use decisionmaking. From this, it was deduced that withholding land from a contract would signify hesitancy toward preserving land, because one could earn money and/or increase cash flow by doing so. Enrollees were asked, therefore, if all of their land was currently under contract. A positive answer was assumed to be strong evidence of a commitment to land preservation, while a negative response demonstrated "hold out", unless of course a portion was being held for sale to a family member.

Using this criteria, commitment to preservation appears to be strong, since 64.9% of the responding enrollees had contracted all of their land. Among those who had not, 35.3% claimed that they did so in order to sell a lot to a family member, while another 35.3% did so to earn capital gains.

All types of operations withheld land from the program; beef and dairy having the highest percentage. Among these, only cash grains and dairy farmers had done so to earn capital gains. Land withheld is also related to the size of the operation, as the highest percentage had holdings in excess of 120 acres. With respect to age, owners 45-54 had withheld the highest percentage. No significant difference in the withholding of land existed among landowners of different development potentials.

13. Length of current contract

Longer contracts were most prevalent among dairy and cash grain operations, landowners with lower household income (and those who earned either less than 10% or greater than 50% of their earnings from nonfarm sources) and, not surprisingly, those farms greater than 80 acres. Owners ages 35 to 55 had the greatest number of contracts in excess of 30 years. Moreover, two landowners over age 65 had contracts of over 30 years as well!

A further test of contract commitment among enrollees was the comparison between the length of one's contract and their expectations. For this test it was assumed that if an enrollee expected development within ten years and enrolled his land in the program for a period of time greater than ten years, his commitment to the program could be considered strong. In general, the gap between one's expectations and length of contract was used as a proxy measurement for one's commitment to keeping land in its present use. For this purpose these two responses were compared. Of those who expected development within twenty years, only 3 out of 70 had enrolled their land in a contract greater than 20 years. At the other end of the spectrum, 24 of 70 of those who

expected development in more than twenty years had enrolled their land in contracts for less than this period of time.

It can be concluded from these results then that commitment to keeping land in its present use is somewhat less strong than it was felt above. Still, since 33 out of 70 enrollees were unsure about when development would actually occur, doubts about overall commitment cannot be concluded unconditionally. Also, one should note that there were no differences among enrollees by development potential.

14. Willingness to accept longer contract

As above, the extent of one's commitment to keeping land in its present form could be inferred from the minimum contract length one would be willing to accept. Enrollees were asked if they would accept a contract if its minimum length were 15 years instead of 10. Among those responding, 94.0% claimed that they would do so. However, when the minimum contract length was increased to 20 years, the expressed willingness decreased to 66.7%. Only 27% of those who would not have accepted a contract for twenty years did not expect development within this time period. At the opposite extreme, only 2 of 44 enrollees who said that they would have accepted a contract of this length did expect development within twenty years. Nonetheless, these results imply that commitment to preserving open space should be strong in the near future as well, particularly among those located in areas of high development potential, since no significant differences existed among enrollees for this variable.

15. Commitment to the provisions of contract

Another question concerned the effect of the program on an enrollee's decision to change land use. Thus enrollees were asked if they would attempt to break their contract "upon receiving an attractive offer" to sell their land. Of respondents, 72.9% claimed that they would not do so. Cash grains and operations listed as "other", those earning less than \$20,000, farms in excess of 120 acres, as well as landowners of ages

55-65 were among those who claimed that they would. Apart from these, the degree of commitment revealed to this point is strengthened by such a result.

16. Credit necessary to prevent land use change

The study attempted to elicit the strength of one's commitment to keeping land in its current use by determining the effectiveness of the credit offered under the program. Enrollees were asked the amount of property tax credit which would be necessary under P.A. 116 to influence them not to sell their land. The extent of the enrollees' interest is shown in Table 12, since over half claimed that any increase in the tax credit would be ineffectual. Nonetheless it is important to note that one-third of those who expressed interest in selling their land beyond the terms of the contract claimed that no increase in their tax credit would be sufficient to prevent them from doing so.

