ATTACHMENT VALUE AND FARMLAND PRICES: AN EMPIRICAL INVESTIGATION

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Abstract

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This study examines the role that attachment value plays in the formation of a willingness to accept price (WTA) for farmland. Attachment value is defined as the estimated or assigned worth of a socio-emotional good that binds one person or group to a physical object. The objective of this study is to determine if a differential exists between the market or assessed farmland price and the price a farmland owner would accept from a strange. Further this study aims to determine if attachment value has an affect on this differential. Qualitative evidence strongly supports the hypothesis that attachment value to farmland affects the WTA and that variables such as length of ownership tenure, family closeness, and community closeness affect the level of attachment value. The quantitative results provide evidence that there is a significant differential between the WTA and the assessed price and further that family closeness and education levels are significant in explaining the differential. An alternative survey instrument to more effectively explore the issue of farmland values and attachment values is presented in appendix 1.

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Dedicated to Lisa and Brad

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1.0 Introduction

Farmers and farmland owners have played an integral role in the process of economic development in the Unites States. Widely considered the stewards of our open spaces and rural landscapes, farmland owners play an important part in rural communities across the country. Similarly, is arguable the most important productive asset owned by farmers. Anecdotal evidence suggests that farmers often have a strong attachment to their farmland. Levak discusses Centennial Farmer's attachment to their farmland:

> *Because of the long family connection with the land, there is often intense emotional involvement on the part of Centennial Farmers. They tend to view their land as something more than a capital investment. (Levak, 1956).*

Analogous to sentimental value, attachment value allows an object to take on an emotional value in addition to its existing economic or physical value. Attachment value is embedded in the concept of social capital, defined as a person or group's sympathy or sense of obligation for another person or group (Robison, Schmid, and Siles, 1999). Farmland is a physical asset with potential for significant attachment value. Attachment value for one's farmland may increase or decrease the price a farmer is willing to accept (WTA) for their farmland. This paper attempts to assess attachment value's effect on the WTA for farmland. Further, the production function of attachment value will be investigated.

Social capital is emerging in economics and agricultural economics literatures, and attempting to provide a more holistic, multi-disciplinary perspective on social constructs and economic phenomenon. Many works in this area have focused on the outcomes of social capital. Putnam (1995), in his book Bowling Alone, empirically argues that social change in the American human landscape has been fueled by a decrease in social capital

over the past several decades. Robison et al. (forthcoming) show that social capital between buyers and sellers of farmland alters the terms of trade. Other authors have concentrated on the important role that social capital plays in international development (Staatz, 1998; Woolcock, 1997). The economic valuation of social capital relationships is just beginning to appear in the literature, with the study by Robison et al. (forthcoming) being a prime example of this.

Currently, methods of asset valuation, specifically contingent valuation, hedonic price methods, and willingness to pay studies (Shabman and Stephenson (1996); Loomis, Brown, Lucero, Peterson (1996); Neill et al (1994)), do not account for the value of socio-emotional goods attached to an asset. The debate in the literature surrounding asset valuation has virtually been limited to determining if capital assets should be valued at what they cost, minus depreciation, or at market value as determined by the discounted flow of income (Timmer, 1999).

This paper investigates the role of socio-emotional goods in explaining a differential between the market price and the willingness to accept (WTA) price. When considering data that includes a WTA price variable, there are several considerations to be made. Firstly, the actual collection of WTA data can be problematic. Loomis, et al. point out that determining a consistent WTA, through asking people what respondents would accept is plagued with several problems. Loomis addresses this problem in terms of a willingness to pay, however similar problems exist when asking people their WTA (Loomis et al., 1996), as was done in the data used for this study. It is possible that when stating their WTA in a hypothetical market, some individuals may be stating what they guess they could get on the market, not the lowest price they would accept. On the other

hand, if some respondents perceive their duty in answering the question as guessing the fair market price, insights into the attachment value in these experiments is reduced. Another problem may arise since respondents are stating their WTA in a hypothetical market. Therefore, their WTA may actually be different if the respondents were faced with an actual opportunity to sell their land (Loomis et al., 1996).

