

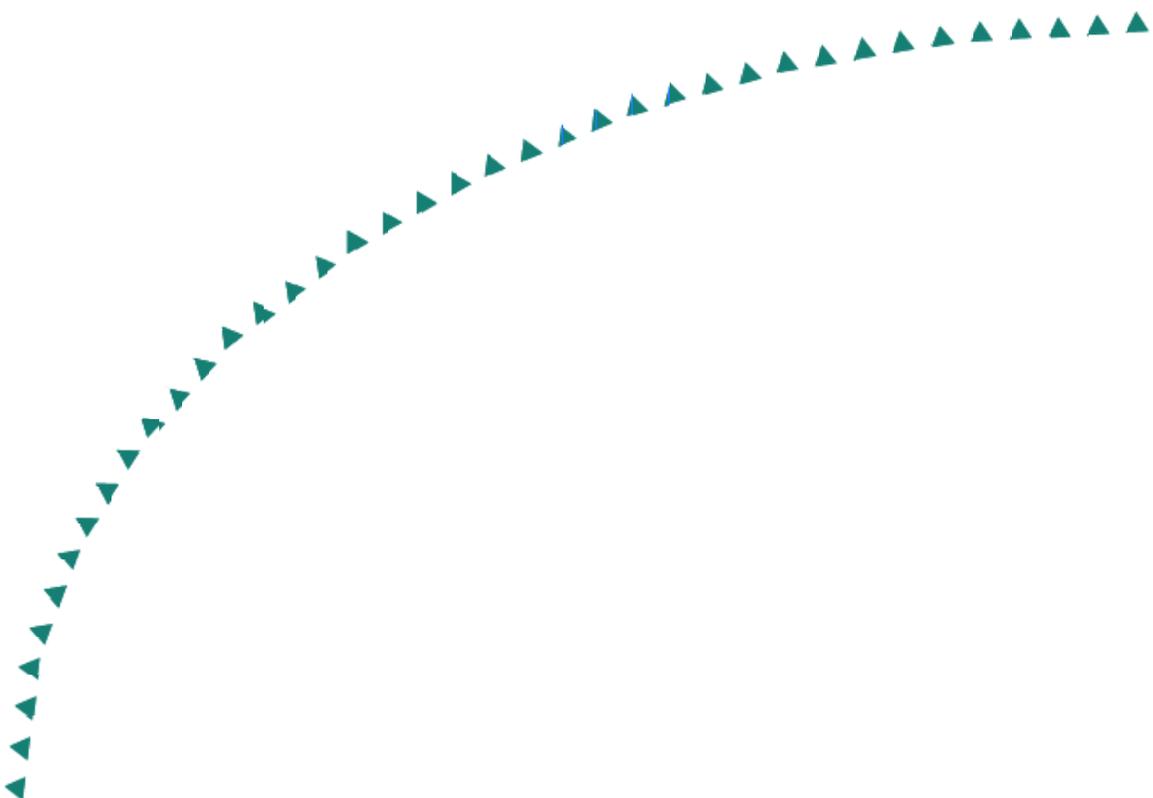
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Final Report

**The Financial Benefits of Early
Acquisition of Transportation
Right of Way**



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Final Report

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Executive Summary

Right of way (ROW) preservation refers to a range of techniques for influencing the development of land that may be needed for right of way in the future. Well-managed preservation activities can provide a number of important benefits both for the government and for the local residents. A particularly significant benefit for the government is the possibility of avoiding the need to buy expensive developed land at some point in the future, either by purchasing it early or by using other methods to keep it in an undeveloped or minimally developed state.

Purchasing land early is of particular interest in a time of tight budgets and rapidly rising land prices, due to its apparent potential for creating long-term cost savings. This report is principally aimed at analyzing the potential financial benefits of purchasing land well in advance of when it will be needed for transportation facility construction. The objective is to provide some theoretical and empirical economic context for thinking about the benefits and costs of early acquisition, within the context of a broader concept of ROW preservation.

There are many reasons for preserving ROW in a minimally developed state; the potential financial gains are just one of these. A discussion of the benefits and costs of early acquisition must be considered in this broader context. That is, a discussion of the financial aspects of early acquisition does not imply whether it is a good or bad idea in general (after non-financial issues are considered).

Given this, it is important to note that **this report is not intended to provide a definitive answer to the question of whether ROW should be acquired early**, only to open a discussion of the issues involved and to suggest the information and analysis that would be needed to provide such a definitive answer. Financial benefits and costs are just one aspect of the problem; findings related to this provide only part of the information that would be needed to form a general policy. Even in terms of the financial considerations, this report addresses the question only in a limited way. While this research does provide some perhaps surprising conclusions regarding the financial benefits of early acquisition, more work is needed to refine the results to the point where they can be used as the basis for a long-term policy.

There are two questions to be answered in determining the financial benefits of early acquisition. First, is the rate of price increase for any type of land high enough to justify early purchase as a general strategy? We conclude that it is not, when a longer-term perspective is considered and the very high rates of the last few years are placed in a historical context. Over a period of the last 40 years, the rates of price increase of both housing and farmland, which we use as proxies for developed and undeveloped land, have been lower than the return on medium-term government bonds, which could be considered the cost of the money being invested.

Second, if the average rate of increase is not high enough to justify early purchase, are there specific locations or types of land that consistently beat the average by large amounts, so that they are good investments even if land in general is not? There are two parts to this question: How high and how common are the highest rates of return, and can the areas of high returns be reliably predicted? Here we conclude that, with the possible exception of farmland around the Twin Cities, periods of rapid price increase are rare, that the increases are not that much more than the average, and that they are essentially impossible to predict.

There is an important conceptual point that must be emphasized here. This is that a policy of early purchase would have to be based on certain rules, or at least rules of thumb; properties that meet certain criteria would be candidates for early purchase and others would not. This decision would have to be based on information that is known *at that time*, and the policy would be evaluated based on the overall average rate of return of the properties that met the criteria versus those that didn't.

It is natural, but incorrect, to make the mistake of thinking about the problem *ex post*, that is, to observe places where land prices have risen dramatically in the last 20 years and to point to those as examples of why early purchase would be an effective cost-saving strategy. This research does not dispute the fact that there are places where purchasing land early would have been highly beneficial, but does dispute its relevance. The more important questions are whether these places would in fact have met some criteria for early purchase, what other places would also have met the criteria, and what the overall average rate of return would have been for *all* the places that would have been purchased early. That is, the question is whether early purchase would be profitable on average, not just whether it would be sometimes.

Another natural mistake is assigning too much importance to the present. Land of all types has been appreciating very rapidly in value for several years, even when compared with alternative investments; certainly a continuation of this pattern would be a strong argument for purchasing land as early as possible. But historically, this period of very large price increases is unique; there is apparently no period in the last 60 years that is comparable. Which brings back the point that the relevant question is not how good land is as an investment in the best of times, rather it is how good it is on average; and the example of the previous 50 years provides a strong counterexample to the presumption that the last ten years represent a long-term condition.

With the exception of land that will certainly or very likely become developed, or which may increase rapidly in value because of development or major highway improvements nearby, there would seem to be little argument financially for early purchase, at least based on the analysis here. However, we cannot rule out the possibility that smaller geographic areas may show more rapid, and possibly more predictable price increases. The large geographic scale of our analysis did not address this question. Our analysis also did not address the possible non-financial benefits of early acquisition; these might in some situations change the conclusions. Addressing either of these factors would be a significant research problem in its own right.

The following summarizes our conclusions regarding the financial benefits of early acquisition as a function of the various possible circumstances that we identified.

Land that is already developed (residential or commercial): Once land is developed, further price appreciation tends to be relatively small, rarely large enough that early acquisition will be worthwhile given the cost of money. Given that this is also the most expensive land to acquire, early acquisition resources are probably best used for other types of property. One exception to this might be if developed land is in danger of being redeveloped to a significantly higher value use. Another would be the transportation project is relatively imminent and the land is being offered for sale voluntarily. In this case purchasing on the open market might save some costs associated with a directed purchase.

Land that is not developed and probably won't be: This would be farm or forest land that is sufficiently far from developed areas that it is unlikely to have a change of use. In most cases this does not appreciate rapidly. The exception is land that is near developing areas (farmland around the Twin Cities) or in desirable recreational areas (lake counties north of the Twin Cities). The results in this research indicated that these land types may appreciate rapidly enough to justify early acquisition. Further research could support this finding and clarify the specific characteristics of land to which it applies.

Land that is not developed and probably will be: This is the one type of land that is almost certainly worth purchasing early. The difficulty in this case is in knowing the probability that a given parcel will actually be developed. The filing of a development plan would be one obvious sign, and perhaps it is safest to wait for this. The one possible exception to the early purchase rule in this case is land where the development will be low-value, and the transportation use many years in the future. In these cases it might be best to allow the land to be used until it is needed.

Land on major transportation corridors: A difficult type of property to analyze is land that does not appear likely to be developed, but is highly accessible and close to other land that is being intensively developed. Some who have seen this research have commented that land along major transportation corridors may appreciate more rapidly than land in general in the vicinity. Thus some areas that may not appear to be good candidates for early purchase when viewed in the aggregate may be more attractive when only the land along the corridor is considered. Again, the aggregate nature of our analysis means that we cannot rule out this possibility. Because a great deal of ROW purchase falls into this category, this would be a valuable subject for further research.

Perhaps the most important question that this research does not address is whether land that is located near current or future major transportation corridors might increase in price more rapidly than land that is not near these corridors. That is, the method employed in this research of examining average price increases over large areas such as counties, might be missing more dramatic, and possibly more predictable, price movements in the specific locations of interest.

Another important issue would be better understanding the non-financial benefits of early acquisition, such as a possibly simplified political process, less local disruption, and more control over project schedule and environmental mitigation. As with price changes, these seem likely to be more significant in some situations than in others; in some cases they may be so important as to justify early purchase even when it is not indicated for financial reasons.

A complicating factor for both prices and qualitative benefits is that there are other methods for managing development short of purchasing the property. These can in some cases provide many of the same benefits as outright purchase, but they also have costs associated with them. Any criteria for early purchase should also include criteria for when these other methods are more appropriate.

Ultimately the objective of all of this research is developing criteria by which properties can be evaluated either as candidates for early purchase, for preservation by some other method, or to be left alone and purchased when needed. As discussed earlier, such criteria must be based on information that is available at the time of purchase, and must be evaluated based on an extended period of time and on a large number of potential applications, not on the basis of a limited number of cases at a specific time in history.

The research in this report is not the last word on the subject. The point was more to establish a baseline understanding of the general characteristics of land price movements and to help clarify the more detailed questions that need to be answered next. Other approaches to ROW management also come at a cost; purchase could be a relatively beneficial approach in some cases even if it is not generally justified from a purely financial perspective.

1 Introduction

Right of way (ROW) preservation refers to a range of techniques for influencing the development of land that may be needed for right of way in the future. Well-managed preservation activities can provide a number of important benefits both for the government and for the local residents. A particularly significant benefit for the government is the possibility of avoiding the need to buy expensive developed land at some point in the future, either by purchasing it early or by using other methods to keep it in an undeveloped or minimally developed state.

Purchasing land early is of particular interest in a time of tight budgets and rapidly rising land prices, due to its apparent potential for creating long-term cost savings. This report analyzes the potential financial benefits of purchasing land well in advance of when it will be needed for transportation facility construction. The objective is to provide some theoretical and empirical economic context for thinking about the benefits and costs of early acquisition, within the context of a broader concept of ROW preservation.

There are many reasons for preserving ROW in a minimally developed state; the potential financial gains are just one of these. A discussion of the benefits and costs of early acquisition must be considered in this broader context. That is, a discussion of the financial aspects of early acquisition does not imply whether it is a good or bad idea in general (after non-financial issues are considered).

Given this, it is important to note that **this report is not intended to provide a definitive answer to the question of whether ROW should be acquired early**, only to open a discussion of the issues involved and to suggest the information and analysis that would be needed to provide such a definitive answer. Financial benefits and costs are just one aspect of the problem; findings related to this provide only part of the information that would be needed to form a general policy. Even in terms of the financial considerations, this report addresses the question only in a limited way.

Given the apparent absence of any prior research on this question, the approach here was to view the problem in the most general way; that is, to create a theoretical framework for thinking about the question, and to develop a broad understanding of land price movements and how they relate to the opportunity costs of holding land. Knowing whether land, on average, is a good investment (for cost-saving purposes) provides a baseline for better understanding specific situations. Different types of properties and locations appreciate at different rates. Starting out by looking at the big picture, and at large geographic areas, can help to identify possible characteristics of potentially rapidly appreciating properties. However, this report does not go to the level of analyzing price movements of individual properties or in small geographic areas; this problem is left for future research.