Among those who needed the least amount of incentive to preserve their land (a 10% credit or less) were cash grain farms, those with holdings greater than 120 acres, those earning less than 20% from nonfarm sources, and middle aged owners (ages 35-65). However, due to their prevalence among all enrollees, the middle aged were also the most intransigent to economic incentives, especially those aged 45-54.

Table 12. Increase in Property Tax Credit Under P.A. 116 Needed to Prevent a Change in Land Use, Enrollees, Michigan Farmland and Open Space Preservation Act, 1987

	No.	%
Wouldn't affect my decision	11	14.3
5%	1	1.3
10%	9	11.7
25% or more	10	13.0
Have no intention to sell under any circumstances	41	53.2
Missing	<u>5</u>	<u>6.5</u>
Totals	77	100.0

17. General effect on the economic viability of one's land

Enrollees were asked if they felt that the program was a major factor in their ability to maintain their current operation. Of respondents, 77.1% claimed that it was (cash grains and farms listed as "other", those earning between \$30,000 and \$60,000 per year, those with holdings between 81-120 acres, and those aged 55 and over were the most obvious dissenters). In response to a related question, 67.2% felt that the program helped them "make purchases for equipment and/or improvements" related to their operations (beef, dairy, and other; higher income farmers). Those with holdings greater than 80 acres; and those ages 45-54 were the principal dissenters in this case.

HINDRANCES TO NONENROLLEES

Beyond the costs associated with enrollment, such as the lien made on one's land, it was felt that the value of the land in an alternative use would be a major factor in one's decision not to enroll. Similarly, the actual amount of benefit was deemed important in such a decision.

18. Reasons for not enrolling

First, explicit reasons for one's nonenrollment were elicited from nonenrollees. Among those responding, the highest percentage claimed that they didn't know about the program (most notably cash grains farmers, smaller farmers - 41-80 acres, those of ages 65 and older, and those with nonfarm incomes in excess of 50%). After those who wanted to keep their development options open (typically cash grains, larger farms, those 55 and older, and those with nonfarm incomes greater than 50%), the next highest single response was "not interested" (typically older farmers and those with high nonfarm incomes). Thus, in keeping with earlier findings of the importance of household income, noneconomic factors were cited for nonenrollment in nearly half of the cases. Among those who responded "other", most were either wary of government in general, or had reservations concerning their ability to get out of the agreement (Table 13).

Table 13. Reason for Nonenrollment
Michigan Farmland and Open Space Preservation Act, 1987

Reason	No.	%
Didn't know about the program	21	28.0
Didn't qualify	4	5.3
Didn't benefit enough	6	8.0
Wasn't interested	14	18.7
Want to keep development options open	15	20.0
Other	15	20.0
Totals	75	100.0

19. Tax credit necessary to prevent land use change

The study attempted to determine when the benefits of the program would be attractive enough to convince nonenrollees to participate. The study asked these nonenrollees to determine the amount of tax credit which would prevent them from converting their land to a nonagricultural use. For this, 41.4% claimed that they would consider holding their land for a certain price, while 12% held that any tax credit would be ineffectual in a decision to sell their land (most obvious among them were large farms, middle aged farmers - 45-55 years, and those with nonfarm incomes in excess of 50%). Some 42% had no intention of selling their land under any circumstances! The overall breakdown of response to this question is shown in Table 14.

Table 14. Percentage Tax Credit Necessary to Prevent a Change in Land Use, Nonenrollees, Michigan Farmland and Open Space Preservation Act

	No.	%
Wouldn't affect a decision	9	12.0
7%	2	2.7
15%	2	2.7
20%	13	17.3
More than 20%	14	18.7
Have no intention of selling under any circumstances	31	41.3
Missing	4	5.3
Totals	75	100.0

BEHAVIORAL DIFFERENCES

Beyond determining the stated intentions of both enrollees and nonenrollees toward keeping land in its present use, the study also explored the actual performance of these landowners from the time of the program's enactment.