Secondly, the differential between the market price and the WTA price can have multiple causalities. The observation of a differential between WTA and willingness to pay (WTP) is not a new phenomenon. Shrogen et al. examine the mounting empirical evidence that suggests there is a significant divergence of willingness to pay values and willingness to accept values. They find this pattern troubling since standard theory would suggest that with small income effects WTP and WTA should be equivalent or at least within a tight bound (Shrodgen et al, 1994). Shrogen's paper tests Michael Hanemann's (1991) explanation of this divergence. Hanemann suggests that a divergence can range from zero to infinity depending on the degree of substitution between goods and positive income elasticity. He suggests that WTP and WTA only converges when the good in question has a close substitute. Findings by Shrogen et al. support this hypothesis. Shorgen claims that the WTA and WTP divergence can be explained by substitutability as well as income and substitution effects.

Kahneman, Knetsch, and Thaler (1990) also examine the divergence between WTA and WTP. The authors explain this divergence, positing that the "endowment effect" persists in the market. They provide several explanations for the differential. They further test the hypothesis that the discrepancy between WTA and WTP reflects a genuine effect of reference positions on preferences. This asymmetry between WTA and

WTP is rooted in the generalization that losses are weighted more substantially than gains in the evaluation of prospects and trades. Given this, if a good is evaluated as a loss when it is given up and as a gain when it is acquire, loss aversion will on average, induce a higher dollar value for owners than for potential buyers (Kahneman, Knetsch, Thaler, 1990).

In the case of farmland prices, the discrepancy between WTA and WTP or the estimated assessed value could be attributed to several competing explanations. Standard bargaining habits may contribute to the seller over stating the reservation price or the differential may reflect a strategic mistake by inexperienced sellers (Kahneman, Knetsch, Thaler, 1990). It is also possible that this differential reflects asymmetric information in the marketplace.

The hypothesis investigated in this paper is that the differential between WTA and WTP is not a mistake, or bargaining tool, but a genuine reflection of the attachment value held by farmers for their farmland. While several important studies have focused on this differential in other contexts and offered numerous explanations towards its existence, none have considered the impact of emotional attachment rooted in social capital relationship on the formation of a differential between WTA the market price. It is difficult to control for all of the possible factors that could contribute to the formation of a differential. However, in this study the production of this differential will be investigated by determining if there is a relationship between the differential and variables that theoretically contribute to the formation of attachment value.

If social capital is to be successfully implemented in an economic framework the source of social capital, or the production function, must be addressed (Schmid, 2000;

Woolcock, 1997). It is argued that without knowing the source of social capital, there is no way to know what form of social capital is present or how to reproduce it (Schmid, 2000). By considering the effect of community association, education, number of years on the farmland, and other potential social capital production components, this study also aims to explore the production of attachment value using both qualitative and quantitative data.

The identification and analysis of attachment value is important for two primary reasons. First, if attachment value influences WTA it may be an important component in explaining observed patterns of farm exits. Second, if owners do have a strong attachment value to land this may imply that supply of farmland in areas with high social capital is inelastic, since attachment value theoretically affects farmland owners responsiveness to market prices. Therefore changes in demand will lead to large changes in price.

The structure of the paper is as follows. Section 2 provides a review of relevant social capital concepts. Section 3 develops a conceptual model of farmland valuation and attachment value including the seller's utility function, a preliminary form of a production function for attachment value, and a derivation of a minimum sell price. Section 4 presents an empirical methodology, including a description of the survey instrument, relevant variables, and justification and limitations of these variables. In section 5 empirical methods and results are presented. The sixth and final section discusses conclusions and limitations of the study.