There are four central chapters in the report. The first develops an inventory of right of way preservation issues in a general sense. This is to provide a broad context of benefits,

costs, and situations within which the subsequent narrower financial analysis can be better understood. These issues include the desired benefits of ROW preservation, the opportunity costs that need to be considered, the range of land use situations that the analysis might need to address, and the problem of land that is purchased but not used for highway purposes. A final element of this is a discussion of the statistical and conceptual difficulties involved in analyzing land price appreciation; it leads to an important argument that anecdotal approaches to the subject should be treated with some degree of skepticism.

This sets the stage for the question of whether early purchase can be used as a cost-saving tool. This is done in two chapters. The first examines whether land tends to outperform potential alternative uses of money in a general sense; that is to say, whether early acquisition is always a good investment. The conclusion is that it is not. Assertions that land should always be acquired as early as possible, regardless of circumstances, are not supported by this analysis.

Given this, the next chapter explores whether there might still be specific circumstances under which land is a good investment, and the extent to which these circumstances can reasonably be anticipated. Good investing requires anticipating *in advance* which land will appreciate rapidly, not just observing it after the fact. Again, the conclusion is that opportunities for significant cost savings are relatively rare and hard to predict; and thus that early acquisition does not appear to be a viable cost-saving policy. However, the possibility still remains that further narrowing down the geographic area or the type of property might provide a way to identify such cost-saving opportunities.

It is hard to evaluate early acquisition without some understanding of the other alternatives to which it should be compared. A policy could appear to be undesirable from a financial perspective, but could nonetheless still be the best of the available alternatives. Appendix A gives a relatively superficial overview of a variety of the most commonly used ROW preservation techniques. All of the methods are essentially variations on a couple of main themes, and as such they all lead to a roughly similar set of benefits, but with differing costs depending on circumstances.

Even if early acquisition of ROW is not a reliable cost-saving method, it might still be a worthwhile policy to pursue because of the other benefits that are associated with it. That is, the non-financial benefits may outweigh the financial costs on average. This issue needs to be evaluated within the context of the other preservation methods that could potentially be used. Because of the large number of qualitative issues involved, this ultimate judgment is outside of the scope of this report. The hope is that the systematic discussion of the issues that is contained here will provide a framework for guiding future research, and will be of some immediate value to decision makers in understanding some of the difficult issues involved.

2 Right of Way Preservation Issues

The Federal Highway Administration defines corridor preservation as “any techniques that state and local governments use to protect existing corridors or planned corridors from inconsistent development, in an effort to minimize negative environmental, social, or economic impacts” (1). Corridor preservation activities can be aimed at existing highways as well as preserving planned corridors in an undeveloped state (2).

The multiple objectives of corridor preservation, the many methods available for achieving it, and the variety of situations that might be faced, make it necessary to place an analysis of the financial considerations within a broader context. This chapter addresses five broad issues that help to frame the question of the financial desirability of early right of way purchase.

The first is an overview of the reasons why governments pursue ROW preservation. This introduces two points, first that the financial merits of early purchase are just one aspect of a more complicated and qualitative problem. Second, that actual purchase of the ROW land is only one of many ways to achieve the desired benefits. A more in-depth discussion of some of these other methods is the subject of Appendix A of this report.

The second issue in this chapter is opportunity costs. Potential cost savings from buying land early must be weighed against the costs that are associated with this. The largest of these is just the cost of money; that is, the money used to buy land could have earned additional value through investment, or used to do highway projects yielding immediate benefits. However, there are also other costs to be considered.

The third section of this chapter describes some of the specific types of ROW preservation situations that typically arise; the financial benefits depend on details of these specific circumstances. For example, price movements in farmland can differ from housing price changes in ways that influence the ROW investment decision. This section also discusses a couple of specific situations in depth; these are important but limited in scope, and hence are not addressed in the main analysis of the report.

The fourth section discusses the costs of excess ROW that is purchased but not used, and describes a limited empirical analysis of the frequency with which this may happen.

The final section develops some ideas about how to think about the issue of the financial benefits of early ROW purchase, and why it is very difficult to analyze quantitatively.

2.1 Benefits of Preservation

There are two broad categories of reasons for preservation. The first is the desire to reduce the amount of disruption and cost to which the public is subjected when highway projects are done. If the public has been kept informed and appropriate agreements,

constraints on development, or outright land purchases have been put in place, then the number of homes and businesses that will be severely impacted can be minimized. Governments generally like to do the right thing by their citizens, and this also has the advantage, from the government's perspective, of minimizing the reasons why the public might eventually oppose a project, and thus avoiding costly project delays. The second general reason has to do with reducing the eventual costs of acquiring the necessary land.

An American Planning Association (APA) and Federal Highway Administration survey of APA subscribers to their planning service found that the primary reason local governments pursue corridor preservation is to avoid conflicts in the right of way (62% of respondents). Closely following were a desire to implement the comprehensive plan (46%) and an attempt to minimize land acquisition costs (44%). Other cited reasons included: aesthetic concerns (view protection and sign control); safety issues; traffic conflicts; and mitigation of dangerous roads and intersections (1).

The benefits of reducing impacts on the public are hard to analyze in any kind of quantitative way. Even just analyzing the benefits to the government itself, that is, eventual reduced political opposition to the project with the probability of reduced project costs, would require a difficult evaluation of the likelihood and costs of any political conflict that might arise, and the probability that ROW preservation practices could avert some or all of this. Attempting to acquire properties early, or even to prevent development through some method, may just move the public involvement problem forward in time, rather than averting it entirely.

One could also note that there have been many examples of major projects, like US 52 in and near Rochester, that involved significant ROW purchase but that did not encounter problematic public opposition, or at least not because of the ROW needs. Conversely, there have been cases such as US 212 in Eden Prairie where the ROW was in place but public opposition still occurred, in part because neighbors wanted to preserve the long-empty ROW corridor as open space. These may be exceptions that prove the rule, but they may also illustrate a conclusion that these purported political benefits need to be more systematically studied.

There are also a number of related benefits. Corridor preservation activities can potentially minimize environmental impacts because mitigation activities can take place in advance of construction (3, 4). Corridor preservation places greater emphasis on planning-level environmental impact analysis, rather than waiting for completion of a full Environmental Impact Statement (EIS), which in turn can make it easier to identify minimal-impact alternatives (3). Social impacts are reduced through the prevention of development and opportunities for planning; by preventing development in planned corridors, local governments reduce displacement of families and businesses located in corridors (3, 4). Corridor preservation can minimize disruption of utilities by giving utility providers advance notice of future projects, which could impact where or how they install their infrastructure (3).

The other broad category of benefits to ROW preservation is economic; that is, the notion that the project will ultimately cost less if the ROW is preserved in appropriate ways. Most significantly, this involves preventing expensive development from occurring on or too near land that will eventually be needed for ROW. There is little controversy about the desirability of this, although depending on the nature of the development that is likely to occur and how long it is likely to be until the highway is built, it may be appropriate in some cases to allow the land to be developed and economically productive until it is needed.

But in general the one thing that will cause land to escalate greatly in value is if something is built on it; thus it will usually be worthwhile to try to prevent this if the land is sure to be needed for transportation purposes in the fairly near future. There are a number of ways to accomplish this short of outright purchase, as described in Appendix A. Because this situation is not controversial, we do not address it in depth in this analysis.

We study instead the economic desirability of acquiring land whose development condition is unlikely to change significantly, either because it is already developed, or because it is not likely to become developed. These are the more difficult cases, because prices of these types of properties can still grow rapidly in some cases, perhaps rapidly enough to justify early purchase as a cost-saving measure. The next two chapters of this report address this question.

There are also potential secondary economic benefits of early acquisition or other ROW preservation methods. Costs can be reduced through avoiding the loss of desirable alignments to development (2, 3, 4). Local governments use corridor preservation techniques to ensure that they are developing areas consistent with long-range plans and regulations (3). Finally, as noted earlier, ROW preservation can simplify the eventual political challenges to starting the project; which in turn can reduce the project costs by allowing construction to remain on schedule.

An existing gap in the literature is a systematic attempt to prove that long-range preservation techniques are actually economically desirable given the opportunity costs of purchasing early, and the ongoing costs associated with some of the other methods described in the next chapter of this report. Much of the attention to benefits of corridor preservation in the literature has been focused on the potential for lowering costs through limiting development in planned corridors. (2, 3, 4) Unfortunately, saving money is not a legally sufficient justification for many preservation strategies, such as zoning ordinances, dedications, exactions, and conditional use permits. (3, 4) A point could also be made that, while corridor preservation aims at reducing eventual disruption and costs to both the public and the government, constraining how people use their land can also be disruptive and costly. More systematic analysis of the benefits and costs of the various preservation methods would be valuable.

2.2 Opportunity Costs

The purpose of this section is to establish a definition of the necessary rate of return that must be exceeded in order for investment in land to be a good idea from a financial standpoint. The goal is not to arrive at a specific number, as this would not be constant over time anyway, but rather to clarify the issues involved and to estimate a general range into which this rate of return would be expected to fall.

From a simple financial perspective, early acquisition may appear to be highly profitable, since land prices seem to almost always grow faster than the rate of inflation. However, the rate of inflation is not the relevant comparison. Purchasing land means that money is being committed to that purpose. This money has a cost; for example it might be borrowed, in which case interest is being paid. If it is not borrowed, the possibility exists that it could have been invested in something other than land, or even that it could have been used to do projects that would have yielded immediate public benefits. An investment must be evaluated in relation to comparable alternatives, not just as a standalone entity.

As an example, suppose the state pays one million dollars to buy land that otherwise would have appreciated at 4% per year for ten years. At this rate of price growth, if the land had not been purchased, at the end of ten years it would cost 1.48 million dollars. But suppose the state could have invested this money in risk-free government bonds paying 5% annual interest. At this interest rate, the money invested in bonds would have appreciated to a value of 1.63 million dollars, enough to pay the higher price for the land plus some left over.

Land must appreciate in value at least as much as the rate of return on comparable alternate investments for it to be a good idea from a financial standpoint. The notion of a comparable investment has two components, the holding period and the level of risk.

Generally investments held for longer periods pay a higher rate of return than do shorter-term investments; that is, a 30-year bond normally pays a higher interest rate than a five-year bond. Thus the longer the expected holding period, the higher the expected rate of appreciation has to be for land to be a superior investment.

More significantly, longer expected holding periods also make it possible to hold riskier investments such as stocks, because the risk of short-term price fluctuations is reduced. That is, stock prices fluctuate much more than house prices on a year-by-year basis, but when held for ten or twenty years at a time, the average rate of return settles down and is not much influenced by what happens over a given year or two; and over the long term these riskier investments pay a much higher average rate of return (5).

Land as an investment is riskier than government bonds, but less risky than the stock market. The appropriate comparison investment depends to some extent on the expected holding period. Thus in the next chapter we provide comparisons of increases in housing prices with five-year bond prices, representing a short-term risk-free investment, and with

stock market returns, representing a high-return, medium-risk investment when the expected holding period is ten years or more.

There are also other issues to consider that make the desirable rate of return on ROW even higher than just the return on alternate investments.

First is that government purchase of land takes it off the local property tax rolls. This is not a direct cost to Mn/DOT, but to the local governments, and ultimately to the citizens that Mn/DOT serves, so it is appropriate to count this as part of the opportunity cost of holding land. Property tax rates vary by county and type of property, but a working approximation would be that this would add another 2% per year to the necessary rate of increase in land prices.

Another problem is general investment risk. The future value of land is considerably less predictable than a government security, which has a known face value. Generally risky investments must pay a higher rate of return on average, relative to a safe investment, to compensate for this unpredictability. It is difficult to reduce this issue to an appropriate number to use as a risk premium. Instead we address the problem of risk directly in terms of the odds of winning and losing, in the next chapters discussing the rate of return on land.

Yet another issue is the possible loss of income and other value that was being created on or by the properties. For example, farmland or commercial properties were producing crops or other products that created income for the owner, and this income will be lost or at least displaced if the land is taken out of production to save it for ROW. Similarly, residential properties were providing housing services that had value to the owner. The lost income or value may be replaced in some other location, but ultimately there is a net loss of productive capacity, since the original land or building capital has been lost. Here we simply note this as an issue, but don't try to place an explicit value on it.