20. Purchases of Land

By increasing the viability of one's holdings, it was also hypothesized that recent purchases of land would be related to enrollment in the program. For this, landowners were asked whether they had purchased land in the past 15 years. Significantly more enrollees were found to have made such purchases to add to their present holdings, specifically those aged 35-65, than nonenrollees during this time period (Table 15). However, since a similar number of both enrollees and nonenrollees planned to purchase land within the next five years, it is difficult to determine if such behavior is actually related to program enrollment (Table 16).

Table 15. Purchase of Land Since 1972 among Enrollees and Nonenrollees Michigan Farmland and Open Space Preservation Act, 1987

Response	Enrollees		Nonenrollees	
	No.	%	No.	%
Purchased land	30	39.0	18	24.0
Did not purchase land	47	61.0	57	86.0
Totals	77	100.0	75	100.0

Chi-square level of significance = .0473

Table 16. Plans to Purchase Land in the Next Ten Years among Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Response	Enrollees		Nonenrollees	
	No.	%	No.	%
Have plans to purchase land	17	22.1	18	24.0
Have no plans to purchase land	55	71.4	57	76.0
Missing	5	6.5	0	0.0
Totals	77	100.0	75	100.0

Chi-square level of significance = .9559

21. Sales of land

Enrollees and nonenrollees were asked if they had sold any land from their total holdings in the past 15 years (Table 17). More nonenrollees had sold land during this period. However, the differences in behavior among these groups is small enough to accept the hypothesis that independence exists between enrollment and sales of land.

Concerning the actual reasons for selling land, there were no significant differences between the groups (Table 18). Among respondents who actually sold land, nonenrollees were seen to be more economically rational in their behavior, since a majority of these sales were motivated by profitability (especially among younger landowners, those with low nonfarm incomes and those located in areas of high potential development), while among enrollees, half of the sales were prompted by either state highway construction or family considerations.

Among those who did not sell their land, no significant behavioral differences existed among the groups (Table 19). While a majority in both cases did not sell because they wanted to "keep their land in its present use," more nonenrollees did not do so because they had not "received any offers." In general, while land sales cannot be said to be related to enrollment in the program, the behavioral aspects of these sales bear some relation to this variable.

Table 17. Sales of Land from Total Holdings in the Past 15 Years Among Enrollees and Nonenrollees, Michigan Farmland and Open Space Preservation Act, 1987

Response	Enrollees		Nonenrollees	
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
Sold land	13	16.9	18	24.0
Did not sell land	64	83.1	56	74.7
Missing	<u>0</u>	<u>0.0</u>	<u>1</u>	<u>1.3</u>
Totals	77	100.0	75	100.0

Chi-square level of significance = .2578

Table 18. Reason for Selling Land in the Past 15 Years among Enrollees and Nonenrollees, Farmland and Open Space Preservation Act, 1987

Response	Enrollees		Nonenrollees	
	No.	%	No.	%
To profit from a capital gain	1	7.6	3	16.7
Because former use wasn't profitable	2	15.4	6	33.3
To allow son/daughter to live there	4	30.8	4	22.2
Holding costs were too high	2	15.4	5	27.8
Other	4	30.8	0	0.0
Totals	13	100.0	18	100.0

Chi-square level of significance = .1041

Table 19. Reason for Not Selling Land in the Past 15 Years among Enrollees and Nonenrollees, Farmland and Open Space Preservation Act, 1987

Response	Enrollees		Nonenrollees	
	No.	%	No.	%
Haven't received any offers	4	6.2	3	5.4
Would have sold, but price was too low	3	4.7	7	12.4
Want to keep land in its present use	54	84.4	44	78.6
Other	3	4.7	2	3.6
Totals	64	100.0	56	100.0

Chi-square level of significance = .4861

In summary, the following variables were found to be related to program enrollment:

1. Nonfarm income
2. Organization
3. Purpose
4. Motivation
5. Type of operation
6. Potential development
7. Length of ownership
8. Acreage
9. Development Expectations

Two variables cited in the model were found to have no relation to the enrollment decision: age and household income.

