

PURDUE AGRICULTURAL ECONOMICS REPORT

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Bumpy Road to Adoption of Precision Agriculture

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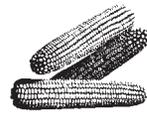
Introduction

Technological change is messy and disruptive. We often must change the way we think about things, as well as the way we do them. Frequently, technological change has unexpected and unintended consequences that cause chain reactions throughout a production and marketing system. Technology does not suddenly appear from the laboratory or workshop fully formed and perfectly operational. It usually requires a period of adaptation, with farm tinkers, manufacturers and scientists all doing their part to make the technology both profitable and practical.

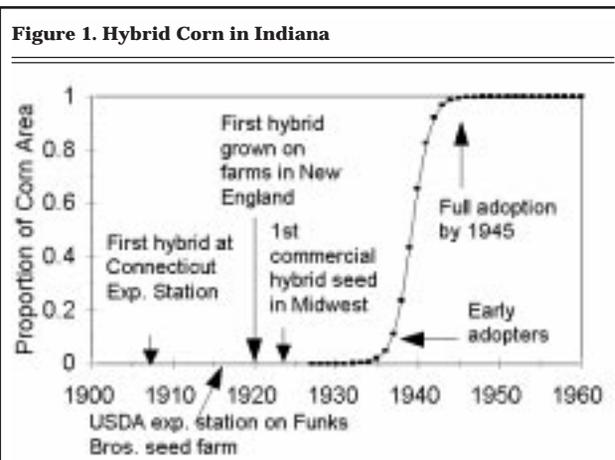
In the middle of this flux, farmers and agribusinesses must make technology choices. They can not wait until the dust is settled and the technology matures because that is too late. Most of the profits from any new technology go to the early adopter. The purpose of this paper is to identify some patterns of technological change that will help farmers and agribusinesses make strategic decisions about one of the major technological changes in the 1990s, precision agriculture. The approach will be to look at what can be learned from previous technology, in particular the motorized mechanization of agriculture in the early twentieth century and the development of hybrid corn.

Hybrid Corn

Hybrid corn came close to following the idealized S shaped adoption curve (Figure 1). When hybrid corn became widely available in the Midwest in the early 1930s a few innovators tried it and it was widely publicized in yield trials and the farm press. As the benefits of planting hybrid seed became well known large number of farmers adopted it. In Indiana this rapid adoption phase occurred in the late 1930s and early 1940s. By about 1950 most farmers who would use hybrid seed had adopted the practice.



The key question is why did many US farmers waited until the late 1930s to adopt hybrid seed. The possibility of hybridizing corn was known in the 19th century. The first corn hybrid was tested at the Connecticut Experiment Station in 1908 (Figure 1) and yielded 202 bu./a., at a time when average corn yields were 40-60 bu./a. What held back the commercialization of hybrids? The barriers were partially institutional. Corn breeding had to be reorganized to identify adapted inbreds and hybrids. A way had to be developed to get that seed to farmers. The science part of hybrid corn technology was available long before the organizations were available which would enable farmers to use it.



Before hybrids, corn breeding focused on mass selection of open pollinated varieties. Most of this selection was done by farmers. Selection by land grant university and seed industry researchers was a small part of the picture. One of the main activities of the USDA corn program was to coordinate a network of farmers selecting the best open pollinated ears from their corn fields. Trying to maintain this model, early corn hybrid researchers spent time trying to develop ways that farmers could develop and produce their own hybrids. Some suggested varietal crosses between different open pollinated varieties as a way that farmers could benefit from hybrid vigor. Others felt that farmers should buy inbreds developed by universities and produce their own hybrids.

It was in the mid 1920s that Henry Wallace, founder of Pioneer Hi-bred Corn Company, Eugene Funk of Funk Brothers Seed and others came to believe that a new organizational structure was needed. Hybrid corn should be developed, produced and sold by specialized

companies. It took a few years for these seed companies with the help of the USDA and the universities to identify adapted hybrids, as well as working out a marketing structure. By the early 1930s all the elements were in place and hybrid corn use expanded rapidly.

Seed corn became an early example of industrial specialization in agriculture. Hybrid seed is a science based product produced by specialists. The role of farmer tinkers in developing hybrid corn technology is small. Even Lester Pfister, founder of Pfister Hybrid Corn Company, was as much an entrepreneur as a corn breeder. The adoption curve for hybrid corn is smooth in part because the technology came to the market in the 1930s in a relatively mature form. The "bleeding edge" of technology occurred earlier in the 1920s and at a very small scale.

Who are the early adopters in the hybrid corn story? Was it the New England farmers who grew the first hybrid corn in 1920 before there was a way to provide a regular supply of hybrid seed? Was it the innovators who experimented with early Cornbelt hybrids in the late 1920s and often found them to be poorly adapted, not much better than their best open pollinated varieties? Or was it those who purchased the first hybrids available on a large commercial scale in the 1930s? When it is said that "most of the profits from new technology go to the early adopters," we mean the "early adopters who get it right." In that sense, the

"early adopter" who increased profits was the Midwestern farmer who used hybrids to increase production in the early 1930s before the impact of increased supply affected the market.

One of the precision farming parallels to the hybrid corn case involves data analysis. Most manufacturers and researchers involved in developing precision farming tools assume that farmers will analyze their own yield monitor, soil test and other site specific data. But is this like expecting farmers to produce their own hybrid seed, just because farmers have always produced their own seed? There are large economies of scale in data analysis that suggest that this function could be carried out more efficiently and at lower cost by specialized organizations. The question is what kind of organization is best suited to handle the data analysis: for profit business like fertilizer dealers and crop consultants, or nonprofit organizations on the model of farm business associations.

Mechanization

Motorized mechanization of North American agriculture presents a more complex adoption path than hybrid corn (Figure 2). The history is complete with false starts and stair step adoption patterns. Motorized mechanization of agriculture



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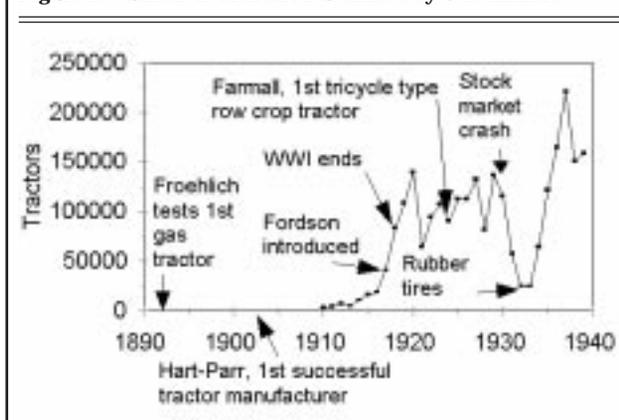
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Figure 2. Number of Tractors Purchased by U.S. farmers



was built on a long history of animal powered mechanization. Initially, innovators wanted motorized machines to do what horse and ox power had done before on the size of farms that they were used to. One of the early problems for tractor manufacturers was to make tractors small enough. Eventually, with the development of new implements and the increase in farm size the comparative advantage of motorized mechanization could be exploited, but we are still living through the farm size adjustment.

Steam powered mechanization was essentially a false start that illustrates the problems with making decisions based on early prototypes. If someone had estimated the potential for mechanization of crop production based on the steam tractors available in the 1890s, the resulting analysis would have presented a relatively bleak picture. Steam power might be competitive with animal traction on very large operations, with large stoneless fields, in areas with high labor costs. This was true in the 1890s in California and on the large bonanza farms in the Red River Valley of North Dakota. Given the information available at the time, mechanization of the Cornbelt was unlikely. The steam technology available would be awkward for primary tillage of the relatively small Cornbelt fields and it would be unusable for cultivation of growing crops.

This analysis of mechanization would be accurate given the

technology available at the time, but it would have missed the mark completely because it did not reflect the potential for technology change in the form of smaller internal combustion engines, power take off (PTO), tricycle type tractors which could be used in row crop cultivation and rubber tires. These innovations were not on the market in the 1890s, but their precursors were being discussed.