2.0 Social Capital and Attachment Value: Definitions and Concepts

Social capital is defined and used in various ways across disciplines. Robison, Schmid, and Siles, (1999) surveyed a group of professional researchers interested in social capital and found that their definitions of social capital varied widely. Social capital is an important concept in the analysis of any repeated human interaction. The discipline of economics concentrates on physical interdependencies between agents. Social capital aims to expand on the study of interdependencies to include socio-emotional interdependencies between agents. Some definitions of social capital address where social capital resides, what social capital can be used to achieve, or what social capital is. Using results from the survey of social capital professionals a working definition of social capital was developed. Social capital is defined as:

> *A person's or group's sympathy or sense of obligation toward another person or group that may produce a potential benefit, advantage, and preferential treatment to another person or group of persons beyond that which might be expected in a selfish exchange relationship.*

Concepts presented and discussed in this analysis rely heavily on this definition, however to effectively capture some of the social capital issues related to farmland valuation this definition needs to be expanded to include the potential for negative social capital relationships. The above definition captures relationships in which agent A's utility is linked directly to agent B's utility, based on a positive relationship. Emotions associated with this relationship may include trust, caring, sympathy, or a sense of obligation. However, if agent A's utility is linked inversely to agent B's utility, this relationship can be characterized as a negative relationship. Emotions associated with

this relationship may include guilt, blame, distrust, or dislike (Robison, not published). Positive and negative social capital can be conceptualized on a continuum with polar extremes of hate and love, and including varying degrees of emotion along the continuum.

Social capital begins with a kernel of commonality. A kernel of commonality is a shared trait between two agents. In general, kernels can be earned through shared activities such as school, work, and recreation, or they can be inherited through unalterable traits such as genealogy, gender, ethnicity, or age. The kernels of commonality involved in a relationship are often important determinants of the kind of social capital in question.

Social capital can be broken into three primary categories: bonding, linking, and bridging. Bonding social capital is typically based on inherited kernels. For example family members are often said to share bonding social capital. Linking social capital is associated with earned kernels of commonality. Linking social capital is often found between peers or schoolmates with equal levels of resources. Finally bridging social capital can reside within relationships built on either inherited or earned kernels of commonality. This type of relationship is commonly found between agents who have different levels of resources or status. Common examples would be a teacher and student, or an employee and employer (Robison, not published).

While it is important to characterize relationships, it is also important to characterize flows between agents. A fundamental concept in social capital theory is that exchange or interaction involves both a transfer of physical goods as well as socio-emotional goods.

Socio-emotional goods are gestures of validation, caring, or sympathy that are often associated with physical goods. However, and exchange of socio-emotional goods can exist independently from the exchange of physical goods. A compliment shared between colleagues or friends is an example of a socio-emotional exchange in absence of a physical good exchange. Exchanges of physical goods can be independent of socio-emotional goods as well. For example, a person checking out at the grocery store with a cashier they have never seen before is likely to only exchange physical goods with the cashier.

Similar to social capital socio-emotional goods can also be negative or positive. When an insult is traded between colleagues the flow creates a negative emotion in both agents thus deteriorating social capital between them. However, when a compliment is shared this is an example of an exchange of positive socio-emotional goods and an investment in social capital.

2.1 *Attachment Value*

Before proceeding with a conceptual and empirical investigation of attachment value, a formal definition and discussion about the function and formation of attachment value must be explored. In this section the following questions will be addressed:

- What is attachment value?
- What produces attachment value?
- How do people communicate their attachment value?
- What affects the level of attachment value?

2.1.1 Attachment Value Definition

Attachment value is a multi-faceted phenomenon that is rooted in a complex web of social capital and economic concepts. Directly answering the above questions will allow an investigation into some of the various aspects of attachment value.

A formal definition of attachment value specifically related to the concept of social capital has yet to be concretely defined in the literature. It may be useful to first consider the definition of the individual parts of the phrase, attachment value. Attachment is defined by the Random House Dictionary of the English Language as, a feeling that binds one to a person thing, cause, ideal, or the like; devotion; regard. Further, value is defined as, relative worth, merit, or importance; equivalent worth or return in money, material, services; estimated or assigned worth. Building on these two definitions a definition of attachment value can be formed. Attachment value is defined for the purposes of this paper as:

> *The estimated or assigned worth of the socio-emotional good embedded in an object as a result of human relationships.*

This definition can be supported intuitively by the example of farmland. In this paper attachment value to farmland will be measured. In other words, a measurement is developed to capture the relative worth of the feeling that binds the owner to the farmland. This relative worth is reflected in the differential between the estimated assessed price and the WTA to a stranger.