Data limitations, most notably the small sample size of the population examined, call for a qualification of these conclusions. Specifically the cross tabulations of independent variables related to the enrollment decision revealed an abundance of "empty cells." Also, the unique characteristics of the type and size of operations in the area of study may create difficulties in applying these findings to other areas within the state of Michigan. These findings should be viewed as an indication of behavior which results from a land preservation program of this type.

CONCLUSIONS

Factors related to enrollment

Given that the tax benefit was cited by enrollees as a primary impetus for enrollment, it is clear that economic considerations are important in land use behavior. Taking this factor into account, an essential question to be asked is "how much so?" With approximately half of this same population claiming that no amount of tax credit would convince them to change their land use, and another 13% claiming that a mere 10% increase in the tax credit would be enough to convince them not to do so, it appears that such a conclusion warrants qualification.

Since the reasons "love of farming" and "protection of farmland were cited by 86.5% of these respondents as the second most important impetus for enrollment, it is clear that noneconomic factors also play an important role. And since nearly three-quarters of this same group claimed that they would not attempt to break their contract upon receiving an attractive offer to sell their land, the importance of economic factors should be restricted to the enrollment decision itself.

Thus, it appears that noneconomic motivations are important only with regard to one's decision to hold land. The financial rewards which accrue from enrollment in a preservation program such as P.A. 116 are merely an added incentive or official sanction for this type of behavior. (This is confirmed by the fact that 77.1% felt the Act was a

"major factor in the ability to continue their operation" and 67.2% claimed it helped them "make purchases for equipment and/or improvements" related to their operations.) So the preservation of farmland and the way of life associated with farming which is guaranteed by enrollment will enhance the present value of one's land. Other benefits which accrue from enrollment such as the tax credit will act to enhance this measure as well.

For nonenrollees, economic motivations can also be considered to be relatively weak with respect to enrollment. Indeed, noneconomic factors were involved in nearly half of the cases among reasons given for nonenrollment. But since half of those cited these influences claimed that they were unaware of the program, it is difficult to understand the actual extent of this factor. Nonetheless, since only 20% did not enroll because they "want(ed) to keep development options open," it cannot be concluded that hindrances to enrollment are predominantly economic in nature.

With respect to general land use, this fact is confirmed since 41.3% of the nonenrollees claimed that they had no intention of selling their land under any circumstances when asked about the tax credit necessary to prevent a change in land use. It appears that there is a large proportion of nonenrollees who did not enroll, not because they want to keep their development alternatives open, but simply because the benefits of enrollment did not exceed the costs, monetary or otherwise. In other words, enrollment did not enhance the present value of their holdings.

Also, over one-third of responding nonenrollees claimed that a tax credit of 20% or less would be enough to prevent them from converting their land to some other use. Since credits from P.A. 116 typically exceed this amount, it appears from this that one reason for nonenrollment is not ignorance, but rather unfamiliarity with the extent of benefits associated with participation.

Commitment to preservation

Among enrollees, commitment to the provisions of the Act appears to be strong as nearly three-quarters of those responding claimed that they would not sell their land upon receiving an attractive offer. However, when this same group was asked the amount of tax credit which would be necessary in excess of P.A. 116 to convince them not to sell their land, only half claimed that they had no intention of selling their land under any circumstances. These sentiments should increase doubts about actual commitment to the provisions of the Act.

Similar intentions are revealed for future land use. Although two-thirds of the enrollees claimed that they would have retained their contract if its minimum length were increased to twenty years, few expressed the desire to preserve their land beyond its expected time to development. Thus, landowners appear to be committed to preserving open space only for the present.

While a significant portion of enrollees (77.1%) claimed that enrollment was "a major factor in their ability to maintain their present operation," a majority also claimed that they had no intention of selling their land under any circumstances. Thus, some doubt can be raised about the actual impact of the program on land use.