Finally, a significant point is the possibility that land will be purchased and never used. One possibility is that the project is never done, but that in the meantime the land has become unviable for other purposes and can't be easily resold without a loss. A more likely scenario is that because the land is purchased well in advance of the finalization of the project design, more land is bought than is ultimately needed. Much of the unused land may be of little value to adjacent landowners and thus will likely be resold at a deep loss, if it is resold at all. If land is purchased after design is finalized, then the amount can be minimized based on a known design, and this problem can be avoided. This issue is discussed at more length in a later section of this chapter.

From all this we conclude that for land to be a good financial investment, the rate of price increase must be at least the rate of return on medium-term government bonds, plus perhaps 5% more to compensate for lost property taxes, loss of productive capital and income, and the likelihood of wasted purchase of land that is not used. An additional compensation for risk could very well add significantly to this.

2.3 Situations of interest

All right of way is not the same. The financial benefits of early acquisition are likely to depend on the characteristics of the land under consideration; and certainly the way in which these benefits can be studied must be divided by type. While there are potentially a huge number of ways of describing land for purposes of analyzing price movements, to keep the discussion manageable we focus on four broad situations.

First, and the primary focus of this report due to the wealth of available data, is land that is already developed. This could be for example the houses or small commercial establishments that are built along highways or streets, and which may need to be acquired if widening is necessary. These are generally expensive purchases because of the need to buy buildings as well as land, and over the last few years prices of these types of properties have been rising very rapidly. Given these high costs and rapid price increases, it is important to understand the potential financial benefits of purchasing these types of properties before they are needed.

A second situation is land that is not developed and is not likely to become so in the near future. This could be farm or forest land in areas that are not near enough to a developed area to be appealing for development. This report addresses this situation as well, although in considerably less detail due to the much more limited data available.

A third type is land that is not developed, or is developed in a low-value way, but is likely to be redeveloped to higher value uses. As discussed briefly in section 2.1, this type of situation is generally acknowledged to be a good application of early acquisition or other ROW preservation methods. As such, it is not addressed at length in this report.

The final, and most complex situation is when land is likely to remain in its present condition (either developed or not), but its value is likely to increase significantly due to substantial improvements to the surrounding area. One possibility is that a high-value development being built nearby could cause a major, and otherwise unlikely, increase in the value of the surrounding properties. Even in this case some increase in value will likely already have taken place in anticipation of the development; other investors have the same information that the government does. So the savings from buying just in advance of a development may be limited.

Perhaps the more interesting possibility from the government's perspective is when land prices increase dramatically due to highway improvements that the government makes. One could imagine, for example, a multi-year highway improvement project, in which early improvements cause the land elsewhere in the corridor to escalate in value, and that the government must then pay the higher price for this land even though their highway improvements created the value in the first place. This type of situation may justify further study.

This fourth type of situation, while it is perhaps the most interesting and potentially valuable from a cost savings standpoint, is very hard to analyze. To do would necessarily

require a very detailed geographic analysis, which in turn raises difficult methodological problems that are discussed in more detail in section 2.5.

2.4 Land purchased and never used

Another difficult issue is that the land that is purchased may never be used, or may be used only after a very long delay. This could occur either because the project is cancelled or is substantially delayed for some reason, or because major changes are made to the design or alignment. The earlier land is purchased the more likely this is to occur, as fewer specifics of the project will have been determined and there will be more opportunity for changes to occur.

In this scenario, the benefit of early purchase is never realized in terms of future cost savings. In the extreme case, no benefits ever occur because the land is never used, and need never have been purchased in the first place. But even the better case, in which the land is eventually used, or sold back to a private owner, is still problematic. As seen elsewhere in this report, idle land is not generally a good investment on average over the long term. Even though some locations may beat the average over certain time periods, as the holding period increases the rate of price increase tends to revert to the average. On average, the longer the holding period, the more money will be lost compared to having put the money into other investments.

Buying far in advance increases the probability of excessively long-term holdings for a variety of reasons. There are many potential barriers to projects being done on schedule: funding may be diverted, environmental analysis may identify problems, or public opposition may delay or stop the project. The traffic projections used to plan and justify the project may turn out to be inaccurate due to demographic or economic changes. Various ways of upgrading existing infrastructure may turn out to be more cost-effective. All of these issues are more likely to be problematic when land is purchased far in advance of its expected use. Even in the best case, too much land will likely be bought because the design will not be finalized and the minimal purchase will be unknown.

To better understand this issue, we looked at historical Mn/DOT project data to examine the frequency with which these barriers create substantial project delays. In the past there has been no explicit policy favoring early purchase, so any land purchases made were probably intended for near-term use. Our objective was to determine how often this short-term use did not in fact work out. This could be taken to represent a lower bound on the amount of land that would be held for long periods if land were intentionally bought very early.

From the Mn/DOT ROW records, we recorded the years of all land purchases for 58 control sections. These had an average of two or three significant episodes of ROW purchase, dating back to the 1920s. For each control section we noted the periods where significant amounts of ROW were purchased within a distinct period of time. Sometimes it was hard to distinguish specific episodes because purchases were spread out over a

large number of years. In these cases we noted these ambiguities and tried to account for them when examining project data.

A separate Mn/DOT data set contained information on when projects were done on each control section. The types of projects ranged from major lane additions or interchange construction, to simple resurfacing and crack sealing. The data included information about the type of project, the width of ROW involved, and a schematic drawing of the part of the control section affected. All of these offered information that helped identify projects where new ROW might have been incorporated into the roadway.

Our objective was to identify situations of two types. The first was where a significant amount of ROW was purchased but no corresponding subsequent project could be found in the control-section project data. The second type was where a significant project clearly involving the incorporation of new ROW was done, but for which there was no apparent recently preceding ROW purchase.

We took a very conservative view of relating projects to ROW purchases; if there was any project subsequent to a period of ROW purchase that appeared at all plausible as a justification for the purchase, we took it as such. Given this approach, we still identified eight significant episodes of ROW purchase that appeared to have no corresponding subsequent project, or projects clearly involving additional ROW for which there was no preceding purchase. This amounts to about five percent of all the projects we examined.

There also could have been projects for which excess land was purchased (before design was finalized) and not sold back because it was forgotten or because it had no post-project value. There could also have been cases where we found a subsequent project that did not in fact use all or any of the ROW purchase we related it to. There is no way to know this. Thus the projects we identified should be taken to represent a lower bound on the amount of purchased land that will be unused for long periods, or forever.

If land in the best case beats other investments only by small amounts and for a short time, then holding for long periods will tend to cancel out any gains as the long-term return loses to other investments. If a parcel is held for 30 years and is only profitable for the first five, then the losses over the next 25 years will cancel the initial gains, plus the gains from four other projects. If this happens 20% of the time, all the gains are lost. This doesn't seem implausible given that long-term holdings seem to happen perhaps 5% of the time even under a policy of buying land at the last minute.

2.5 Methodological and Conceptual Issues

This final section addresses two very general conceptual or methodological issues that have been raised on several occasions by people who have been involved in advising this research or have heard results presented. These points are somewhat subtle but very important in understanding what this research is trying to accomplish and in appropriately interpreting the results. One issue has to do with the historical perspective in which the

land value question is addressed; the other with the use of general price trends as opposed to specific case studies or smaller scale analysis.

The rate at which land prices increase is higher at some times and lower at others. It is higher at some locations and lower at others. Periods of rapid price growth may be different from one location to another. To consider adopting early purchase as a general strategy for saving money on eventual project costs requires not just that there are situations in which it would have been a good idea, but rather one of two considerably more difficult conditions.

One possibility would be that early acquisition is always a good idea; that is, land prices always rise fast enough that it is desirable to buy land as early as possible. This question is addressed in Chapter 3 of this report. The other possibility is that it is sometimes desirable to buy land early, and that these situations can be *reliably predicted*.

That is, it is easy after the fact to point to a particular area and assert that it would have been a good idea to have bought land there 20 or 30 years ago. That such situations exist is undeniable, but is not a sufficient condition for concluding that early acquisition is warranted in general. The relevant questions are first, whether that particular area would have been identified 30 years ago as a target for early acquisition, and second, what other areas would also have been identified and how much they have appreciated in value.

The relevant benchmark for evaluating cost savings is not the most extreme case, but rather the average cost savings that would have resulted from *all* the parcels that were purchased early on the basis of whatever criterion was being applied. An early acquisition program must have a set of guidelines for deciding to purchase certain properties and not others. The analysis in Chapter 4 of this report describes briefly the difficulty of predicting areas of rapid price growth with a simple model. Certainly it is possible that a detailed model could do better, but this needs to be demonstrated.

Another aspect of this issue is historical context. Minnesota is at this time several years into an era of rapid property price growth that apparently far exceeds anything that has happened in at least the last half-century if not longer. In such an environment it is tempting to draw conclusions about the virtues of early purchase that would not have been supportable based on price movements before 1995. This research aims to take a long-term view: Early acquisition is about how prices will change over a period of ten or twenty or more years, not how they will change in the next two years. And there is little reason to believe that current price trends will continue for a long time. Thus this report focuses more on average price increases over long periods, rather than overemphasizing the last ten years.

This point leads into the second major methodological issue, which is the decision in this research to study general price trends rather than focusing on specific areas. One aspect of this is that recent price movements are so out of line with longer-term averages that a case-study approach would likely draw conclusions that would not be historically

representative. Again, the question is what we should do for the next 20 years, not what we should have done for the last 20.

The larger problem, however, is determining price trends from small samples of properties, as would be necessary in a case study or location-based approach. Many factors affect the price of a given property and how it changes over time. Given a large enough sample of properties, these parcel-specific factors will tend to cancel each other out so that general price trends can be observed. But the sample must be very large, perhaps several hundred, before this effect becomes reliable. If the elapsed time between two purchases is quite lengthy then the compounding effects of the annual general price increases will eventually come to dominate property-specific effects. Generally though, trying to deduce price trends by comparing the average price of one set of properties at one time to the average price of a different set of properties at a different time (which may not have been comparable properties to start with) is an exercise that should be considered with caution.

The benefits of this case-study type of approach would be twofold. First, the results would have somewhat more intuitive meaning to most people; the analysis in principle could be reduced to a specific amount of money that was saved or lost in a certain situation, as opposed to the kinds of abstract generalities that this report focuses on. Second, it directly addresses the question of price movements for land along current or planned transportation corridors. A legitimate objection to the methodology of this report is that by utilizing county-wide average or median prices, it may be failing to identify much more dramatic price movements in specific locations.

There seem to be three ways of approaching this question. One would be to consider cases where some land for a given highway project was purchased in the past and the remainder is being purchased now, to compare the relative costs of the two acquisition sets. Another possibility is land that was purchased for highway purposes in the past and is now being sold back because it was not used. Another would be to look at projects where a large number of complete parcels are being purchased, and try to find past sales prices for those parcels.

Either of these methods would require more detailed data and possibly a different theoretical approach. It would be much more important to be able to explicitly examine the comparability of sales at different times, as well as to employ a robust strategy to characterize geographical considerations. Land near corridors is usually more valuable than land that is more remote, but this does not necessarily mean that the price appreciates more rapidly. Parcels that seem extremely expensive now may have always been more expensive than others in the area for other reasons.

This could very well be a worthwhile future study, but it is outside the scope of this one. As such, the present study should certainly not be seen as the last word on the subject, but rather as an effort to frame the issue and reduce the set of situations that needs to be examined in detail in future efforts.

3 Early Acquisition: Basic Financial Analysis

One important possible justification for early ROW purchase is that it can ultimately lead to cost savings if the land would otherwise have increased significantly in price. This chapter examines the most basic question: Considered solely from a financial standpoint, is buying land in advance of when it will be needed a good investment in a general sense?

The financial merits of early purchase come down to a simple problem. Buying land early means that dollars are being spent now, to gain the benefit that some presumably larger number of dollars will not have to be spent at some point in the future. The question is whether enough future money is likely to be saved in order for this to be a good investment.

The specific question here is whether buying land in advance of when it is needed is a good idea as a generic proposition. More detailed questions such as identifying high-payoff locations or land that is about to be developed, or timing purchases based on market conditions, are treated in the next chapter. Similarly, other non-financial benefits of ROW preservation are not addressed here; they were discussed in Chapter 2.

This basic analysis consists of three steps. The first is determining the relevant benchmark for how good a return land should provide. The second is examining historical evidence on the return to land compared to other possible investments, over a variety of time frames. The third step is a short theoretical discussion explaining why the results in general are consistent with theory and what this implies for land purchasing policy.