2.1.2 Attachment Value Production

To provide a thorough discussion of attachment value we must also consider how attachment value is produced. The question of attachment value production is an

important one because presumably the origin of attachment value will greatly influence its longevity, flexibility, and durability.

Attachment value originates from reciprocal social capital relationships that agent A has with other agents. In this case, attachment value is derived from associations made between agent A's friends and family and object X which has a resulting stock of attachment value.

Consider the example of an engagement ring. An engagement ring has significant attachment value because it is associated with a strong relationship between the owner and the other person associated with the ring, the owner's fiancé. This ring is worth more to the owner than the market value because it has a strong attachment value. However, the attachment value is highly dependent on the level of sympathy, love, or social capital present in the relationships surrounding it. If this relationship deteriorates, so does the value of the attachment. If the couple breaks up, for example, the social capital relationships surrounding the engagement ring will be altered thus altering the attachment value associated with the ring. In the case of negative attachment value, attachment value may even decrease the WTA to a stranger to a level below market value. In this case production of social capital is dependent on interactions and exchanges of socio-emotional goods with another agent associated with the common physical object.

2.1.3 Communication of Attachment Value

The communication of attachment value must also be understood before it is operationalized. The communication of attachment value depends on the property rights assigned to object Y. Consider Y that holds an attachment value for agent A. If agent A

is assigned the property rights to Y, attachment value is likely to be communicated in the WTA price for the object Y. Conversely, if the property rights are assigned to agent B for Y, the price that A is willing to pay B will likely be higher than the market price.

We must also consider the case where property rights for object Y are assigned to neither A nor B, because Y is a high exclusion cost good. If this is the case, A's attachment value can be communicated through protest or lobbying efforts directed at the governing body for the high exclusion cost good. For example, many people feel that natural areas around the United States have a value higher than market value. This may be a result of attachment value to natural areas. When these areas come under threat, lobbying campaigns and protest efforts are often implemented. In this case, the value of the attachment is equal to the opportunity cost of the lobbyists or protestors for their efforts to preserve the land.

2.1.4 Determinants of the level of attachment value

The strength of attachment value depends on the origin and type of the attachment value. The strength of attachment value, is directly correlated with the strength of the relationship surrounding it. Intensity of the attachment value determines the resulting economic outcomes, such as the WTA for farmland.

Robison et al (1999) provide an analogy between social capital and physical capital in an article entitled "Is Social Capital Really Capital". The authors point out that social capital can depreciate over time just as does physical capital. Depreciation of physical capital results in a decreased physical value of the asset. Similarly, depreciating social capital has a direct effect on attachment values associated with the social capital. When social capital depreciates the associated attachment value will decrease also.

Attachment value is an important component of the social capital theoretical framework. In this study, attachment value to farmland is specifically investigated. The owner is considered the primary agent in this context and is assumed to own the property rights to the farmland. Therefore, it is assumed that attachment value is communicated through an increase or decrease in WTA relative to the market price.

2.2 *Qualitative evidence of attachment value*

There is overwhelming anecdotal and qualitative evidence suggesting that farmland owners have a strong personal attachment to their farmland. Through numerous discussions and articles farmland owners state that farming traditions and the farmland are a part of their family and a focal point in both their personal and professional lives. The Centennial Farm Association[1] in Michigan has done a significant amount of work documenting the formation of farmers' attachment to their land.

Many of Michigan's Centennial Farms have kept careful history of their farms, including anecdotes, family histories, and community events over time. Centennial Farms provide an interesting case study of the formation of attachment values. It is clear that the formation of attachment values can be attributed to a wide variety of factors. Several excerpts from interviews with Centennial Farmers are provided below. These excerpts help to identify some key factors in attachment value production and further provide insight into how attachment value is passed through generations.