At the turn of the century most parts of the U.S. economy were mechanizing because science and innovation was supplying ever more convenient motorized power and because higher labor costs were driving a demand for automation. With hindsight we can see that mechanization of agriculture was inevitable, it was just a question of how. In a market economy it is unlikely that agriculture will be permanently different from other sectors of the economy.

It can be argued that precision farming is currently at the steam tractor stage. Currently available precision technology fits on some farms in some areas, just as steam mechanization was feasible in California and in the Red River Valley in the 1890s. But most economic studies indicate that current technology often fails to cover costs. Using current technology requires considerable time and dedication. Packaged precision farming systems are not yet available. At the same time, precision farming technology currently in the development stage could greatly increase its profitability and

ease of use (e.g. soil sensors, decision support systems). Global Positioning System (GPS) based technology is being applied throughout the economy wherever activities are scattered over a large geographical area. GPS systems are being applied in trucking, forestry and security services. It is likely that agriculture will be able to find a profitable use for GPS. We just do not know yet which use will be most practical and profitable. Current precision farming technology may be a false start and we can ask if precision farming innovators are the early adopters who get it right and reap the profits of innovation, or if they are the tinkers who prepare the way for later widespread adoption?

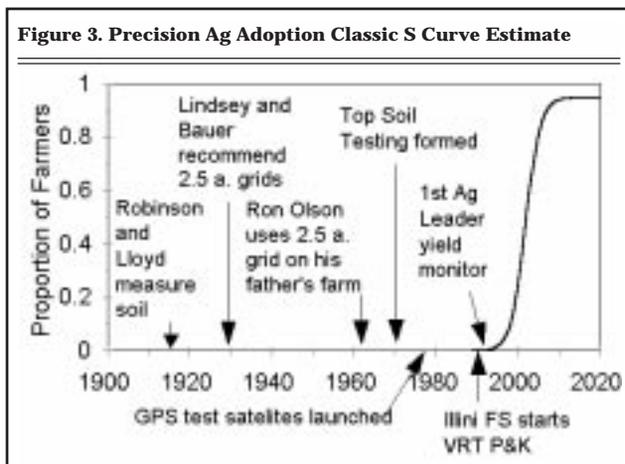
Precision Farming

Precision farming is a new technology with a long history (Figure 3).

Farmers have long tried to maximize crop yields and profits by spatially varying input applications. Scientists have studied spatial variability since at least 1915. Mechanization made it profitable to treat large areas with uniform inputs. GPS and other precision farming technology promises to reverse the trend to standardized crop recipes and make it economically feasible to manage crops on a more site specific basis.

Precision agriculture is an intuitively appealing concept and some expect it to have a smooth, rapid adoption path similar to hybrid corn in the 1930s and 1940s (Figure 3.). Several characteristics of the technology and the economic context suggest that the dynamic of change for precision farming will not fit the classic S curve model:

- 1) the technology is immature — farmers can not buy a complete precision farming system. Partial systems may be profitable for some farmers, but not for everyone.
- 2) the technology lends itself to tinkering — precision farming is not a yes or no choice. Farmers



- can and will modify the technology substantially.
- 3) institutions are not ready to deal with precision farming data — getting the most from precision farming will probably require data pooling, but we lack the organizational structure to do this pooling effectively.
 - 4) Midwestern agriculture is increasingly risky — with reduced government price stabilization precision farming adoption may be subject to the kind of economic ups and downs that delayed mechanization of many farms in the 1920s and 1930s.
- b) lack of decision support systems may constrain wide spread use of precision farming technology. Nice colored maps are not enough to make it pay.
 - c) full adoption may only occur after complete on-the-shelf systems are available and supporting institutions are developed to manage and analyze data. The current effort to develop systems in which farmers can analyze their own data might turn out to be like the efforts of corn breeders to develop systems which would allow farmers to grow their own hybrid corn seed.

Conclusions and Implications

Experience with technology adoption in agriculture suggests that the relatively rapid, smooth adoption process exemplified by hybrid corn in the Midwest is the exception, rather than the rule. The dynamics of adoption are often bumpy, with false starts and periods of stagnation because of technological or institutional barriers.

Science based technologies which are presented to the farmer as a package for an either/or choice often have the smoothest adoption path. If they are profitable, not too risky and within the resources of farmers, they are rapidly adopted. If profitability is

questionable, risk is too high and/or resource requirements too great, they disappear. But even in the case of these package technologies, institutional factors may affect adoption. Widespread use of hybrid corn was delayed by the lack of organizations for corn breeding and commercialization. Use of genetically engineered crop varieties is facilitated by the organizations created for commercialization of hybrid corn.

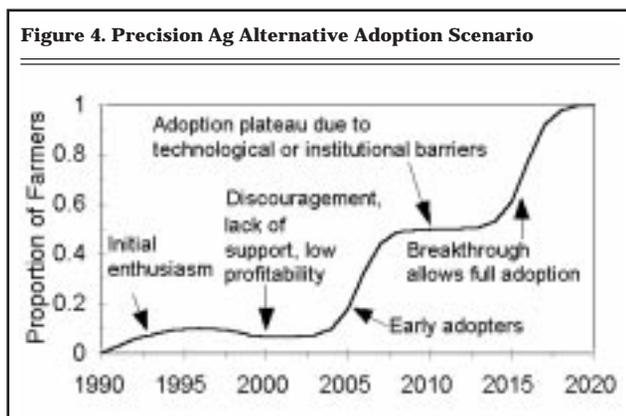
Technologies which come to the market in an incomplete and immature form may have long adoption periods with many ups and downs. Farmer and agribusiness innovators often play a major role in the development of these technologies. The adoption of the tractor in the U.S. is an example. Precision farming technology has many of the same adoption characteristics as motorized mechanization. It came on the market in an incomplete form and many questions remain about its profitability. It lends itself to farmer modification.

In a strategic planning perspective, the dynamics of technology adoption may derail the best laid plans. The cases of hybrid corn and motorized mechanization suggest the following lessons:

- 1) be ahead technologically, but not too far ahead — evidence is that profits go to the early adopter, not necessarily to the tinkerer.
- 2) be prepared for bumps — technology change is rarely smooth. Precision agriculture may have more ups and downs than most.
- 3) development of management expertise is often the most durable product of trying new technology — in the case of precision farming, we know that the hardware and software will change rapidly. Building the capacity for spatial management will be the longest lasting investment.

An alternative scenario for precision farming adoption suggests (Figure 4):

- a) the current burst of precision farming enthusiasm may not be sustainable — many farmers and agribusinesses bought into precision farming on a promise of profitability. While crop prices are high and the technology is a novelty, they may be willing to wait. When corn drops below \$2/bu., Cornbelt farmers and agribusinesses will ask harder questions about precision farming returns.



Income Tax Aspects of the Taxpayers Relief Act of 1997

George F. Patrick, Professor

Tax cuts and a balanced budget were negotiated by President Clinton and Congress in the Taxpayer Relief Act of 1997 (TRA '97). However, political realities resulted in many of the tax cuts only occurring several years in the future. A few provisions of the law are retroactive, some take effect in 1997, and most are phased in gradually beginning in 1998 or later years. This article provides an overview of some of the provisions affecting agriculture as well as those affecting producers as individuals.

Agriculturally-Related Provisions

Deferred Payment Contracts - TRA '97 defers proceeds from deferred payment contracts for sales of crops and livestock until the year of receipt for both regular tax and alternative minimum tax (AMT) purposes. This provision applies to farmers using the cash basis method of accounting and is retroactive to tax years after 1986. In 1996, the IRS had taken the position that producers selling commodities using a deferred payment contract could defer the income from the sale until the year of receipt of the proceeds for regular tax purposes. However, the proceeds would have needed to be included as income in the year of delivery of the commodity for AMT. Later, in Notice 97-13, the IRS allowed producers to follow previous procedures for the 1996 tax year but would have required AMT income adjustments in the 1997 to 2000 tax years. TRA '97 eliminates the need for these adjustments. Farmers who included the proceeds from sales made in 1996 under deferred payment contracts for 1996 AMT income, or earlier years, and paid AMT should explore their refund possibilities.