3.1 General growth of land and other asset values

For purposes of understanding land as an investment, we consider housing prices as a general proxy, as housing has by far the best available data. (It will be seen in the next chapter that other land types do not differ substantially in how their prices move over the long term.) The large volume of sales and the relative comparability of different housing properties make statistics calculated from housing much more reliable than those from other property types. We found housing price data for every state for every decade dating back to 1940. We also had detailed housing price data for Minnesota annually from 1984 to 2003.

Farmland is another important type of property for purposes of understanding ROW acquisition costs. Data for this was less available than for housing; we use the U.S. overall rates of price increase as a proxy for Minnesota for the 1960-2000 period.

For bond prices, we use federal five-year bond rates, as this holding period seemed to be a reasonable representation of a conservative medium-term land acquisition strategy. For

stock prices we use total returns on the Standard and Poor's 500, a commonly used stock market index. Annual total returns were calculated as the end of year index price minus the beginning price, plus dividends. This total divided by the beginning index price was the annual rate of return.

We show the inflation-adjusted (2000 dollars) rate of house price increase for reference, but for comparison of the different assets we show nominal returns (Table 3.1). The returns are the implicit annual average returns given by investing a sum of money in the asset at the beginning of the decade and selling it at the end, reinvesting any dividends.

Table 3.1 Historical Annual Returns on Housing and Other Assets

	1960s	1970s	1980s	1990s	Average
Inflation adjusted house price increase	0.9%	4.3%	-1.1%	2.6%	1.7%
Nominal house price increase	3.8%	8.3%	4.5%	6.7%	5.8%
Nominal US farmland	5.3%	14.2%	-0.8%	4.8%	5.7%
Nominal federal 5-year bond rates	5.1%	7.8%	10.7%	6.1%	7.4%
Nominal stock market total returns (S&P 500)	7.8%	6.2%	16.4%	18.4%	12.1%

It is illustrative to first consider this table from the long-term perspective. Suppose in 1960 right of way had been purchased for a future highway, which would end up being built in 2000. In 1960 the median home price in Minnesota was \$12,800. By 2000 this had risen to \$122,400, seemingly a clear confirmation of the benefits of early purchase. But the same \$12,800 invested in a sequence of five-year bonds starting in 1960 would have appreciated to \$222,500 by 2000, and invested in stocks would have been worth \$1,230,300. Granted that 2000 was the peak of a bubble stock market, but extending the analysis to 2005 does not change the basic point. The house (which some think is now at the peak of a bubble market itself) is worth about \$200,000; stocks, which have suffered one of the worst five-year stretches in decades, are still worth about what they were in 2000. So the difference is a factor of six rather than a factor of ten.

Next consider a medium time frame of ten years. Housing lost to risk-free government bonds in two of the four decades for which we have data, and was only slightly better in the decades when it came out ahead. Compared to the stock market, housing came out ahead only in the 1970s, but lost very badly in both of the next two decades. The unusually high return on housing in the 1970s was due at least in some part to the high overall rate of inflation during this decade; in the 1980s, housing actually lost value compared to the rate of inflation.

Finally, we consider five-year holding periods, the shortest time frame that is probably relevant for right of way preservation. For this analysis we have annual house price data for Minnesota starting in 1984. From this point and for each year thereafter, we calculate

the annual average rate of return that would have been attained by investing in each of the three assets and selling it five years later (Table 3.2). So for example the row for 1984 gives the annual rate of return on assets purchased in 1984 and sold in 1989, the row for 1990 is the return on assets purchased in 1990 and sold in 1995, and so on. The table ends at 1998 as 2003 is the last year for which we have housing prices.

Table 3.2 Next Five Years Return on Various Assets

	Stocks	Bonds	Housing
1984	16.6	12.3	2.5
1985	16.1	10.1	3.1
1986	19.2	7.3	3.2
1987	13.8	7.9	3.3
1988	13.9	8.5	3.9
1989	15.9	8.5	3.7
1990	14.6	8.4	4.2
1991	10.2	7.4	4.7
1992	17.4	6.2	4.8
1993	16.5	5.1	6.1
1994	20.5	6.7	8.2
1995	24.5	6.4	9.1
1996	28.1	6.2	9.9
1997	19.2	6.2	10.9
1998	11.5	5.2	9.9

Starting in about 1993 five-year housing investments started to outperform bonds due to a combination of interest rates declining to levels not seen in decades, and an unusually large and persistent boom in housing prices. Over the last five years in particular, housing has beaten both bonds and stocks by a significant amount, but from a longer historical perspective this is an extremely rare occurrence. Thus it would be appropriate to maintain some caution regarding expectations about how prices will evolve in the future. To assume that housing will continue to beat bonds (not to mention the stock market) for a great deal longer would be unsupported by historical experience.

Another interesting point regarding the short-term nature of large price increases comes from comparing housing prices in different states across the U.S. In inflation-adjusted terms, half of all the states had negative rates of return on housing during the 1980s, and twelve did even during the economic boom times of the 1990s. The most striking point, though, is that there is almost a perfect negative correlation (-0.84) between the two decades in terms of which states did better or worse than average; the states with the biggest gains in one decade in almost every case did the worst in the other decade. There seems to be a sustainable rate of price growth, and periods in which it is exceeded are almost always followed by periods that are lower than the average, in any given location.

A final cautionary note is to recall the last example locally of such rapid growth in inflation-adjusted real estate prices. This was farmland in the 1970s (Figure 3.1):

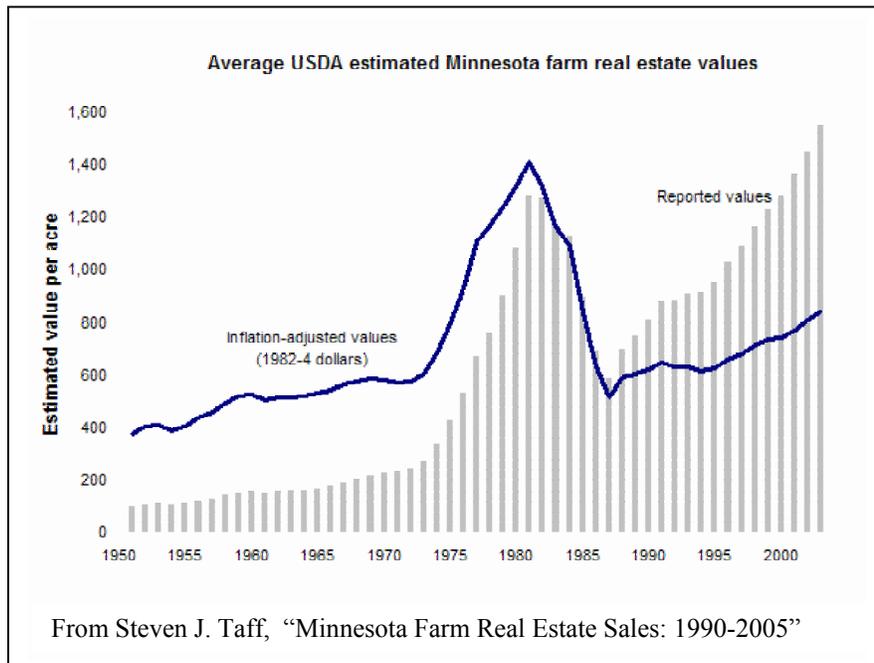


Figure 3.1 Historical Minnesota Farm Prices

The fact that housing only occasionally does better than other investments would not necessarily be a serious problem if it were possible to predict the times when it would happen. But there is no evidence that anyone has such a predictive model, indeed the existence of such a model would contradict basic financial theory regarding the general impossibility of arbitrage. That is, if it were known that a particular investment would do better than others for some years in the future, then investors rushing to buy that asset to gain the excess returns would immediately cause the price to adjust so that future returns would be equalized. More intuitively, it seems highly improbable that the people buying farmland in 1980 were correctly anticipating the future direction of the solid line in Figure 1, as they would have been able to do with a reliable real estate price prediction model.

3.2 Theoretical Analysis

Viewing early acquisition purely as a financial investment problem, the reason for skepticism about its value arises out of basic financial theory. The efficient market hypothesis, in very simple terms, states that the current price of an investment should already reflect expectations about its future value, discounted to the present and adjusted for risk, and thus, if everyone has the same information, then all available investments should pay the same (risk-adjusted) rate of return (5). That is to say, investing in land should not, in general, have a higher rate of return than any other asset.

However, the rate of return for a given asset could vary across investors because of different opportunities and expenses. The possibility exists in theory that land might generate a higher return for the government than it does for private investors, and thus that buying land at market prices would be a wise decision for a government. The purpose of this research was to explore this possibility. However, the findings here indicate the opposite is true, that is, that land actually pays a lower return to the government than other investments would. This section provides a reason for this.

The theory of asset pricing states that the current price of an investment asset is equal to the present (discounted) value of the expected future net revenues (5). These future revenues have two components, the ongoing income that the asset generates, such as dividends or interest, and the eventual price at which the asset can be sold.

Typically the owner of the asset receives both of these revenue types. For example, the owner of a stock receives dividends (or these are reinvested in the company, raising the stock price), and can eventually sell the stock, ideally for more than the purchase price. The owner of a house also receives both revenue types. The house increases in value over time, but another very significant component of value is that the house generates ongoing rental income. For owner-occupied houses this income is implicit; no money changes hands, but owning the house means that rent does not have to be paid to someone else. This is a tangible benefit, and a major contributor to the value of the house. Similarly for commercial properties and farmland, a major part of the value is that the property can be used to generate income.

The point here is that the resale value of the property captures only a fraction of the total return that created the price in the first place. Housing generates a total return (price appreciation plus implicit rent) that is comparable to other investments of similar characteristics. However, if the rent component is taken out, the remaining return is rather low compared to investments of similar risk and expense. This is what was observed in the preceding section.

The problem for governments considering buying property to preserve it for ROW is that it will be hard for them to capture the same rate of return that a private owner would realize. However, the price they would have to pay for the property will reflect the higher private rate of return; thus the government would earn a low return on a risky investment.

The obvious solution to this problem is to rent out the properties and earn income from them during the holding period. Doing this would certainly change the results; land would at least do better than bonds. But while it may be reasonable to rent out specific properties on a short-term basis while a project is being prepared, to adopt a general policy of purchasing land and renting it out over a long time frame raises some very significant questions.

The first set of questions revolves around the difficulty of doing this successfully. Companies that specialize in property rental tend to focus on specific types of properties in specific areas; for Mn/DOT to own perhaps thousands of different properties with

many different uses, all over the state, would create a management problem that no private investor has apparently ever seen as a desirable business opportunity. The cost of managing and maintaining these properties so that they remain rentable could consume a significant fraction of the income that they generate.

The second set of questions has to do with the political consequences of Mn/DOT being a large-scale landlord. One issue is simply that people may not see this as an appropriate role for a state agency. When the properties are in developed areas, changing them from owner-occupied to rental could have negative impacts on surrounding properties. It could be hard to justify spending money to improve or even maintain the properties when the plan is to tear them down eventually, but if they are not maintained this could cause problems with neighbors. It could also be hard to manage the tenants when the properties are all over the state. It wouldn't take many Mn/DOT-owned properties being rented by tenants with criminal (or even just annoying) tendencies to create significant political fallout.

From a financial standpoint, as a general rule, land will not be a profitable investment unless it can be used to generate some income while it is being held. However, it could be that land in specific locations, or at certain times, or of particular types, is a good investment even if land in general is not. The next chapter addresses this possibility.

4 Early Acquisition: Detailed Financial Analysis

The objective of this chapter is to analyze whether there are specific locations or property types for which the appreciation in land prices exceeds the average by enough to make them good investments even though land in general is not. As in Chapter 3, this discussion only addresses financial benefits.

The analysis in this chapter proceeds from the main results in the last chapter; that housing and farmland prices do not on average rise fast enough to be a good investment as a general strategy, and that while land does sometimes outperform other investments, these episodes are impossible to predict. Given these findings, there is still the possibility that certain types of properties, or land in certain locations, could reliably increase in price so much faster than the average that they would still be good investments. To understand this issue requires answers to two main questions.

First, are there places or property types that increase in price much faster than the average for extended periods? Within this general question there are secondary issues. First, do these situations of rapid price increase happen with sufficient frequency to merit attention? Second, do the price increases exceed the average by enough, and for long enough, to make a significant difference financially?

The second major question then is: Even if periods of rapid sustained price increases do exist, is it possible to predict when and where they will happen with sufficient reliability to secure the benefits? The possibility, or even certainty, that some properties will yield a good payoff is not important if there is no way to predict which properties will fall into this category.