Nonenrollees also appear to be committed to preserving open space, as a significant number claimed that they would do so with only minimal economic incentives. Among these, one should note that an even split occurred between those who didn't know about the program and those who weren't interested in it. Thus, it can be hypothesized that increased awareness of the Act would only affect half of those who already intend to preserve land.

General land use decision making

What is the impact of the program on land use decisions? Since there is a significant relationship between purchases of land and enrollment, it can be hypothesized

that the program has given landowners the opportunity to increase the size of their present holdings. However, since there is no significant difference between these groups' future plans to purchase land, no strong conclusion can be made regarding this hypothesis.

Given that significant differences exist among them for reasons for selling land, economic considerations may play a more important role in decision making among nonenrollees than enrollees, especially among those in regions of high development potential. However, while 12.5% of nonenrollees and 4.7% of enrollees would have sold land if the price were right, a majority of landowners in both cases expressed the desire to "keep their land in its present use."

To reiterate, 77.1% of responding enrollees felt that the Act was a "major factor in the ability to continue their present operations." Of this same group -62.2% claimed that it helped them make purchases for equipment and improvements. Taken alone, these results suggest that the program has been a positive force enabling landowners to remain in farming. These facts must be balanced with the knowledge that a substantial number of enrollees claimed that they had no intention of selling their land in any case.

Furthermore, while present landowner commitment to preserving open space appears to be strong, the long-term outlook is less optimistic, as only 4.3% of the enrollees contracted their land beyond its anticipated time of development (this is not surprising since a majority of enrollees were between the ages of 45 and 64). Thus, a principal policy finding of this study is that the program has had, and probably will have, a limited impact on land use in the Lansing Area. Since many nonenrollees also appear to be committed to preserving land in its current form, at least for the present, this does not imply that prime farmlands will be lost in the near future.

Finally, the survey results suggest that the sanctions associated with enrollment, specifically the use rights restrictions and lien, are a significant obstacle to increased participation.

RECOMMENDATIONS AND AREAS OF FUTURE STUDY

This study indicates that enrollment can be enhanced with increased public awareness. Since it has been shown that a significant number of nonenrollees are already committed to keeping their land in its current form, a campaign of this sort could be moderately successful.

For this purpose, a study of the enrollment process similar to that of Carman (1977) could be useful to determine which factors contribute to ignorance of the potential benefits of the Act. Because this study suggests that variations in enrollment can be explained by variations in expected net returns, the impact of increased awareness of features such as tax savings should also be examined.

Similarly, since many nonenrollees expressed dismay over the lengthiness of the application procedure as well as uncertainty concerning the program's use provisions, attempts to minimize potential transactions costs could be made. As suggested by Cochrane (1976), emphasis could be given to studies which examine the effect of the program's restrictions on the enrollment decision. Since it was hypothesized that increases in program sanctions would be related to low enrollment, future research could attempt to measure the effect of say, a shorter lien and/or freer use rights on enrollment. These findings could then be implemented into local land use policies, and their effect on preserving open space could be monitored.

Lastly, the benefits of enrollment are apparently diminished by high percentages of off-farm income. For this, an exemption of a percentage of such income could be considered to increase enrollment. Indeed, many nonenrollees, typically part-time farmers, expressed the desire to preserve open space. However, as expected, their level of income prevented them from doing so. Thus, it would be interesting to determine the impact of a liberalization of the enrollment requirements on the program's long-term objectives.

ENDNOTES

- 1 Screening Committee, Governor's Conference on Agriculture, Prospects for Michigan Agriculture and Agribusiness in the 1980's, October, 1983, p. 13.
- 2 Michigan Public Act No. 116, 1974.
- 3 Lynn R. Harvey, "Property Taxes: Assessments, Rates, Revenues, and Relief Programs Including P.A. 116," Department of Agricultural Economics Staff Paper, Michigan State University, April, 1987.
- 4 Michigan Statistical Abstract 1985, p. 4.
- 5 Harvey, op. cit., p. 14.
- 6 Soil survey maps, Clinton, Eaton, and Ingham counties.

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