The history of the farm and the family clearly play an important role in the formation of attachment value. For example, one centennial farmer recounts:

> *The haying season and riding the big hay wagon back to the house and barns after it was filled to overflowing.... After threshing, it was my job to pull the ropes out of the*

[1] The Centennial Farm Association is a group of farmland owners whose farmland has been in their family for more than 100 years.

straw stack that tied up the shock of grain... eating the wonderful bacon that my uncle used to smoke in the smoke house... going into the woods to pick the succulent blackberries... memories that keep centennial farms going in Michigan (Wermuth, 1986, as cited by Shaffer 1997).

This quote clearly depicts a sense of place felt by the farmland owner based on memories of the past. This may indicate that the formation of attachment value depends partially on whether the farmland owner grew up on the farmland. The farmer clearly indicates at the end of the quote that it is these memories that help to keep centennial farmers "going".

Another farm family recounts:

We have so many memories of the farm- the Atwater Kent battery radio, getting electricity from the REA in 1937, the round hard-coal burner with isinglass in the doors, the furnace being installed in 1933, doing school homework by Aladdin lamp light, and everyone helping with the Saturday night chores so we could play Pedro. We are surrounded by reminders of all those who came before us on the farm who have shaped and touched out lives with their own here on this Centennial Farm (Wermuth, 1986, as cited by Shaffer 1997).

This quote suggests that family history and family closeness may be important determinants of attachment value. It further implies that the length of time the farm has been in the family is an important consideration.

Community size and closeness are also indicated to be important aspects of attachment to the land. Case studies on Centennial Farms conducted by Levak investigate the community relationships between Centennial Farms and their community. It was concluded that recognition of Centennial Farms in communities depended on the size of the community, and the contribution of the owners of the farm to the community. In addition, communities, especially small communities, felt that having Centennial Farms in their community were important to the community values of stability and permanence of the population (Levak, 1956). Perception of the community towards

farmland owners could potentially play an important role in the formation of attachment values.

Other comments from Centennial Farmers indicate the wide range of non-economic benefits gained from farming Centennial farmland. Farmland owners' attitudes about agriculture and an agricultural lifestyle undoubtedly contribute to the formation of attachment value to farmland. The following comments from Centennial Farmers indicate some of the most important factors that contribute the formation of attachment value.

> *It is indeed hard work – but there are immediate rewards to what you do. The other guy doesn't see it way down on the assembly line. You see the outcome of your own efforts or mistakes, either way. You immediately see what you have done. The reward of agriculture is the challenges and self satisfaction of what you've done (Van sickle, 1999)*
>
> *My grandparents purchased the farm in August of 1998. I still own the original farm. Kenny my grandson does the fieldwork and Charlie puts up the hay. My grandson is buying it and hopefully he'll keep it for another hundred years (Laing, 1999).*
>
> *The farm means family to us. We all grew up here. Even the cousins consider this THE farm, everybody does. This is the central place. Every family needs a heart, well for us, not only is the heart an emotional place by a physical place. I think that's what the farm means to most of us (Parker, 1999)*
>
> *This farm means... it's part of my history. It's neat that I'm a part of something that has gone back so far and is continuing (Hill, 1999).*
>
> (4-H Folk Patterns Project, 1999)

In the above quotes it is clear that many Centennial Farmers feel a deep connection with the land that they live on. The value of their land comes not just from the income earning potential but also the history and emotional connection to the farmland. The Centennial Farms project provides a strong example of the formation of attachment value to farmland. This non-scientific inquiry does not provide any evidence

that can be generalized with confidence. However, it does point to possible contributors to the formation of attachment values that warrant more formal investigation. Given the obvious importance that non-monetary factors play in the decision frameworks of these farm families, one must consider the role that socio-emotional goods in the formation of a WTA price. A more formal inquiry into the formation and effect of attachment value on WTA is warranted.