4.1 Variability in Land Price Growth

This section focuses on identifying specific situations where the price of land has increased considerably faster than the average for a prolonged period of time. The point of interest here is the long-run rate of return, as the point of early acquisition is that the land will be held for a considerable time. That is, if land will be held for ten years, the relevant consideration is the overall price change for the entire ten years, not just that increases were large at some point during that span. A property held for ten years, where three of those years had 20% increases and the others were zero, would have increased only 5.6% per year on average.

There are two sections to the analysis. The first examines housing prices across all Minnesota counties to determine if there are some counties where the average house price growth exceeds the average for prolonged periods. We focus on a five-year holding period for expositional purposes, but also discuss the implications of extending the holding period. The second section examines agricultural property; as there are far fewer

of these in the database, the analysis of these is somewhat more limited, although there are still interesting results.

We use housing to represent developed land in general since there was too little data available to explicitly analyze price trends for commercial properties. Similarly, we use agricultural land to represent all undeveloped land. A case could be made that other land types might not have similar price trends; this is very likely true in any given short period. However, while some land types may become more or less expensive relative to others for a time, over the longer term these differences probably tend to even out. In Table 3.1, housing and farm prices often grew at very different rates, but the long-term average was nearly identical for both.

The analysis in this section is derived from a Minnesota Department of Revenue database of all arm's-length housing, commercial/industrial, and farmland transactions in the state from 1984 to 2003 excepting a few months in 1985-86. This includes 1,083,936 total residential sales. All but 8 counties have at least 1,000 total sales during this span of time. We also have sales records 32,773 sales of farmland of more than 35 acres (and the acreage of the parcel). We also had data for farms with buildings, and for commercial and industrial properties, but there were too few of these, and the price variability across properties was too large, to draw any analytical conclusions.

Unfortunately we were not able to study situations where land was rezoned or redeveloped to a higher value use, because there was no way to track parcels through time except when they remained in a single use. This clearly would have been an important type of situation, since changes in potential use from low-value to high-value uses could cause land prices to rise very rapidly. This would be a good situation to examine using a case study approach.

4.1.1 Housing prices in Minnesota counties

Housing prices show a great deal of variation across the state. The relevant consideration for this analysis is not the price level, but the rate of growth. It is the possibility that prices might rise – not their current level – that makes early purchase a potentially valuable investment. Specifically, the relevant variable is the rate of growth in a given area relative to the state average for a given year. Predicting the average rate of increase is impossible, and because the average is usually lower than the return on alternative investments, land as a generic investment will probably lose money over the long term relative to the alternatives. But if there are locations that beat the average by a significant amount and for extended periods, these might be good investments even if land in general is not.

While it may seem like a simple matter mathematically to calculate the annual rate of house price increase in the counties across the state, there is actually a difficult statistical problem involved. There are a number of issues.

First is that there is often a very wide range of prices in a given location in a given year. When house prices range from \$5,000 to \$500,000, the average can become overly

influenced by a small number of houses at the extremes. This can lead to very large fluctuations in the average from one year to the next. This can be overcome to some extent by using the median, which is the value at which half the prices are higher and half are lower. This removes the influence of the extremes, and it also corresponds more closely to intuition about what the typical house is.

However, even the median value can show large fluctuations from one year to the next. It is not unusual in the data to observe the median price in a county increasing 30% in one year and declining 25% in the next year. This is almost certainly a data sampling problem and not an economic phenomenon. It could happen for a couple of reasons. One is just that when samples are small the mean or median of a sample will, as a statistical fact, tend to jump around to some extent. However, in many cases the fluctuations are too large to be explained entirely by this.

A more difficult problem is that there could be temporal correlation in individual house prices, that is, the houses sold in a given year could cluster around a certain price point rather than being randomly drawn from the entire “population” of houses. A single new housing development can generate a substantial fraction of the sales in a small county in a given year, and these houses will all tend to be about the same price, so it is not just a random draw from one year to the next. If they are all above the normal median price, they will have the effect of pulling the observed median up sharply; if there is no similar development the next year then the median will tend to fall back to its normal level. There is a difficult statistical problem in figuring out how to describe the annual rate of increase in a way that smoothes these sampling-based short term fluctuations while still picking up genuine price trends.

Fortunately, in this project we are interested in situations where land will be held for several years. In this case the relevant statistic is not the observed annual increase from year to year, but rather the average annual increase over the entire period that the property is owned. That is, if Mn/DOT purchases land now with the intention of building a road on it ten years from now, then the year-to-year fluctuations in price don't matter; only the price at the beginning and the price at the end matter.

For expositional purposes, we calculate five-year average annual increases by county, for holding periods starting in 1984. Thus, as in Table 3.2 in the last chapter, the 1984 rate of return refers to the annual average return that would be obtained by investing in housing in 1984 and selling it in 1989; the 1985 return is for housing purchased in 1985 and sold in 1990, and so on. In Figure 4.1 this information is represented as the number of five-year periods (out of 14 possible) that the average annual rate of house price increase exceeds 3% above the state average for a given county. This essentially represents the frequency with which house prices increase faster than the state average for prolonged periods.

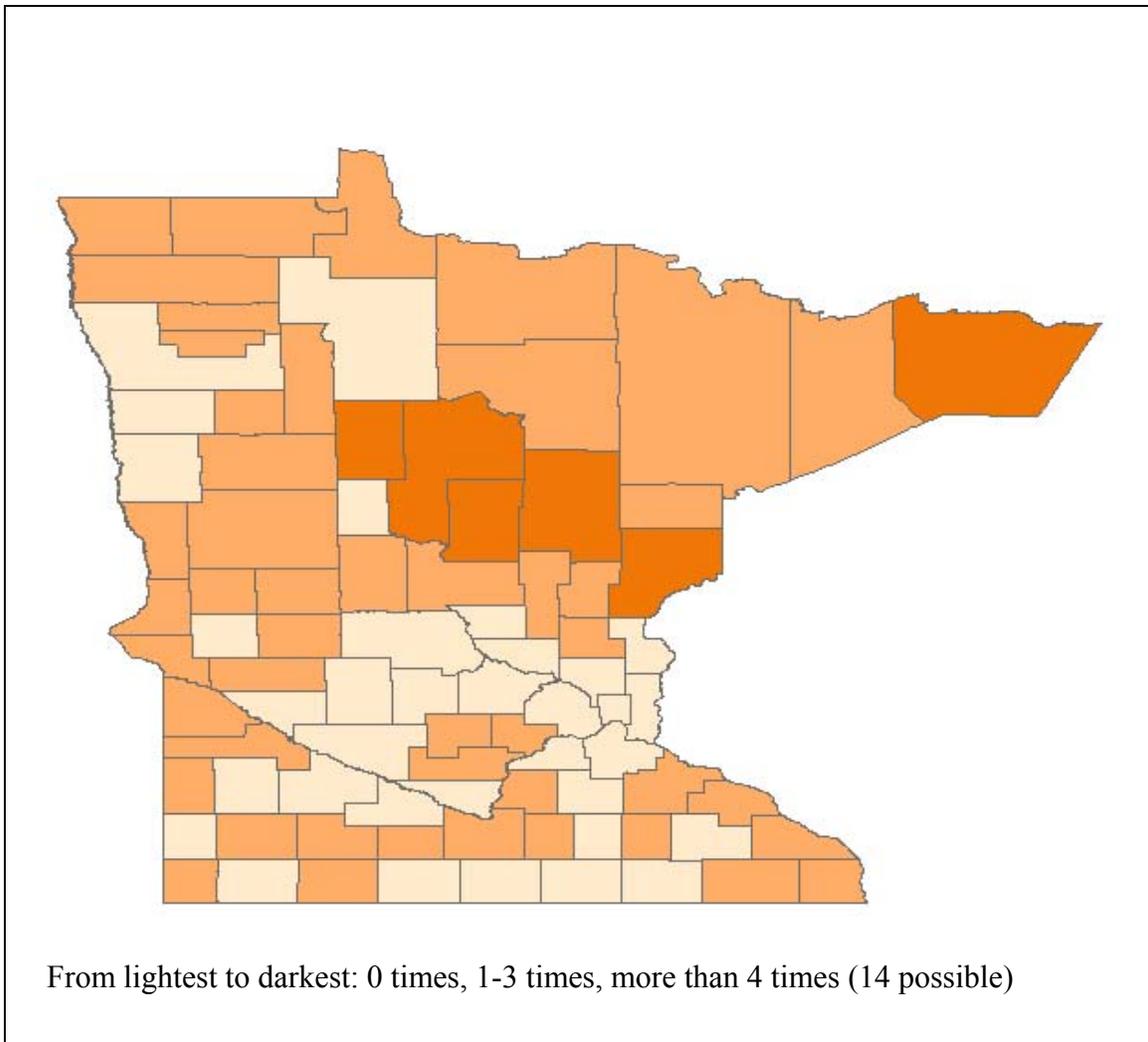


Figure 4.1 Frequency of Rapid House Price Increases by County

Generally a very large fraction of the excess return periods stand alone; that is, while a given five-year span might beat the average significantly, the five-year spans starting one year earlier and later do not. In only a few cases does the excess return persist over a number of possible investment start dates. Another point of interest is to note that in almost all the Twin Cities metro and collar counties, the rate of return never significantly beats the average. In Carver and Isanti counties there is one five-year span each of small excess returns.

The places that beat the mean substantially tend to do so only for short periods, then revert to the mean or sometimes worse. Extending the holding period to seven years greatly reduces the number of counties showing excess returns; extending it to ten years has a similar impact (Table 4.1). As a general result, the longer the holding period, the less likely that returns will beat the average by enough to make land a better investment than other alternatives.

Table 4.1 Number and Percent of Cells Showing Excess Returns

Holding period	Number of cells	> 3% per year	> 5% per year
5 years	1218	82 (6.7%)	33 (2.7%)
7 years	1044	49 (4.7%)	6 (0.6%)
10 years	783	29 (3.7%)	1 (0.1%)

Another issue with regard to determining price increases is that the median prices reflect both sales of existing homes and of new homes. In most cases new homes are going to be more expensive than the median, and thus will have the effect of increasing the median price relative to what it would have been if only sales of existing homes were counted. The point of concern here is that in deciding to purchase a property early, the question is how much the price of that particular property will rise, not how much the price of a constantly improving median home will increase.

We addressed this by using the revenue data to identify housing properties that changed hands more than once during the data period. We then compared the rate of price change for those properties to the rate of change in the median for the same period. For example, if a house was sold in 1991 and again in 1998, we calculated the annual rate of increase implied by the two prices and the seven-year holding period; then compared this to the statewide average rate of increase in the median home price between those two years. If the rate of increase for that house exceeded the median rate of increase by, for instance, 0.5% per year, then we recorded that number (0.5%) for that house.

We restricted the data in two ways. The first was to remove any house for which the period between sales was less than two years, under the assumption that these may have been purchased in the first place specifically with an intention to resell them. In these cases one or both of the sales may not have been at true market value, or the property might have been substantially improved in the meantime.

The second restriction was to remove any house for which the rate of price growth was more than 10% per year above or below the median for the years that it was held. Again the concern was that such very high or low growth rates were more likely to reflect non-market prices or substantial changes to the property, rather than true changes in market value. These restrictions did not change the outcome significantly.

In general we found that the rate of price increase for resold homes was about half a percentage point per year below the rate of growth of the median price. Thus it appears that the rate of growth of the median house price is a reasonable proxy for how a particular property will change in price, given that no substantial changes are made to it.

4.1.2 Prices of agricultural land

We considered the possibility that the rate of growth of house prices might not be a good proxy for the price growth of undeveloped property types such as agricultural. There is a fundamental difference. Even a high demand for housing in an area often does not drive

up prices significantly because new housing (or commercial buildings) can be built to meet the demand, keeping supply and demand in relative balance at least over the longer term (barring other barriers to development). Agricultural, forest, and similar undeveloped land types, by contrast, are the opposite; increasing population and development pressure in an area decrease the available supply, leading to price increases. Thus it is reasonable to suppose that rapidly growing areas might show large increases in farmland values even if housing prices do not grow much.

It is hard as a statistical point to determine the rate of price growth for agricultural land because the sample size is much smaller than for housing. On a small geographic scale, such as a county, there might only be a handful of farm transactions in a year. Professor Steve Taff (University of Minnesota Applied Economics Department), who interprets farmland price movements for the state, discusses at length the difficulty of determining price changes in small geographic areas (6). Because of the small number of transactions, the mean and median price show very large fluctuations from one year to the next; and the observed annual rate of growth over longer periods is very dependent on the particular years that are chosen for endpoints.