Income Averaging for Farm Income - TRA '97 makes income averaging available to farmers for years in the 1998 to 2000 period. Producers can elect to treat part or all of their farm income as if it had been earned equally over the three

preceding tax years. Farm income is defined as Schedule F, or Form 4835, income plus the income from the sale of draft, breeding and dairy animals and farm machinery and equipment, but not land, reported on Form 4797. For example, assume that a producer's taxable income in 1995, 1996, and 1997 was \$10,000 below the beginning of the 28% tax bracket and \$30,000 above the beginning of the 28% tax bracket in 1998. If the producer elected to treat the \$30,000 from 1998 as if it had been earned equally in the three previous tax years, then the entire \$30,000 in this example would have been taxed at the 15% marginal tax rate. These income averaging provisions apply only for income tax purposes and not for self-employment tax. Only farm income, as defined above, is eligible for averaging. However, the entire taxable income of the taxpayer in the preceding years is included in the tax calculations. Although the new income averaging provisions may provide tax relief to farmers in some high income situations, because of the wide tax brackets there may be little or no tax savings for farmers with income averaging in many situations. Thus, tax planning prior to the end of the tax year should not be neglected.

Distress Sales of Livestock - TRA '97 expanded the relief provisions for the drought sales of livestock to floods and other weather-related conditions for sales after 1996. Because of weather-related conditions, a farmer



may sell more livestock than normally would have been sold. As an exception to the general rule, reporting of the proceeds from the sale of those additional animals may be postponed for one year at the producer's election. A Presidentially declared disaster area must exist, although the animals or the sales do not need to be located in the disaster area. However, the producer must be

able to show a direct relationship between the disaster and the sale of the animals. In other weather-related situations, a producer may sell more animals than normal and replace them within two years of the year of sale. A producer may elect to postpone recognition of the gain of the livestock by reducing the basis of the replacement livestock. A Presidentially declared disaster area is not required for this provision to be used. Both of these elections are described in detail in IRS Publication 225, *The Farmer's Tax Guide*, for drought situations. Similar procedures would be used for other weather-related conditions in 1997 and later years.

Selected Other Business Provisions - Although not just specific to agriculture, TRA '97 increased the self-employed health insurance premium deduction to 50% in the year 2000. The deduction continues to increase, reaching 100% of premiums for 2007 and later years. TRA '97 also allows the same recovery period for alternative minimum tax (AMT) depreciation as for regular tax depreciation for assets placed in service in 1999. Thus, farmers will not need to have a separate AMT depreciation schedule for assets acquired after 1998. For net operating losses (NOL) in years after 1997, the carryback period will be two years instead of the current three years, while the carryforward period will become 20 years. However, if the business NOL is attributable to losses in a Presidentially declared disaster area, the carryback period remains at three years.

Capital Gains

Tax rates on capital gains were generally reduced for sales after May 6, 1997. However, the tax rate on short-term capital gains, generally assets held a year or less, continues to be the individual's regular tax rate which could be as high as 39.6 percent. "Mid-term" gains, assets held for more than a year but not more

than 18 months and sold after July 28, 1997, are taxed at the lower of the individual's regular tax rate or 28 percent. Long-term gains, generally for assets held for more than 18 months, are taxed at a 20 percent rate (10 percent for individuals in the 15 percent regular tax bracket). The holding period for livestock held for draft, breeding, dairy and sporting purposes to qualify to be treated as a long-term capital gain continues to be more than 12 months (more than 24 months for cattle and horses). Thus, the proceeds from a producer's sale of a sow that had been held for 17 months would be treated as capital gain but taxed at the lower of the producer's regular tax rate or 28 percent.

Gains on "collectibles" such as works of art, antiques, and "old iron" are taxed at the lower of the regular tax rate or 28 percent even if held for more than 18 months. A special maximum tax rate of 25 percent applies to the gains on the sale of real estate which is attributable to Section 1250 recapture. This would apply to the gain on a general purpose farm building or non-farm real estate on which straight-line depreciation had been taken. For example, if a building which originally cost

\$20,000 and had been depreciated to \$12,500 were sold for \$25,000, then the \$7,500 of depreciation recapture would be taxed at the 25 percent rate and the remaining \$5,000 of gain would be taxed at 20 percent. Any depreciation recapture on machinery, equipment, or other Section 1245 property is treated as ordinary income and taxed at the taxpayer's regular income tax rate. Thus, the sale of multiple assets may involve several capital gain tax rates.

For assets held more than five years, the tax rates will be even lower beginning in 2001. For individuals in the 28 percent or higher regular tax bracket, the 20 percent capital gains tax rate drops to 18 percent for assets acquired on or after January 1, 2001 and held for five years. An asset owned on January 1, 2001 can qualify for the reduced rate if an individual pays the tax due on the gain as of the end of the year 2000 and then holds the asset for five years or more. For individuals in the 15 percent regular tax bracket, treatment is more favorable. First, the 10 percent capital gain rate drops to 8 percent for assets held for five years or more as of January 1, 2001. Second, an individual in the 15 percent regular tax

bracket does not have to pay tax on the gain as of the end the year 2000 to qualify for the reduced capital gain tax rate.

The rates and holding periods are summarized in Table 1.

Long-term capital losses are first used to offset long-term capital gains in the same tax rate group. If there is a net long-term capital loss in a rate group, it is used to offset gains in the next highest rate group. Any net short-term capital loss would first offset long-term capital gain from the highest rate group with remaining net loss being applied to the next highest rate. As under previous law, annual deductibility of net capital losses is limited to \$3,000 for individuals.

Up to \$500,000 of gain on the sale of a principal residence may be excluded from income by a married couple, filing jointly (\$250,000 for single individual) for sales after May 6, 1997. In general, the home must have been the principal residence for two of the five years prior to the sale. This provision replaces the postponement of the recognition of gain if reinvested in another principal residence within a two-year period and the "once in a lifetime" exclusion of \$125,000 of gain for individuals age 55 or older. However, it should be noted that the exclusion applies to gain on the sale of the personal residence and not the rest of the farm.

Child Tax Credits

For years after 1997, taxpayers with qualifying children may claim a maximum tax credit of \$500 (\$400 in 1998) for each qualifying child. To qualify, the child must be an individual who can be claimed as a dependency exemption by the taxpayer, is under the age of 17 at the end of the tax year of the taxpayer, and the child, stepchild, or eligible foster child of the taxpayer.

The credit is reduced \$50 for each \$1,000 that adjusted gross income (AGI) exceeds \$110,000 for married filing jointly, \$75,000 for single, or \$55,000 for married filing separately. The credit reduces income tax liability on a dollar for dollar basis. However, this credit interacts with the Earned Income Credit (EIC) and

Table 1. Capital Gain Tax Rates by Date of Sale and Holding Period

Date of Sale and Holding Period	Tax Bracket of the Taxpayer ¹	
	15% regular tax	28% or higher regular tax
Before May 7, 1997		
One year or less		regular tax rate
More than one year	15%	28%
May 7 - July 27, 1997		
One year or less		regular tax rate
More than one year	10%	20%
After July 28, 1997		
One year or less		regular tax rate
More than on year but not more than 18 months	15%	28%
More than 18 months ²	10%	20%
After December 31, 2000		
More than 5 years	8%	18% ³

¹ For 1997, the 15 percent tax rate applies to taxable income of \$41,200 or less for married individuals, filing jointly and \$24,650 for single individuals.

² Excluding "collectibles" which are taxed at the lower of the regular tax rate or 28 percent.

³ Assuming asset was acquired after December 31, 2000 or tax on gain paid in 2001 and held for more than 5 years.

there is a complex formula to determine the amount of the credit and whether it is refundable.