We adopted a strategy of grouping all the sales in the first five and last five years of our data (1987-91, and 1999-2003) and treating them as having all occurred in 1989 and 2001 respectively. We then compared the implicit annual rate of growth between these two times across counties (Figure 4.2).

Here we finally observed some of the expected results. Counties where farmland is being converted to development at a rapid rate did in fact have very high rates of appreciation in farmland prices. Washington and Chisago counties had annual rates exceeding 15% on average over this entire period, while 20 other counties had growth rates over 10% per year. Almost all of these other counties were Twin Cities metro or collar counties, or were in the “cabin belt” of counties on and south of a line between Duluth and Brainerd, exactly where high price growth rates would be expected.

However, it is still worth maintaining a note of caution toward these results. First, the early period of the data started at the end of a very significant decline in farm prices, so land could have been undervalued during our baseline period. By contrast, the latter period of our data was during an unprecedented boom in housing prices, which would have the effect of making undeveloped land seem more valuable than it would in a more normal housing market. These two facts together could be making the growth rate during this time appear to be higher than it would have been if a different time frame had been studied.

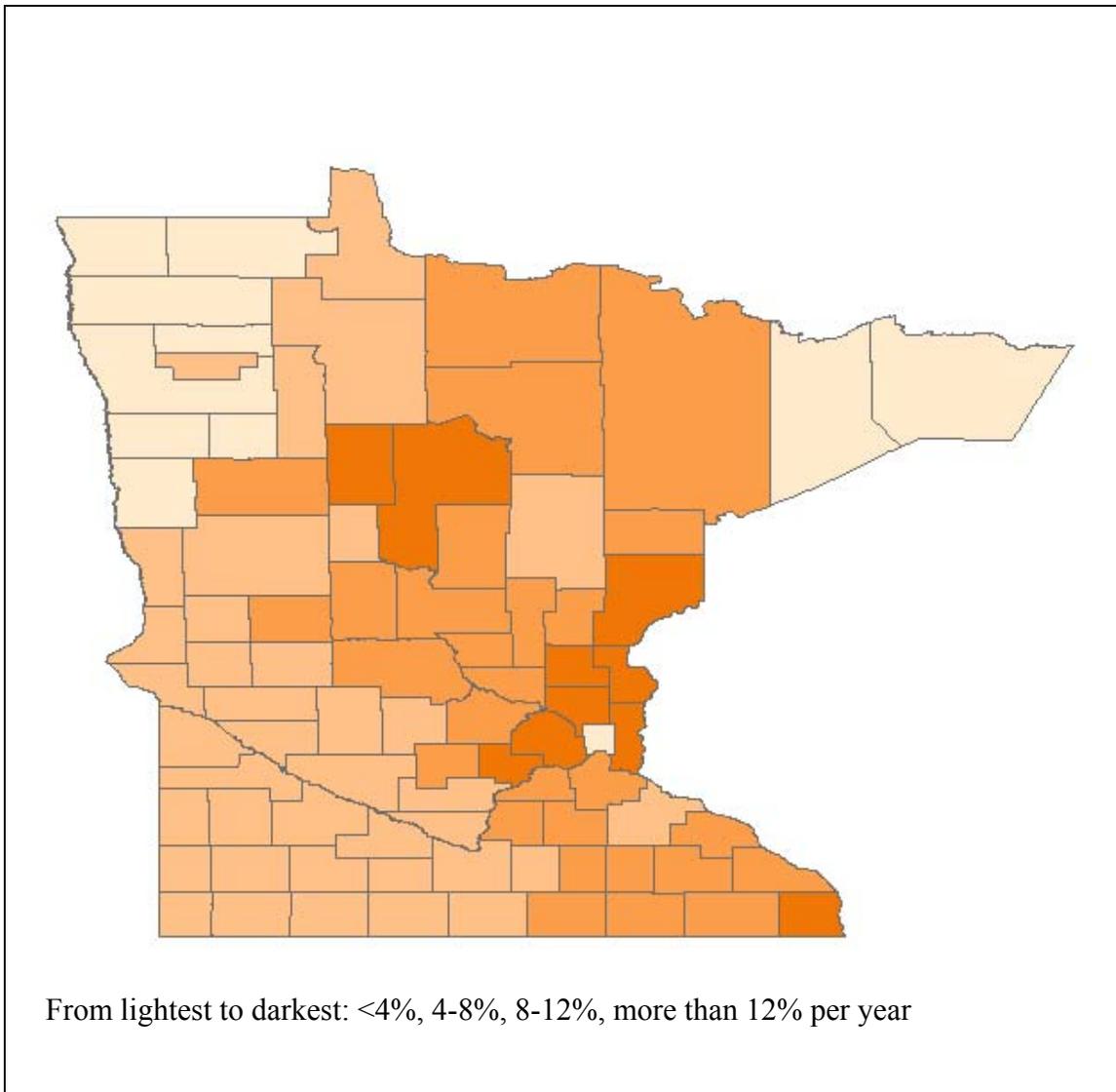


Figure 4.2 Annual increase in farm prices by county, 1989-2001

Another possible source of bias is that the land being sold in the two periods might not be comparable. The stagnant housing market of the 1980s could have limited development so that most of the actual sales during the first period of our data were for actual farming purposes. However, more of the sales during the latter data period might have been for development due to the strong housing market at this time. So to a certain extent these shifts in the nature of the properties being sold in the two periods could lead to an impression that prices were rising more rapidly than perhaps they really were.

A final point is that even the highest rates of farm price increase were only slightly better than the bond market, when adjusted to account for lost tax revenues, risk, and the other factors discussed in section 3.1. And even these high rates of return still did worse than the stock market during this time. So the value of these purchases could still be open to doubt to some extent.

4.2 Predictability of Land Price Changes

Land sometimes appreciates in value rapidly enough to potentially justify investment over limited time frames. In this case the value of early purchase hinges on accurately identifying these situations. That is, gaining the financial benefits of early purchase requires being able to reliably predict which locations will appreciate rapidly and which won't. This section describes an attempt to develop a regression model to predict price appreciation in different locations.

The basic question here is whether it is possible to identify leading indicators that predict rapidly rising land prices in a given area. The situation of interest here is where the land is likely to increase rapidly in value even if there are no physical changes to the property. The objective is to be able to use a set of easily available demographic and perhaps other data about a location to predict with a reasonable degree of accuracy what trends in housing and other property values will do. The useful outcome would be a set of rules of thumb, for example, that land in a given area should be purchased early if population growth in that area is expected to exceed a certain level for the years under consideration.

The first variable that we try to predict is the rate of growth of housing prices. We attempt to explain this using the rate of population growth and the rate of income growth as primary predictors. We also examine other possibilities including current level of housing prices, past rates of house price increase, and housing prices relative to income levels. Later in the section we develop a model for farmland prices. For both of these models we use the data from the Minnesota Department of Revenue that was described in the previous section.

With regard to both house prices and the explanatory variables, we consider the size of these values relative to the state mean. The possibility here is that perhaps a given level of population growth does not have a predictable impact on house prices, but above-average population growth might be a good predictor of above-average increases in housing prices (although this still leaves the problem of predicting the average rate of increase).

We attempt to predict the five-year rate of house price increase by county as defined in the previous section, using as explanatory variables the rates of population, job, and wage increase in that county over the previous five years. That is, prediction has to be based on information that is already known; the fact that the way that these variables will actually evolve is unknown when the prediction is made is a major part of the difficulty of doing this. There were approximately 1,300 different combinations of five-year periods and counties that were included in the regression.

The current house price level, the ratio of house price to income, and the rate of growth of wages were not statistically significant explainers of house price growth rates. The best regression included the past rates of population and job growth. However, the predicted impacts were very small; an extra 1% per year of population increase led to only 0.18%

per year in house price appreciation, while an extra 1% per year of job growth led to an extra 0.09% of house price growth. Given that population and job growth rates do not vary that much across counties, the predicted differences in house price growth are very small, even relative to the typically small differences that actually occur. The amount of variation in house prices that was explained by this regression was only about 3%.

Another problem with this regression is that the estimated parameter values are quite dependent on the particular years that are examined, implying that the relationship between the variables is not stable over time. This is related to the low explanatory power of the model; most of the fluctuations are just random. An examination of the predictive power of the model confirms that population and job growth are very limited in their ability to explain house price increases (Table 4.2).

Table 4.2 Predicted Versus Actual House Price Increases

Actual →	<-5%	>-5%	>-2%	>2%	>5%
Predicted		<-2%	<2%	<5%	
<-0.7%	4	13	18	9	2
>-0.7%, <-0.3%	18	60	113	32	5
>-0.3%, <0.3%	23	107	500	125	16
>0.3%, <0.7%	1	8	137	32	4
>.7%	0	7	59	11	1

The rows of this table show five categories of predicted house price increases. The columns show five categories of actual increases. The cells then show the number of cases with a given prediction level and a given actual level. For example, there were 23 cases of five-year periods for a given county where the rate of increase was predicted to be about the state average, but where the actual annual rate of increase was more than 5% below the state average.

There was only one case where a location had both predicted and actual rates of return in the highest category. No matter what the predicted level, the vast majority of the actual outcomes were in the middle range, around the state average. The cases that were predicted to do the best did do slightly better than those that were predicted to do the worst, but the differences are small. More importantly, if the objective is to predict places that do in fact have rapid price increases, more than 5% per year above the average, then these locations were as likely to be predicted to do badly as to do well.

Predicting farmland price increases was somewhat more viable, primarily because the price differentials across counties were considerably larger and more sustained than they were for housing, and also because the locations of large price increases corresponded more closely to areas of large population growth. As described in the last section, all that was known about farmland prices were median prices by county at the beginning and end of the data period, centered on 1989 and 2001. We attempted to explain these price changes using population growth rates during the 1980s (the prediction has to be derived from information that is known at the time it is made).

For farmland, only population growth was a good explainer of price changes. The best regression explained farmland price growth during this period as a base growth rate (intercept) of 8.15% plus 1.53% times the average rate of population growth during the preceding decade. This explained about 35% of the variation in farmland price growth rates across counties.

A rule for purchasing farmland in counties with population growth greater than 2% per year would have captured about only one-third of the counties with greater than 12% annual increases in farm prices, but perhaps more importantly it would not have captured any counties with less than a 10% annual increase. The predictive ability of the model might be even better than this since it is based on county-wide population increases rather than in the local area under consideration (farm prices grew rapidly in Hennepin County although the total population did not because it was already very large).

An interesting point about this result is that even in the highest growth areas, more than half of the rate of farmland price increase was just the base growth rate; the marginal impact of population growth added only slightly to this in most places. As with the housing prices discussed earlier, this is a very high baseline rate of increase by historical standards, and may not be sustained if interest rates rise or other investments start performing better. And as with housing, if that baseline growth rate declines then the total rate of price increase even in the fastest growing areas may no longer be enough to justify early investment.

5 Conclusion

There are many reasons why governments might want to own otherwise limit development on land that will someday be needed for highway right of way, and many ways of achieving the desired results. The issue of this research was early purchase of ROW land, and specifically the financial benefits in terms of the lower prices gained by purchasing sooner. There are other, more qualitative benefits of early purchase; these are potentially important too. As such we note them, but they are outside the scope of this research.

Understanding this limitation on the scope of the research is critical to correctly interpreting the findings that are discussed below. Purchasing land early might always be a good thing, it might never be a good thing, or it might be good in some situations and not in others. Evaluating an early acquisition policy would require a full accounting of all the costs and benefits involved. This research, however, addresses only a subset of the costs and benefits, those that can be financially quantified; and even within this subset only a limited set of circumstances are studied. Because of this, the findings must be considered preliminary and incomplete. They point the way to the questions that would need to be answered to develop a policy regarding early acquisition, and they provide ideas on how those questions could be answered. The most significant of these questions and ideas are discussed later in these conclusions.

The approach of this research was to treat the financial considerations of early acquisition as an independent problem, and to study this problem in a very general way rather than analyzing specific properties or using a case study approach. There were three primary reasons for this approach. First, it represented potentially the shortest path to the broadest possible conclusion. If early acquisition could be shown to be a good idea financially, and in a broad range of situations, then it would almost certainly be a good idea in general, since most of the non-financial considerations are benefits, not costs. Such a finding would be very powerful due to its very general and unambiguous nature. Although we do not arrive at such a conclusion, ruling it out helps to establish that more geographically detailed research is indeed necessary.

Second, it seemed important to develop a more general understanding of the issue before addressing price movements of specific properties or geographic areas, in order to have an appropriate context and theoretical framework to understand the findings. Without a more general understanding of land prices and how they change over time, it would be impossible to know if a given case study or set of properties was really typical of its type. For example, any study of price movements over the last 15 years would conclude that land appreciates very rapidly, but this has not been a typical period historically. Policies based on such an analysis could backfire if price appreciation reverts to historically typical patterns. Understanding these larger issues can help to place the interpretation of future geographically focused studies into an appropriate context.

Finally, there did not seem to be any prior research addressing the question of the timing of ROW acquisition. The few documents on the subject address primarily legal and

procedural considerations. While they often discuss costs and benefits, they do not try to empirically quantify them. Given this lack of any previously established knowledge, we felt that the best starting point would be to approach the problem in a very general way. The objective was to draw general conclusions, which could not be easily done with a detailed site-specific study. While our approach did not definitively answer the entire question, it did at least lead to the general knowledge that early acquisition at best seems to be a good idea only in certain situations, and to some ideas as to the characteristics of these situations.

With that clarification in place, the next section of these conclusions discusses the findings of this research and their implications. The final section then discusses some of the significant questions that were not addressed in this research, and some ideas for how they could be studied.

5.1 Conclusions Regarding Financial Benefits of Early Acquisition

There are two questions to be answered in determining the financial benefits of early acquisition. First, is the rate of price increase for any type of land high enough to justify early purchase as a general strategy? We conclude that it is not, when a longer-term perspective is considered and the very high rates of appreciation of the last few years are placed in a historical context. Over a period of the last 40 years, the rates of price increase of both housing and farmland, which we use as proxies for developed and undeveloped land, have been lower than the return on medium-term government bonds, which could be considered the cost of the money being invested.

Second, if the average rate of increase is not high enough to justify early purchase, are there specific locations or types of land that consistently beat the average by large amounts, so that they are good investments even if land in general is not? There are two parts to this question: How high and how common are the highest rates of return, and can the areas of high returns be reliably predicted? Here we conclude that, with the possible exception of farmland around the Twin Cities, periods of rapid price increase are rare, that the increases are not that much more than the average, and that they are essentially impossible to predict.

There is an important conceptual point that must be emphasized here. This is that a policy of early purchase would have to be based on certain rules, or at least rules of thumb; properties that meet certain criteria would be candidates for early purchase and others would not. This decision would have to be based on information that is known *at that time*, and the policy would be evaluated based on the overall average rate of return of the properties that met the criteria versus those that didn't.

It is natural, but incorrect, to make the mistake of thinking about the problem *ex post*, that is, to observe places where land prices have risen dramatically in the last 20 years and to point to those as examples of why early purchase would be an effective cost-saving strategy. This research does not dispute the fact that there are places where purchasing land early would have been highly beneficial, but does dispute its relevance. The more

important questions are whether these places would in fact have met some criteria for early purchase, what other places would also have met the criteria, and what the overall average rate of return would have been for *all* the places that would have been purchased early. That is, the question is whether early purchase would be profitable on average, not just whether it would be sometimes.

Another natural mistake is assigning too much importance to the present. Land of all types has been appreciating very rapidly in value for several years, even when compared with alternative investments; certainly a continuation of this pattern would be a strong argument for purchasing land as early as possible. But historically, this period of very large price increases is unique; there is apparently no period in the last 60 years that is comparable. Which brings back the point that the relevant question is not how good land is as an investment in the best of times, it is how good it is on average; and the example of the previous 50 years provides a strong counterexample to the presumption that the returns of the last ten years represent a long-term condition.

Land has a low rate of return in terms of price appreciation compared to other investments, and especially when risk is considered. A large part of this is that much of the rate of return to a private investor comes from the use of the land; governments generally cannot gain this ongoing income since the objective of early purchase is often precisely to prevent development, and because the government is not in the business of property management. Simply avoiding future price increases does not pay off that much in its own right.

Some places do better than average, but not that much better over the long term. The longer the time period being considered, the less likely a given location will beat the average by a large amount. Thus the further in advance the land is being purchased, the less likely that the average rate of price increase over the entire period will be enough to justify early purchase from a financial standpoint. The one exception to this is farmland in developing areas around the Twin Cities, but even here the high rates of return could just be an artifact of the particular period being examined, and the relative lack of available data.

It is nearly impossible to predict which places will beat the average based on information about them at the beginning of the period during which the land would be held. Smaller and smaller geographic areas may have faster increases, but probably not for extended periods, and are correspondingly harder to predict. Similarly, shorter time periods can generate higher annual returns than longer periods, but are much harder to accurately predict.

With the exception of land that will certainly or very likely become developed, or which may increase rapidly in value because of development or major highway improvements nearby, there would seem to be little argument financially for early purchase, at least based on the analysis here. However, as discussed earlier in the conclusions, we cannot rule out the possibility that smaller geographic areas may show more rapid, and possibly more predictable price increases. The large geographic scale of our analysis did not

address this question. Our analysis also did not address the possible non-financial benefits of early acquisition; these might in some situations change the conclusions. Addressing either of these factors would be a significant research problem in its own right.

The following summarizes our conclusions regarding the financial benefits of early acquisition, as a function of the various possible circumstances that we identified.

Land that is already developed (residential or commercial): Once land is developed, further price appreciation tends to be relatively small, probably almost never large enough that early acquisition will be worthwhile given the cost of money. Given that this is also the most expensive land to acquire, early acquisition resources are probably best used for other types of property. One exception to this might be if developed land is in danger of being redeveloped to a significantly higher value use. Another would be the transportation project is relatively imminent and the land is being offered for sale voluntarily. In this case, purchasing on the open market might save some costs associated with a directed purchase.

Land that is not developed and probably won't be: This would be farm or forest land that is sufficiently far from developed areas that it is unlikely to have a change of use. In most cases this does not appreciate rapidly. The exception is land that is near developing areas (farmland around the Twin Cities) or in desirable recreational areas (lake counties north of the Twin Cities). The results in this research indicated that these land types may appreciate rapidly enough to justify early acquisition; further research could support this finding and clarify the specific characteristics of land to which it applies.

Land that is not developed and probably will be: This is the one type of land that is almost certainly worth purchasing early. The difficulty in this case is knowing the probability that a given parcel will actually be developed. The filing of a development plan would be one obvious sign, and perhaps it is safest to wait for this. The one possible exception to the early purchase rule in this case is land where the development will be low-value, and the transportation use many years in the future. In these cases it might be best to allow the land to be used until it is needed.

Land on major transportation corridors: A difficult type of property to analyze is land that does not appear likely to be developed, but is highly accessible and close to other land that is being intensively developed. Some who have seen this research have commented that land along major transportation corridors may appreciate more rapidly than land in general in the vicinity. Thus some areas that may not appear to be good candidates for early purchase when viewed in the aggregate may be when only the land along the corridor is considered. Again, the aggregate nature of our analysis means that we cannot rule out this possibility. Because a great deal of ROW purchase falls into this category, this would be a valuable subject for further research.

5.2 Future Research Needs

Perhaps the most important question that this research does not address, as just discussed, is whether land that is located near current or future major transportation corridors might increase in price more rapidly than land that is not near these corridors. That is, the method employed in this research of examining average price increases over large areas such as counties, might be missing more dramatic, and possibly more predictable, price movements in the specific locations of interest.

This question could be addressed using a different methodological approach with considerably greater geographic detail. This approach would also require greater detail about individual properties, including precise acreage, buildings, and so on. Small sample sizes would make it harder to compare prices of different properties or even the same property at different times, as the condition might have changed. However, this question seems of sufficient importance to justify at least an effort at this labor-intensive type of research.

Another important issue would be better understanding the non-financial benefits of early acquisition, such as a possibly simplified political process, less local disruption, and more control over project schedule and environmental mitigation. As with price changes, these seem likely to be more significant in some situations than in others; in some cases they may be so important as to justify early purchase even when it is not indicated for financial reasons. Because of the qualitative and judgmental nature of some of these benefits, this will be a hard question to quantify.

A complicating factor for both prices and qualitative benefits is that there are other methods for managing development short of purchasing the property. These are discussed at some length in Appendix A, and in other sources. These can in some cases provide many of the same benefits as outright purchase, but they also have costs associated with them. Any criteria for early purchase should also include criteria for when these other methods are more appropriate.

Ultimately the objective of all of this research is developing criteria by which properties can be evaluated either as candidates for early purchase, for preservation by some other method, or to be left alone and purchased when needed. As discussed earlier, such criteria must be based on information that is available at the time of purchase, and must be evaluated based on an extended period of time and on a large number of potential applications, not on the basis of a limited number of cases at a specific time in history.

The research in this report is not the last word on the subject. The point was more to establish a baseline understanding of the general characteristics of land price movements and to help clarify the more detailed questions that need to be answered next. Other approaches to ROW management also come at a cost; purchase could be a relatively beneficial approach in some cases even if it is not generally justified from a purely financial perspective.

References

1. Federal Highway Administration and American Planning Association (2000).
Transportation Corridor Preservation: A Survey of Current Practice by Local
Government Planning Departments, FHWA.
2. Thomas, D. A. and R. S. Payne (1998). "Long-Range Highway Corridor Preservation:
Issues, Methods and Model Legislation." BYU Journal of Public Law **13**(1): 1-39.
3. Armour, R., D. Rose, et al. (2002). *Assessment of Techniques for Corridor
Preservation in South Dakota*, Dye Management Group & South Dakota
Department of Transportation.
4. Williams, K. M. and R. Frey (2003). *Corridor Preservation Best Practices for Local
Governments*. Tampa, FL, Center for Urban Transportation Research.
5. Brealey, Richard A. and Stewart C. Myers (2000). *Principles of Corporate Finance*,
Sixth Edition, Boston, Irwin McGraw-Hill.
6. Taff, Steven J. (2005) *Minnesota Farm Real Estate Sales: 1990-2004*. Staff Paper P05-
7, Department of Applied Economics, University of Minnesota.

Appendix A: Preservation Techniques

Corridor preservation strategies fall into three general categories: acquisition of property rights (which can be divided into full fee simple acquisition, and less-than-fee-simple methods), regulation of land use, and negotiation with the landowner for preservation of land in an unimproved condition (2). Each category contains many strategies, with each strategy having its own benefits and consequences.

The major objectives, as discussed at greater length in the preceding chapter, are minimizing the costs to government while also minimizing impacts and constraints on landowners. There are also secondary objectives, such as reduction of safety hazards, implementation of a comprehensive plan, and avoidance of unnecessary future construction. In some cases the government will eventually want the whole parcel and may want to constrain development entirely. In other cases they just want part of the parcel and are primarily concerned with just making sure that development will not eventually be in the way; but do not want to prevent development in general.

A government's choice of strategy is intrinsically tied to the impact that the government is seeking to minimize. Further, the availability of any given technique is by state law, as many strategies require specific enabling legislation. For example, the state of Utah relies on cities to use police powers to preserve corridors in light of the state's limited authority (2). Survey results suggest that local governments conduct the majority of corridor preservation activities (1). Finally, some methods, in particular land acquisition, are more expensive than others, and so financial constraints will impact the choice of strategy as well.

More detailed information on alternative corridor preservation strategies, as well as benefits and consequences of the different strategies, are outlined in the following sections.

A.1 Fee Simple Acquisitions

The most extreme and expensive form of preservation is actually purchasing the property. By acquiring rights in fee simple, the state or local government owns the land and has ultimate control over the corridor, and can best preserve the land for highway use. However, early acquisition of fee-simple rights involves a number of issues in addition to the expense.

The primary issue involves the potential for future federal reimbursement of ROW acquisition costs. Normally federal project funding could be used to purchase ROW; it can be applied ex post to earlier purchases only under certain conditions. These primarily revolve around the desire to make sure that the eventual project and the supporting

environmental impact study are not unduly affected by the fact that money has already been invested in a certain ROW alignment. One specific point is the need for some kind of environmental study before purchase. The objective of this is to ensure that environmental impact problems do not come to light after significant amounts of money have already been invested, and that there is no incentive to minimize or ignore these problems because of the sunk costs. There is also a requirement for some form of public involvement prior to land being purchased; again to avoid a situation where the public is coerced into accepting a particular solution because of the money that has already been invested.