Educational Incentives

TRA '97 provides several ways of reducing the cost of your or your children's college education. In general, these programs do not start until 1998 and are subject to income limitations. Also, the provisions are mutually exclusive. Thus, taxpayers must choose which of the credits or exclusions they will use.

HOPE credit is a nonrefundable credit against federal income taxes (cannot exceed the income tax liability) of up to \$1,500 per student per year. The credit applies only to the first two years of the student's post-secondary education in a degree or certificate program. The HOPE credit is available only for the taxpayer, spouse, or individuals who may be claimed as dependents, who are pursuing a course of study on at least a half time basis, and have not been convicted of a felony drug offense. The credit is 100 percent of the first \$1,000 of qualified tuition and fees, and 50 percent of the next \$1,000 of such qualified expenses. Books, room, and board are not qualified educational expenses for the HOPE credit. The HOPE credit is effective for expenses paid after December 31, 1997 for academic periods beginning after that date. Because the HOPE credit can be claimed for only two tax years per student, it may be possible that not all of the expenses of the first two years of education will qualify. The HOPE credit will be phased out over the \$80,000 to \$100,000 modified adjusted gross income level for married couple filing jointly. The phase-out level of incomes will be adjusted for inflation beginning in 2001.

The Lifetime Learning Credit is equal to 20 percent of qualified tuition and fees incurred after June 30, 1998 on behalf of the taxpayer, taxpayer's spouse, or dependents. For the period of June 30, 1998 to January 1, 2003, up to \$5,000 of qualified expenses are eligible per taxpayer return. This increases to \$10,000 for 2003 and later years. The Lifetime Learning Credit is available for any

course of instruction at an eligible educational institution to acquire or improve job skills of the student. This is in addition to the type of expenses which would qualify for the HOPE credit. Like the HOPE credit, the Lifetime Learning Credit is phased out in the \$80,000 to \$100,000 modified adjusted gross income range for joint filers. Furthermore, the credit is not allowed on scholarships which are excluded from gross income or expenses that are deductible. For tax planning, it should be noted if the educational expense can be deducted as a business expense on Schedule F or Schedule C, the tax-savings (considering both income and self-employment taxes) will generally be larger than claiming the Lifetime Learning Credit. If the educational expense may be taken only as an itemized deduction, one should determine whether the deduction or credit provides the larger tax-savings in a year.

Special "educational IRAs" were created solely to pay qualified higher education expenses. For



1998 and later tax years, \$500 annually per beneficiary under the age of 18 can be contributed to an education IRA. Only one education IRA is permitted per beneficiary. The contribution is reduced for contributors with modified adjusted gross incomes of \$150,000 to \$160,000 for joint returns. Distributions from an education IRA are excludable from income to the extent that they do not exceed the qualified higher educational expenditures (which are defined more broadly than for the HOPE credit) of the individual. If the education IRA has not been used for qualified educational expenses by the time the beneficiary reaches 30 years of age, it must be distributed and is subject to a 10 percent penalty tax in addition to regular income tax. However, a rollover of the education IRA from one beneficiary to another is allowed, provided the new beneficiary is a

member of the family of the old beneficiary.

Distributions after 1997 from an existing retirement IRA are not subject to the 10 percent early withdrawal penalty if used to pay qualified higher educational expenses (including graduate school) of the taxpayer, taxpayer's spouse, or any child or grandchild of the taxpayer or spouse. However, such distributions are subject to regular income tax.

Interest paid on student loans will be deductible for computing adjusted gross income after 1997. The maximum interest deduction is \$1,000 in 1998, \$1,500 in 1999, \$2,000 in 2000 and \$2,500 in 2001 and later years. The deductible amount is phased out for single individuals with income beginning at \$40,000 and \$60,000 for joint returns. The deduction is allowable only for interest which must be paid on a qualified educational loan during the first 60 months in which interest payments are required. The interest deduction is not allowed for an individual who may be claimed as a dependent on another taxpayer's return.

Individual Retirement Accounts (IRAs)

The adjusted gross income (AGI) limitations for deductible contributions to IRAs are gradually increased. Currently, deductible contributions are phased out beginning at \$30,000 AGI for single individuals and \$50,000 for married individuals filing jointly. The lower phase-out limit will be \$50,000 for single individuals by 2005 and \$80,000 for joint filers by 2007. Spouses of individuals who are covered by a qualified retirement plan could not make a deductible IRA contribution under previous tax law. Deductible contributions will be allowed for 1998 and later tax years, although they are phased out for taxpayers with an AGI of more than \$150,000.

"Roth IRAs" are nondeductible IRAs available in 1998 and later years. Unlike regular IRAs, contributions to a Roth IRA do not reduce income for income tax purposes when the contribution is made.

However, if invested for five years or more and distributed after the beneficiary reaches age 59 ½, then the distributions are **not** taxable. The maximum contribution to all IRAs, including Roth IRAs, is limited to \$2,000 per year. Roth IRA contributions are phased out for joint filers with an AGI of more than \$150,000 (\$95,000 for single individuals). Taxpayers with an AGI of less than \$100,000 can rollover or convert an existing IRA into a Roth IRA in 1998 and the tax due can be spread over four tax years. The Roth IRA will be

a very attractive investment alternative for some people.

Selected Other Provisions

TRA '97 has many other income as well as estate and gift tax provisions which can affect individuals and businesses. Some provisions, such as the increase in the mileage rate for charitable use of a car increase from \$0.12 to \$0.14 per mile, may affect a number of people but have only limited impact. At the other extreme, provisions such as the repeal of the 15 percent tax on excess distribution

and excess accumulation of retirement accounts may have a very large effect on a small number of individuals.

Because of the very extensive nature of the changes being implemented by TRA '97, individuals are encouraged to review their tax situation carefully, both for 1997 and future tax years. Even individuals who have prepared their own tax returns may want to review their situation with a competent tax advisor.

Joan R. Fulton

Joan R. Fulton joined the faculty in July as an assistant professor in the areas of teaching, extension and research in marketing and agribusiness. She did her Ph.D. work at the University of Minnesota where she explored the impact of centralized versus decentralized decision making authority in grain marketing cooperatives. For the past four years she has been an assistant professor at Colorado State University where she taught marketing and agribusiness classes and developed a research program dealing with the question of "how does organizational structure affect efficiency and profitability in agribusinesses?" Her research has involved extensive work with agricultural cooperatives at the local and regional levels. Although she had only a limited extension appointment while at Colorado State University she was active in a number of areas that included: working with local and regional cooperatives in the state as a resource person for their educational programs by consulting on program planning and being a speaker for director training workshops; serving as a member of the Education Committee of the National Council of Farmer

Cooperatives; and being a part of the planning committee and/or speaker for extension programs dealing with marketing and value-added opportunities in Colorado agriculture.

Teaching

At the undergraduate level Fulton will be teaching classes in futures and options, cooperatives, vertical coordination, and food marketing management. Fulton will also have graduate teaching responsibilities in marketing and price analysis. She plans to continue development of computer software for educational purposes, with particular emphasis in the area of commodity marketing.

Research

Fulton will continue her research program examining the broad question how the organizational structure of markets and businesses affects efficiency, equity, return and risk. Specific examples of this research include: factors affecting the success/failure of joint venture

and strategic alliance agreements, how alternative organizational and ownership structures allow producers to take advantage of value added business opportunities, and the return and risk trade-offs associated with alternative business structures such as the New Generation Cooperatives.

Extension

Dr. Fulton's extension program at Purdue University will communicate the results of her research on agribusiness organization structure to business leaders across the state. She will participate in Outlook sessions sponsored by the Department of Agricultural Economics, work with the Center for Agricultural Business, and work with leaders from agricultural cooperatives in Indiana and the surrounding area. Fulton will also publish the results of her research in extension bulletins and the Purdue Agricultural Economics Report.



Joan R. Fulton

Manufacturing Growth in Indiana

Craig Houin, Graduate Student and Kevin McNamara, Extension Specialist

Increased competition among communities to attract new manufacturing plants in the 1990s lead to the question of whether or not recruitment programs worked to attract firms. A survey article by Smith and Fox concluded that recruitment programs that reduced corporation taxes had little effect on a firm's location decision. Market access, labor force characteristics, and a concentration of businesses activity were far more important influences on firm's location choices (Smith and Fox).

Footloose firms (firms not restricted to a location due to supply or demand constraints) evaluate several factors in the selection of a location, such as proximity to customers/clients, highway access, real estate costs, skilled workers, business atmosphere, wage rates, utility rates, costs of living, business taxes, cultural/recreational facilities, fire protection, and educational facilities (Site Selection Handbook; McNamara, Kriesel, and Rainey).

Communities can influence some of these factors, such as fire protection, educational facilities, utility services, lot size, etc. However, other factors, such as access to major transportation networks and availability of skilled workers can not be easily influenced. When attempting to determine the strengths and weaknesses of individual communities, leaders must be realistic in assessing their community's potential to attract new firms. If a community does not possess factors influencing location, footloose firms may be difficult to attract.

** The data were attained from the Conway Data and the "Site Selection Handbook," and represents announcements of firm locations, new or expanded. The firms that were reported are a sample of the growth that actually took place. Announcement data represent firms that meet one of the following criteria a minimum investment of \$405 million, creation of 100 jobs, and a minimum of 500,000 square feet of floor space created. This criteria was relaxed for certain cases to provide a more balanced geographical representation, thus enabling smaller projects to be reported, these were generally expansion projects in rural communities.*

Growth Trends in the United States

The continued growth of the global economy has spurred a world wide industrial explosion. While a large percentage of this growth has been outside the United States' borders, such as in Brazil, China, India, Russia, and Saudi Arabia, the US has been a growth leader. In 1996 alone, large manufacturing projects have grown in the US by 5,576 new plant construction announcements. (Pennington).

accounted for 77% of this growth. These regions were: the East North Central, South Atlantic, East South Atlantic, and West South Atlantic Regions (Conway Data). Fifty percent of the nation's population lives within these four regions.

The East North Central, which includes Indiana, and South Atlantic Regions, grew by 14,657 firms (Table 1) accounting for 52% of new firm announcements. Announced firm locations tend to be in popula-

"The continued growth of the global economy has spurred a world wide industrial explosion."

Industrial growth in the US has resulted in community job growth. New machinery manufacturing establishments provide, on average, an estimated 242.6 new jobs per plant (Pennington). Electrical manufacturing establishments provide an average 219.7 jobs per plant, and transportation equipment a 194.3 job average per plant. While these sectors offer the highest number of jobs per plant, communities generally see all manufacturing plants as desirable.

Total announcements, which are public statements by firms of new facility construction or existing facility expansion, for industry in the U.S., from 1992-1996, was 27,770 establishments (Conway Data*). Four of the nine U.S. regions

tion centers with the infrastructure, labor, and other assets firms need to support growth and expansion. The Mountain and Pacific regions and Northeastern region experienced the least amount of growth since 1992, accounting for 23% of total U.S. announcements. These regions represent 50% of the U.S. population. States in these regions generally do not have the population base, infrastructure, workforce, or manufacturing base found in the Midwest and southwest areas of the United States.

With a concentration of manufacturing growth in twenty-two states, slower growing states should examine their recruitment potential and consider shifting attention to strategies that support indigenous business growth. The key to successful growth is providing a location that allows firms to effectively compete in the marketplace.

The East North Central Region attracts and retains manufacturing. The region has lead the nation in new firm announcements three of the last five years. This growth is attributed to the return of manufacturing firms that moved south for

Table 1. United States Firm Locations by Region (1992-1996)

Region ¹	Year					Total 1992-96	Population ² Million	Locations/ Million People
	1992	1993	1994	1995	1996			
New England	45	40	64	78	144	371	13.313	27.87
Middle Atlantic	195	243	146	372	833	1,789	38.153	46.89
East North Central	773	1,043	1,468	1,824	2,240	7,348	43.456	169.09
West North Central	230	243	262	307	356	1,398	18.348	76.19
South Atlantic	1,114	1,135	1,360	1,601	2,099	7,309	46.994	155.53
East South Atlantic	388	414	616	587	662	2,667	16.066	166.00
West South Atlantic	704	672	796	957	1,032	4,161	28.828	144.34
Mountain	161	120	258	316	304	1,159	15.644	74.09
Pacific	255	251	223	480	359	1,568	15.601	100.51
Totals	3,865	4,161	5,193	6,522	8,029	27,770	236	106.72

¹ *New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont Middle Atlantic: New Jersey, New York, and Pennsylvania. East North Central: Illinois, Indiana, Michigan, Ohio, Wisconsin. West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota. South Atlantic: Delaware, D.C., Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia. East South Central: Alabama, Kentucky, Mississippi, Tennessee. West South Central: Arkansas, Louisiana, Oklahoma, and Texas. Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming. Pacific: Alaska, California, Hawaii, Oregon, and Washington.*

² *Populations from 1995 Census Data*

low wages and more friendly tax climates (Rondy). They are returning in search of skilled labor and product markets.

Growth Trends in the East North Central Region

The East North Central Region experienced more growth than any other region, with a growth of 7,348 corporate facility announcements. Infrastructure, skilled labor, educational centers, and communication services position the East North Central Region for continued growth. The region has potential to meet the demand for technological services, has an educated labor force, and provides access to product markets.

All East North Central States (Illinois, Indiana, Michigan, Ohio,

and Wisconsin) experienced growth from 1992-1996. Ohio led with announcements for 3,639 new or expanded manufacturing facilities (Table 2). Illinois and Ohio, with 53 percent of the region's total population, accounted for 69 percent of the new firms in the region, per capita, from 1992-1996.

The East North Central Region has transportation networks, manufacturing, and financing. Major rail services in the cities of Chicago and Detroit, along with the networks throughout Illinois, Indiana, Michigan, and Ohio allow the region to supply materials and products all over the United States. Furthermore, the region's highway system is considered to be one of the best in the country because of the tremendous

amount of interstate highways connecting the region to Canada and the rest of the US. (Rondy).

Comparing the establishment announcements considering the population provides insight into each state's relative performance. Table 2 measures growth as a number per million population. Ohio still leads the region on a per capita basis. However, Wisconsin and Indiana become the second and third leading states when considering locations per million people. Illinois and Michigan had around 100 announcements per million, a slower pace than the two least populated states.

Indiana competes for new investment well with other states in the region. Indiana's growth is attributed to the state government and

Table 2 East North Central Region Firm Locations by State (1992-1996)

	Year					Total 1992-96	Population 1995	Locations/ Million People
	1992	1993	1994	1995	1996			
East N.C. Region								
Illinois	70	64	145	451	573	1,303	11.82	110.24
Indiana	159	122	132	180	184	777	5.80	133.97
Michigan	64	90	57	243	480	934	9.55	97.80
Ohio	319	689	911	888	832	3,639	11.15	326.37
Wisconsin	<u>161</u>	<u>78</u>	<u>223</u>	<u>62</u>	<u>171</u>	<u>695</u>	<u>5.12</u>	<u>135.74</u>
Sums	773	1,043	1,468	1,824	2,240	7,348	43	169.15

local governments policies to attract and retain firms (tax abatements and workforce training assistance), geographic location, business cost, and labor availability.

Growth Trends in Indiana

Indiana had announcements for 180 manufacturing plants, 11 headquarters, 13 offices, 4 research and development plants, and 32 distribution warehouses from 1992-1996, creating an estimated 20,344 new jobs. With the steel industry rejuvenated in the Northwest corner of the state and the auto industry moving into the central and southern half of the state, Indiana has made steps to increase employment.

Indiana's continued attractiveness is seen by the location of I/N Tek steel plant in New Carlisle and the Toyota Plant in Princeton.