Fee-simple acquisitions take four different forms with somewhat differing issues involved:

- Hardship acquisition
- Donation
- Protective acquisition
- General early acquisition

Hardship Acquisition is only available in certain specified situations at the request of the landowner, for example, health, safety, financial hardship or inability to sell due to public knowledge of an upcoming project. As such, it is not useful as a proactive preservation tool, as the state lacks control over hardships of landowners. These purchases can potentially be reimbursed from federal funds after federal approval of the project, and can be done before full environmental approval.

Donation is when the landowner voluntarily gives the land title to the state, typically to gain tax benefits. It is only available in certain specified situations at the will of the landowner. For projects using federal money, the donor must be advised of the right to property valuation and payment. As with hardship acquisition, this is not that useful as a proactive preservation tool since the government cannot coercively solicit donations.

Protective Acquisition is aimed at preventing significant additional costs or imminent development. It is quite limited from the standpoint of federal cost reimbursement:

Reimbursement of advance acquisition is limited to ‘one or a limited number’ of parcels under imminent threat of development, but only if acquired after a preferred location is established and public involvement conducted. Early acquisition (before federal project agreement) is constrained by a land-use planning prerequisite to which few states can conform (3).

An important point in this regard is the need to insure that the purchase will not influence the environmental assessment, in the sense of causing the purchased alignment to be unduly favored over other possibilities. While this is potentially a proactive preservation strategy, it is constrained in its applicability because of the limited number of individual properties to which this category can legally be applied.

General Early Acquisition is just the fee-simple purchase of land for fair market value, with no other conditions attached. This can be financially difficult as it requires a funding source other than federal money. Some states have dedicated funding:

- California – \$25 million fund; 20 year limit on holding land;
- Utah – Revolving loan fund; funded through tax on rental cars;
- Arizona – Funded through gas tax.

With regard to future federal reimbursement, it is possible to credit these costs toward the state portion (match) of costs on projects with federal funding in certain circumstances. For early acquisition of total takes, properties acquired must be on all possible alignments of the future highway (3).

The Federal Highway Administration cautions that purchases with state money before completion of the Environmental Impact Statement (EIS) could jeopardize future receipt of federal money (4). The issue is whether, in retrospect, the acquisition influenced the construction of the project or location choice. States like Florida attempt to get around this by completing categorical exclusion documents for property acquired through voluntary purchase, followed by a full EIS for the project. The categorical exclusion document assesses potential environmental impacts for specific land purchases (4).

A.2 Less Than Fee Simple Acquisitions

These are preservation strategies in which the government acquires some direct control over how a particular parcel is used, but short of actually buying the parcel. There are three broad categories here:

- Options to purchase
- Purchase of development rights
- Property exchange

In a **Purchase Option** the state pays a landowner for the right to purchase a property at a specified future date, for a specified price. A somewhat less restrictive version of this is a right of first refusal, where there is no date specified, but the state is given the first chance to buy (or refuse to buy) the land if the owner decides to sell. This tactic will prevent major development as the current owner has little incentive to invest in improvements when the future sale price is already fixed. It is a low-cost way to prevent development in the short term, and allows the property to remain on the tax rolls and economically productive (although constraining possibly useful improvements). It can be preferable to direct purchase in cases where design is not finalized and the state is not sure exactly how much of a parcel will be needed, so that the amount of land eventually purchased can be minimized.

However, this is a short-term strategy. Long-term options would be very difficult to value and subject to considerable risk in the eventual price paid. Short-term options would need to be renewed if the state is not yet ready to purchase the land when the option comes due, and this could become an administrative burden. Over a longer period, the ongoing cost of purchasing options could be higher than the opportunity cost of just buying the

land directly. Finally, this should be thought of as insurance, or as a way of buying time; the cost of the option does not count against the eventual purchase price.

Purchasing Development Rights is a related but slightly different tactic. In this case the government pays compensation to the landowner for imposing a restriction on development of land in a corridor. Compared to the purchase options described earlier, this is a less restrictive strategy as it can be applied specifically to those aspects of development that the government wishes to forestall, while not necessarily constraining other, less problematic types of development on the parcel. This can be designed as a permanent easement pending fee-simple purchase, or as a temporary easement.

As with future purchase options, this costs less than full acquisition in the short run, requires no property management on the part of the government, and allows the land to stay on tax rolls and remain economically productive. However, it is also similar in that the price paid does not count against the future cost of the land, and in that it can be expensive in fast-growing areas where development could be lucrative. The specific legality of this in Minnesota is also unclear; it may require expressed legislative authority.

Property Exchange is a type of transfer of development rights. An example would be the state providing a property owner with different land in exchange for a development plan consistent with the state's needs. There are only circumstantial opportunities for this as it is limited in most states to surplus land already owned. This is just paying a landowner with other land rather than with money. Minnesota's Constitution requires unanimous approval of the governor, the attorney general and the state auditor and that the land be used for the same trust as the land exchanged was to be used.

A.3 Land Use Regulation

Strategies for regulating land use require little capital investment, and attribute some of the cost to the developer, but they also require increased administrative costs to local governments exercising police power. These strategies are tailored to limiting development, but require legal justifications beyond cost savings, and are more likely to be perceived as coercive. From the perspective of the state, such methods can require considerable coordination with local officials, and typically cannot be applied directly as can purchases of land or development rights.

There are six methods discussed here:

- Access Management Regulations
- Setback Regulations
- Ordinances or Zoning
- Site-Plan Review and Subdivision Controls
- Conditional Use/Interim Use Permits
- Dedications and Exactions

Access Management Regulations, such as limitations on curb cuts, seek to preserve the capacity of existing highways to limit future land acquisition needs. Such regulations have the benefit of limiting immediate capital investment and, if successful, may limit long-term needs for new roadways. However, governments must ensure that reasonable access is allowed to property owners.

As an example, in Wisconsin an administrative rule mandates that any new land recording (consolidation, platting, etc.) along a preserved corridor must be approved by the state; also that localities must conduct corridor studies to identify priority corridors and address preservation issues. Another rule mandates that no private access to state highways is allowed and establishes setbacks where no improvements can take place (1).

Of the available techniques, access management techniques are among the most widely used, but least discussed. Respondents to an American Planning Association (APA) survey reported that limiting curb cuts is the most widely used preservation strategy, followed by mandatory dedications from subdivisions, official maps, and landowner agreements (1). Accordingly, some researchers have suggested that “corridor preservation” should be called “corridor management” to shift focus to maintenance of existing highways as well as planned ones (4).

Setback Regulations are prohibitions on building on a property within a specified distance from the property line. They cannot be established solely for highway purposes or because of intent to acquire; legitimate purposes include aesthetics and safety. It may in some cases be possible to reduce setback regulations of the line not adjacent to the corridor to mitigate impacts from exaction, donation, or agreement to leave undeveloped. These are likely to be most useful when a minimal amount of land is needed; very large setback requirements are unlikely to be justifiable by typical reasons.

Ordinances and Zoning are the use of local power to regulate the intensity of land use. They can be used to restrict building in the right of way of a mapped transportation facility without a variance. These methods will not necessarily keep land from being developed, but can be used to keep it in a low-intensity state. It is not legal to “down-zone” or zone with “acquisitory intent,” that is, denying a request for a zoning change solely because of a highway. Ordinances and zoning cannot be targeted, arbitrarily applied, or piecemeal; they must be based on uniform planning criteria. As such they may be less useful than other techniques when the corridor preservation need is very localized or specific to a few parcels.

Site-Plan Review and Subdivision Controls can be used by local governments to supervise the development process so that growth is consistent with adequate access and infrastructure. Many counties and cities require development approval as part of police power. This allows negotiation for adequate setbacks and open space for future needs. However, it needs the cooperation of developers. Legally, a plan must be approved if it meets all legal requirements, regardless of the impact on the transportation corridor. There may be a need for compensation for takings if plan approval is conditioned on the adjustment (3).

Conditional Use/Interim Use Permits allow individual landowners permits for low-intensity uses for a limited time period. This method is probably best for areas that are years away from construction; the land might as well be used in the meantime, but only for uses that will be low-cost to take down. The conditions defining “low-intensity” must be clear; this requires long-range planning and coordination between the state and locality. The cooperation of the landowner is needed, and it is likely that some sort of compensation must be paid if the land has not already been set aside for highway purposes.

Dedications and Exactions are an exercise of local police power; generally considered an impact fee paid with land instead of cash. They are assessed to a developer in exchange for development approval, a zoning change or a conditional use permit. According to the APA survey cited earlier, mandatory dedication (exaction) is the second most commonly used preservation technique (1).

Two United States Supreme Court cases (*Dolan v. City of Tigard*, 512 U.S. 374 (1994), and *Nollan et ux. v. California Coastal Commission*, 483 U.S. 825 (1987)) are the controlling standards for assessing the validity of dedications or exactions. The *Nollan/Dolan* cases create a “rough proportionality” test, which requires that the extent of exaction must be roughly proportional to the impacts of development based upon an individual determination. Further, a nexus is required between the exaction and the state need. A detailed, accurate record of assessment of impacts and determination of dedication necessary is needed. This method is easier to apply at the local level as it requires the cooperation of local permitting authorities, however, it may be possible for the state to work with these authorities to achieve its objectives.

As an example, the state of Nebraska has legislative authority through its mapping powers to preserve 300 feet on either side of an alignment. The state department of transportation (DOT) works with localities and the public to determine which corridors should be identified as priority corridors for preservation. After priority corridors are identified, they are filed with all permitting agencies so that when a local agency receives a permit request for construction along preserved alignments, it must submit the permit to DOT for approval. The DOT has 60 days to accept or deny the request for development. The state and local governments may also negotiate an agreement with the permit applicant so long as the agreement maintains the integrity of the corridor. If the permit request is ultimately rejected, then the state has 180 days to acquire the property. Most of the variation among states in this category lies in how states determine priority corridors and how the policies are implemented. Nebraska heavily relies on its localities to negotiate agreements with developers to preserve rights-of-way (1).

A.4 Negotiation With Landowner (Mitigation)

The final category includes techniques to mitigate the impact of highway development on property owners. These techniques can include: transfers of development rights; density transfers; impact fee credits; and tax abatement (2, 3, 4). These techniques may be used in

tandem with regulatory or acquisitory action to mitigate consequences to landowners (4). These strategies can also be used to negotiate with a landowner in exchange for property rights or an agreement to limit development (4). Finally, mitigation of impacts may be used to increase the perceived legitimacy of state action, both in a public relations sense, and specifically relating to takings litigation.

These differ from the land use regulations discussed in the previous section in that they apply to individual properties; most likely in cases where the general-purpose regulations do not achieve the necessary land set-asides. These are really just variations on the theme of acquiring development rights; they are all ways of acquiring long-term easements on parts of properties without a direct payment as such. In some cases the payment is in the form of in-kind exchanges for other rights of value, and in other cases there are indirect monetary exchanges.

But in every case the payment, such as it is, is made by the local government. This is another critical way in which these techniques differ from the simple purchase of development rights, which can be done by the state. These methods all need the cooperation of the local government, which in turn requires that the local government see some value to itself in making these sacrifices.

The state obviously benefits from these methods in that no payments need to be made. Even the local government benefits from the fact that little capital investment is needed for these techniques. In addition, the landowner retains the use of the land, within the limits set by the agreement.

There are four categories:

- Transferable Development Rights
- Density Transfers
- Impact Fee Credits
- Tax Abatement

A **Transferable Development Right** is a government-created right to develop land. The owner may sell or retain the right to use on parcels other than the land in the alignment. For example, the landowner could develop a separate piece of property at the same density as the land in the corridor, even if such density would otherwise not have been allowed in that location.

With a **Density Transfer** the landowner leaves some land vacant for highway purposes, and is then allowed to cluster development in excess of ordinary limits, so that the remaining property can be developed with the same total number of housing units, or feet of floor space, as would have been allowed on the full parcel.

An **Impact Fee Credit** is the waiver of impact fees on a development. An impact fee is a fixed sum of money assessed as a condition to issuance of a building permit (or occupancy permit or plat approval). The fee is levied to fund services and facilities necessary to serve the new development (in a proportionate amount to the need generated

by the development). Some states give developers fee credits in exchange for dedication of land to the city in transportation corridors. States and local governments arguably need legislative authority to assess impact fees. Minnesota has yet to enact enabling legislation and the Minnesota Supreme Court has yet to definitively rule on the constitutionality of impact fees in the absence of legislation (Country Joe, Inc. v. City of Eagan, 560 N.W.2d 681(Minn. 1997)).

Tax Abatement involves allowing the landowner to exclude the land in the corridor for the purposes of property taxes in exchange for an agreement to leave the land undeveloped or used at lower intensity.