Via the interstate highway system, transports leaving Indiana can reach 60% of the US population in one day (Site Selection, Feb. 1994, pg. 64). Indiana also has high concentrations of rail routes creating many opportunities for product mobility that are not offered in most states (Site Selection, Feb. 1994, pg. 64). Indiana's ports on Lake Michigan and the Ohio River provide Indiana the Atlantic Ocean and the Gulf of Mexico- via the Great Lakes and the Inland Waterway System.

Indiana had both new facility and expansion announcements from 1992-1995. The distribution of these announcements is shown in figures 1 and 2 (Figure 2 on page 12). New firm locations are concentrated in Allen (Fort Wayne) and Marion (Indianapolis) counties. Other counties exhibiting growth include Vigo (Evansville), Lake (East Chicago), St. Joseph (South Bend- Mishawaka), and Delaware (Muncie) counties. Firm expansions are concentrated in the same areas, Allen, Marion, and St. Joseph counties (Conway Data Inc.). Figure 2 shows the growth of expanding firms is more widespread than that of new firm announcements. Figures 1 and

2 show growth occurred in and around metropolitan areas and along major interstate highways.

Outlook

Regional and national growth trends suggest Indiana will to continue to experience growth. Growth in new plant investment will be concentrated around Indiana's metropolitan areas and along the interstate highway system. Expansion of existing industry, while concentrated in the manufacturing base around metropolitan areas, will be statewide. This should provide rural areas opportunity to maintain and expand their manufacturing base.

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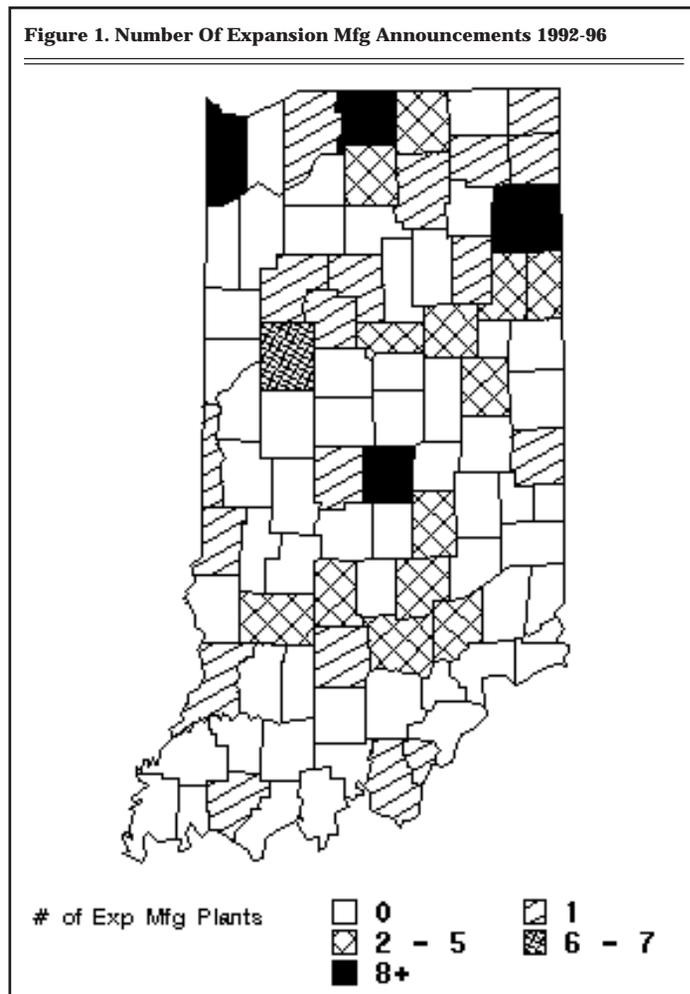
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Figure 1. Number Of Expansion Mfg Announcements 1992-96



Key Estate and Gift Tax Law Amendments

1. What is now the unified credit with an equivalent exemption amount of \$600,000 has increased to \$625,000 [renamed as the “applicable exclusion amount” (AEA)] in 1998 with more increases in most years until the AEA reaches \$1 million in 2006. There is no indexing of AEA for inflation. The \$10,000 gift tax exclusion will be indexed.

2. There is a new “family-owned business interests exclusion (FOBE)” permitting up to \$675,000 of FOB to avoid inclusion in the gross estate tax estate in 1998. The FOBE amount is reduced as the AEA in (1) above increases. The two together may reach a maximum of \$1.3 million. In the year 2006, the FOBE

amount is a maximum of \$300,000. There is no indexing for the FOBE.

Many requirements and definitions for FOBE eligibility draw directly from the special use valuation (SUV) law. SUV allows for a reduced valuation of farm and ranch land for estate tax purposes. However, the FOBE requirements go beyond the those for SUV. Qualifying decedent's estate and qualified heirs will, generally, have to engage in “material participation” — direct involvement in a trade or business. This new law emphasizes that “rent” arrangements will not satisfy the “business involvement” test for the owner of the business interest. However, for the decedent who was actually engaged in a business with a

family member ready to get involved or who is already in the business there should be little problem in qualifying — if the “percentage tests” are satisfied.

For example, the FOB interests must make up more than 50% of the decedent's estate and the total value of qualified FOB interests that passes to qualified heirs must be over 50% of the decedent's adjusted gross estate.

3. An amendment to the special use valuation law permits a qualified heir to cash rent to family members without causing recapture of the SUV estate tax savings. This is a change in the “at risk” rule that required the qualified heir to share lease to a family member. This change is consistent with earlier amendments providing that the “qualified use” or “at risk” requirement was lifted from the decedent (1981) whose land was rented to a family member and otherwise qualified for SUV and likewise for a surviving spouse (as a qualified heir) (1988) — meaning a cash-rent lease was permitted. Also, the \$750,000 limit on reduction in land value under SUV is indexed after 1998.

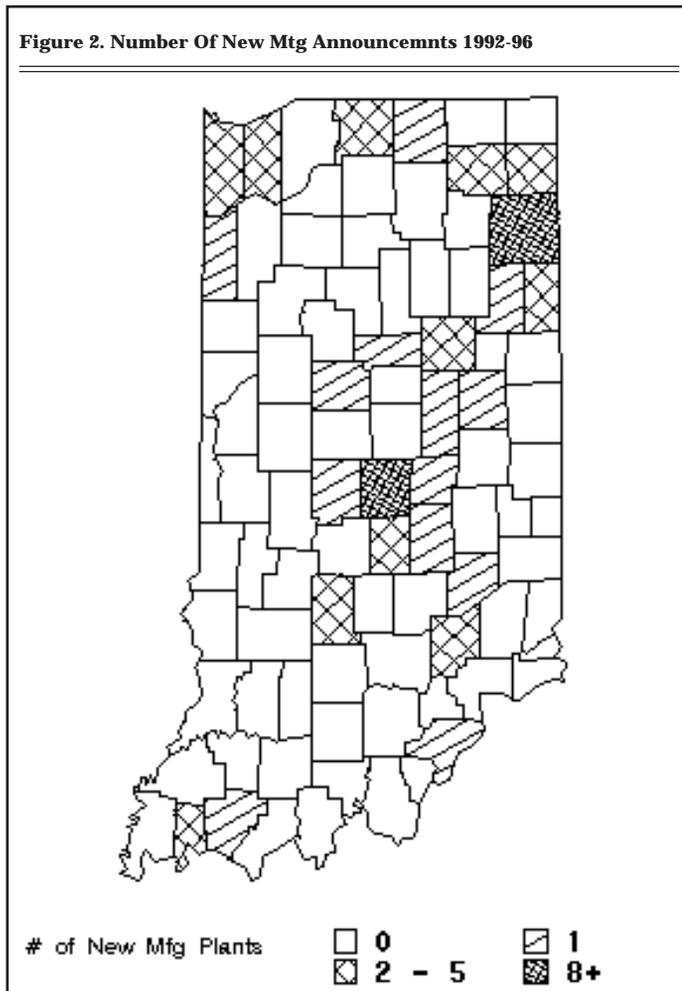
4. For those estates with a “closely-held business interest” that have an estate tax liability, installment payment of estate tax remains available at a reduced interest rate of 2% (down from 4%) for up to \$1 million in closely held business assets. The law no longer allows, that reduced interest to be deductible, but the \$1 million limit is indexed.

The Taxpayer Relief Act of 1997 includes several amendments to the federal estate and gift tax laws. Gerald A. Harrison has a paper “**Estate and Gift Tax Changes in The Taxpayer Relief Act of 1997**” that may be obtained by calling Gerry Harrison at 765-494-4216; or E-mail: harrison@agecon.purdue.edu or a toll-free call: 1-888-398-4636.

Additional discussion of these changes is planned for the January 1998, “Purdue Ag Econ Report.”

Continued from page 12.

Figure 2. Number Of New Mtg Announcemnts 1992-96



Using Budgets to Establish 1998 Rents

D. Howard Doster, Extension Economist*

Rents for 1998 will be influenced by a number of factors but key among these will be the expected level of returns. Some factors are already known. For example, 1998 government payments will be down \$8-12 per acre of corn base. Some factors can be anticipated such as crop production costs that on average are unchanged for 1998. Finally, some factors such as yield and price remain highly uncertain.

Everyone has expectations about future costs, yields, and prices. These expectations can be quantified in budgets. The author's budgets for 1998 are shown in Table 1. Rotation contribution margin (revenue minus variable costs) is shown to be \$169 for the low yielding Miami soil, \$218 for the average yielding Crosby soil, and \$280 for the high yielding Brookston soil. For each soil, the budgeted per acre contribution margin is the return to the machinery, the labor-management performance, and the land. Use the revenue and variable cost items to fit the terms of your lease or a lease you may be considering. For example, if you're a cash rent tenant, subtract cash rent from the contribution margin to determine the amount expected to be available for machinery replacement and labor-management, including yourself.

In Table 2, the budgeted increase in contribution margin is shown for each year after setting the 1995 contribution margin (not shown) equal to zero. Referring to the average yielding Crosby soil, note the 1996 budgeted contribution margin increased \$20 over the 1995 budget. The 1997 increase is another \$22 per acre. The 1998 budget is \$55 higher than the 1995 budget, and \$13 higher than the 1997 budget. The 1998 budget for the low yielding Miami is \$11 higher and the high

yielding Brookston is \$18 higher than the 1997 budget.

These numbers indicate that returns have been increasing, and are expected to increase again for 1998. Higher potential returns provide a strong economic incentive for 1998 rents to move higher again.

Price Expectations

Price expectations are expressed daily in the Chicago Board of Trade (CBOT) futures contracts. Until October 10, 1997, from the time trading began for futures contracts for November '98 soybeans and December '98 corn, prices for those contracts were lower each day than prices for year earlier November, '97 beans and December, '97 corn contracts.

On October 10, 1997, right after the USDA October 1, Crop Report, November '98 soybean contracts closed at \$6.90, and December '98 corn closed at \$2.90. A year earlier, however, futures prices moved lower all fall. From August '96 to December '96, November '97 soybean futures dropped \$.90 per bushel and December '97 corn fell \$.50 per bushel.

This year, while starting at lower price levels in July '97, November '98 soybeans and especially December '98 corn moved higher. *By November, if fall '98 futures contracts do not drop below their October 10 closing prices, budgets for 1998 will indicate higher rents for 1998, compared to 1997 budgets.*

As referenced in the Table 1 budgets, the prices for harvest '98 are

Table 1. 1998 Benchmark Contribution Margin¹ Budgets Corn/Soybean Rotation, Owner Operator Budgets Prepared October 10, 1997 for 1998 crops

Soil type Crop	Miami		Crosby		Brookston	
	Corn	Beans	Corn	Beans	Corn	Beans
Expected yield per acre	107.1	34.3	132.6	42.4	163.2	52.2
Harvest price	<u>\$2.70</u>	<u>\$6.65</u>	<u>\$2.70</u>	<u>\$6.65</u>	<u>\$2.70</u>	<u>\$6.65</u>
Crop sales	\$289	\$228	\$358	\$282	\$441	\$347
Less variable costs						
Fertilizer	33	16	43	19	54	22
Seed	20	7	22	11	25	13
Chemicals	23	27	23	28	24	30
Dryer fuel	7		10		12	
Fuel	8	8	9	9	10	10
Repairs	8	8	9	9	10	10
Hauling	6	2	8	3	10	3
Interest	6	5	7	5	8	6
Insurance/misc	<u>13</u>	<u>10</u>	<u>13</u>	<u>10</u>	<u>13</u>	<u>10</u>
Total variable costs	<u>\$124</u>	<u>\$83</u>	<u>\$144</u>	<u>\$94</u>	<u>\$166</u>	<u>\$104</u>
Contribution margin (cm) (sales minus variable costs)	\$165	\$145	\$214	\$188	\$275	\$243
Government corn payment	28 ²		34 ²		41 ²	
Rotation contribution margin (cm) per acre [(corn cm + bean cm + gov)-2]	<u>169</u>		<u>218</u>		<u>280</u>	

¹ Contribution margin is revenue (crop sales plus government payments) minus variable costs.

² Expected government payment is \$.36 x .85 x FSA yield (assumed here to be 90, 110, and 135 for these soils) x corn base acres (assumed here to be 50% of the farm acreage). Instead of \$.36, use \$.35 for 1999, \$.32 for 2000, \$.26 for 2001, \$.25 for 2002. The corn base acreage and FSA yield for a farm are already determined. The acreage of corn actually grown in 1998 does not affect the government payments in 1998-2002.

* The author thanks Professor Chris Hurt for the numerous changes he suggested to earlier drafts of this paper.

based on October 10, 1997 futures contracts of \$6.90 for beans and \$2.90 for corn. On November 15, 1996, the fall '97 futures were \$6.78 for beans and \$2.70 for corn.

Rents are negotiated throughout the year, but especially in the fall. For rents negotiated last summer, 1998 rents could be lower than 1997 due to lower price expectations at that time. For rents negotiated after you read this paper, rents could be higher than in 1997.

Benchmark Budgets

Landowners are encouraged to prepare so-called "benchmark" budgets before negotiating a rent with a prospective tenant. With access to computer spreadsheet software, it's possible to quickly create precise budgets using expected government payments, costs, yields and prices for the next year.

Approximate government payments are now known for each farm for each year through 2002. Expected yields by soil type are available from local NRCS (Natural Resources Conservation Service) offices. Yields can be assumed to increase about 1.1% per year, based on the change in average Indiana crop yields since 1975. Cost estimates can be made as soon as next season price quotes from dealers for seed, fertilizer, and chemicals are announced a few days after Thanksgiving.

Anticipated harvest prices for the next year's crops are expressed daily in Chicago Board of Trade futures contracts. Futures prices can be converted to expected local elevator prices by using a normal difference or "basis" for each elevator for each date.

The basis may be quite different for different locations on the same date. It is quite different for the same location at different times of the year. However, for any specific location and date it is generally fairly close each year. Therefore, a normal harvest basis for any elevator can be subtracted from November soybean futures prices and from December corn futures contract prices. The result is an estimated local elevator harvest price, based on the current futures contract price.

Many elevator operators, if asked, will share their normal basis levels for specific dates. A basis of \$.25 for beans and \$.20 for corn was subtracted from the futures prices to arrive at prices used in Table 1 and Table 2.

The author recommends that landowners create representative or benchmark budgets. It is useful to get representative budgets for costs, yields, and prices. Whether stated or unstated, every landowner and every prospective tenant has expectations about likely events for the next year. It is not necessary and may not be desirable for the landowner to use a specific prospective tenant's expected yields, costs or prices.

Production performance of tenants in any community varies considerably. For example, at the 1997 Purdue Top Farmer Crop Workshop, thirty-two tenants indicated an average expected corn yield difference of 25 bushels between the next-to-best and next-to-worst tenant if both could farm the same farm, the same year, with the same machinery, weather, etc.

Once a landowner creates a benchmark budget, they can negotiate with prospective tenants as to how to share the contribution margin. For example, *if given the opportunity to bid, a tenant will likely bid up the rent until the expected contribution margin each year is about the same, after paying their share of the variable costs including cash rent.*

Highly skilled tenants may expect to produce higher yields than in the landowner's benchmark budgets. They may expect to have excess funds after recognizing their machinery replacement and labor-management services. Lowly skilled tenants may be forced to stop bidding and not rent the farm.

Once a landowner creates a benchmark budget for their farm, they can quickly update it. For example, benchmark budgets can be made on the same date, say, December 15, or March 15, every year. Given a series of benchmark budgets made on the same date every year a landlord has evidence to support a change in rent. This is likely the situation as you read this paper.

The November 15 date for calculating prices in Table 2 was used for a number of reasons. The current year crop size and expected year-end carry-out has been widely circulated by USDA and others. Thus, persons interested in buying or selling futures contracts are well informed about market conditions at that time. Also, leases may have a December 1 notification date for terminating a lease.

Budgeted costs are based on the same criteria used to prepare the per acre production costs information in the annual Purdue Crop Guide, ID-166 by Doster, D.H., et al. For 1998 budgets, the total variable costs are essentially unchanged from the 1997 budgets.

Table 2. Comparison of Benchmark Budgets for 1995-1998; Change in Budgeted Contribution Margin From 1995 Budget; Three Soil Types, Corn/Soybean Rotation, Owner/Operator 1995, 1996, 1997 Budgets Prepared on Previous November 15; 1998 Budgets Prepared on October 10, 1997¹

	Low Yield Miami Soil	Average Yield Crosby Soil	High Yield Brookston Soil
1995	\$0	\$0	\$0
1996	15	20	23
1997	33	42	48
1998 ²	44	55	66

¹ Closing Chicago Board of Trade December, 1998 corn futures price was \$2.90 and closing November, 1998 soybean futures price was \$6.90. Cash prices used were \$2.70 for corn and \$6.65 for beans.

² Source: Table 1. 1998 Benchmark Contribution Margin Budgets.

You are invited to adjust the budgets for your own needs. You may want to substitute November 15, 1997 prices. You may want to substitute your costs and/or check the 1998 Purdue Crop Guide, ID 166, which will be based on early-order 1998 seed, fertilizer and chemical prices and is expected to be published in January. Currently, the total variable costs as shown in Table 1 are less than \$1 per acre different from 1997 budgets.

Rent Adjustors

Once a cash rent based on a benchmark budget is agreed upon, the landowner and prospective tenant can negotiate how to share changes in government payments, costs, and especially yields and prices. The agreement can be simple, merely agree to share 50/50 any changes from the benchmark budgets. Now you have a type of crop-share lease.

The lease with adjustors need not include any information about actual performance on the farm. Thus, the tenant will not be pressured to plant/harvest this farm on the best dates and the tenant will not need to keep separate cost or yield records for this farm. The lease adjustors can be based on events that occur outside this farmgate. For example, benchmark budget yields can be adjusted by the percentage change between expected and actual county average yields. Benchmark budget prices can be adjusted by the change between expected and actual local elevator

prices for a pre-specified date or dates. USDA reports an index of average input prices. This index can be used to adjust variable cost changes.

The Right Rent

No attempt is made in this paper to estimate the "right rent". However, this benchmark budget comparison information supports the conclusion that persons who negotiate their rents annually will increase their rents in 1998. Assuming the expected rent was right for 1997, a higher amount will be the right rent for 1998, if fall '98 futures prices stay at their October 10 levels or go higher. The budget comparison information also supports the conclusion that persons who adjust their rental rates infrequently will increase their rate if they negotiate a change for 1998.

When rents are market determined, such as by a rent auction, tenants can be expected to bid the known government payment into their rent offers. For both cash rents and share rents, the next year government payment can be expected to somehow get to the landowner, if the landowner chooses to allow prospective tenants to compete for the next year's lease. Likely, most prospective tenants will want to bid only part of any budgeted increase in contribution margins caused by higher crop prices. As demonstrated in recent years, prices can move rapidly both higher and lower. Particularly for

1998, many persons are concerned about possible weather effects on yields. Perhaps landowners will want to offer to share yield and price risk. You might decide what percent of the change from your benchmark budget each party will get. In return for accepting some of the risk, landowners can expect to negotiate a higher base rental rate.

Many factors besides budgets affect rents. For similar soil and location, rents negotiated by the same tenant may differ considerably. For example, at the 1997 Purdue Top Farmer Crop Workshop, thirty-two tenants with an average of 10 rentals each, indicated their share of the expected returns per acre varied by \$50 per acre between their most profitable and their least profitable rental. This reported variation may be indicative of the current difference in lease terms and rates within a specific township or county.

Share Rents and Privilege Payments

Suppose you are a tenant with a 50/50 crop share lease on Brookston-type soil and produce corn and soybeans. On average, you grow one-half each of corn and beans, and expect to have the revenue and variable costs as shown in Table 3.

Perhaps you realize that \$120 contribution margin per acre is more than most tenants expect to receive as the return to their resources of machinery and labor-management. Some tenants will bid away part of this amount plus all of the government program payment into a privilege payment in order to get a 50/50 lease instead of a cash rent lease on the high yielding Brookston-type soil for 1998.

In the Table 3 benchmark budget for the low yield Miami-type soil the 50/50 tenant's per acre contribution margin without government payment is \$70. In the average yielding Crosby-type, it is \$91.

Without stating what rent is right, the author used the following charges for machinery replacement and labor-management in 1997 budgets published in The Purdue Crop Guide, ID166. In that publication, charges were \$83 on low

Table 3. 1998 Benchmark Contribution Margin Budgets Corn/soybean Rotation, 50/50 Crop Share Tenant¹ Budgets Prepared October 10, 1997 for 1998 Crops

Soil Type Crop	Miami		Crosby		Brookston	
	Corn	Beans	Corn	Beans	Corn	Beans
Crop revenue	\$145	\$114	\$179	\$141	\$221	\$174
Less variable costs						
100% of fuel and repairs	\$16	\$16	\$18	\$18	\$20	\$20
50% of other variable costs	<u>\$4</u>	<u>\$4</u>	<u>\$6</u>	<u>\$6</u>	<u>\$7</u>	<u>\$7</u>
Total variable costs	<u>\$70</u>	<u>\$50</u>	<u>\$81</u>	<u>\$56</u>	<u>\$93</u>	<u>\$62</u>
Contribution margin (revenue - variable costs)	\$75	\$64	\$98	\$85	\$128	\$112
Per acre contribution margin without government program payment	<u>\$70</u>		<u>\$91</u>		<u>\$120</u>	

¹ Source: Table 1. In Table 3, the tenant's share is 50% of the crop sales, 100% of the fuel and repairs and 50% of the other variable costs.

yielding soil, \$87 on average yielding soil, and \$92 on high yielding soil. On the low yielding Miami-type soil, one-half of the \$28 government payment plus the \$70 tenant's budgeted 50/50 contribution margin equals \$84.

Conclusions

As presented in this paper, the budgets indicate rents negotiated after November will likely be higher than rents negotiated in fall '96 for 1997. The budgets also indicate rents will likely be much higher for leases renegotiated for the first time in several years.

In addition to a cash rent based on a benchmark budget, tenants may propose adjustors for yield and prices. Landowners may concur, assuming they expect over several years, to realize a higher average rent. Once created, a cash lease with adjustors can be a simpler alternative for sharing risks than a crop share lease.

On higher yielding soils, the budgets for a typical 50/50 share lease in 1998 suggest tenants could pay a privilege rent plus all the government payment. On low yielding

soils, the 1998 budgets suggest a typical 50/50 lease will include sharing the government payment 50/50 with no provision for a privilege payment.

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