3.0 A Theoretical Model of Farmland Valuation with Attachment Value

In this section, three components of a theoretical model built to analyze attachment values affect on farmland valuation are presented. In section 3.1 a utility model for the farmland owner is presented hypothesizing that utility is derived from economic gains as well as socio-emotional gains from owning farmland. In section 3.2 a production function for attachment value is presented and discussed. In section 3.3 an indifference equation for selling the land and not selling the land is developed and the relationship between price to a stranger, estimated assessed price, and price to the seller is derived.

3.1 Utility Model

Utility is the level of satisfaction that an agent obtains from consuming a good or undertaking an activity. A utility function is measured by attaching a number to each component of the utility function, such that if A is preferred to B then the number associated with A is higher than B. The decision to sell farmland depends on an agent's utility from selling farmland, U_f, versus an agent's utility from not selling farmland, U_{nf}.

In this conceptual model the decision to sell farmland will be considered in a static context. It is assumed that if $U_f^A > U_{nf}^A$ at time t, the agent will sell their farmland.

Further, if $U_f^A < U_{nf}^A$ at time t, then the agent will not sell their farmland. Typically, we consider utility to be a function of income or some other physical gain. However, one might assert that utility is a function of more than physical variables. Consider the utility a farmland owner receives from owning farmland. Anecdotal evidence presented in section 2 indicates that farmers are receiving utility from more than just their monetary gains from farmland. In addition to income received from the land, evidence suggests that farmers receive socio-emotional goods from owning farmland. The following utility function is based on this suggestive evidence.

(1) $$u_i[\pi_i(l_i) + A_i(l_i) + A_j(l_j) + K_{ij}(\pi_j(l_j))]$$

where $\pi_i(l_i)$ is the economic and/or physical gains, $A_i(l_i)$ is i's attachment value to the land, $A_j(l_j)$ is the attachment value i retains from selling farmland to j, and $K_{ij}(\pi_j(l_j))$ is the satisfaction that i gains vicariously from an increase in j's income, weighted by the strength of their relationship K_{ij}. This utility function suggests that farmers receive utility from economic gains from the land, and their own attachment to the land. In addition, this model assumes that agent i has internalized the well being of agent j and therefore receives utility from j's attachment to j's land and j's income from their land.

In a neo-classical framework we assume that an agent receives utility only from the income or other physical gains received from the farmland. Therefore, if the value of the farmland, based on the conventional land valuation methods, decreases, WTA should decrease accordingly. The neo-classical model holds fixed the role of socio-emotional goods and other non-monetary factors in the determination of the WTA. However, in the case of farmland, preliminary evidence suggests that emotional attachment to farmland

may play an important role in the formulation of utility from the land and hence the determination of WTA.

3.2 Production of Attachment Value

A conceptual model for the production of attachment value is presented in this section. This model is based on several conversations with farmland owners as well as qualitative evidence provided in section 2.2. Consider the utility of the owner $u_i[\pi_i(l_i) + A_i(l_i) + A_j(l_j) + K_{ij}(\pi_j(l_j))]$. It is clear how $\pi_i(l_i)$, the net present value of the land is produced. The production of $\pi_i(l_i)$ comes from revenue gained by the owner from the farmland. It is less clear however, how $a_i(l_i)$ is produced. It is hypothesized that attachment value is embedded in a system of social capital relationships. As discussed in section 2.1.2, attachment value is based on reciprocal social capital. Based on this, the function representing the production of attachment value must incorporate variables associated with reciprocal relationships associated with the farmland. A production function for $a_i(l_i)$ is presented in (2).

(2) $a_i(l_i) = f(y_i, h_i, c_i, r_i, f_i)$

where y_i is the number of years the agent has owned the land, h_i represents how many generations the farmland has been in the family, c_i indicates the number of children the agent has, r_i is the relationship of the agent to the community, and f_i is a measure of family closeness.

Years on the farm (y_i) may be the most important variable in the formation of attachment value. As the length of ownership time increases it is likely that the number of social capital relationships associated with the farmland also increases. As the number

of social capital relationships associated with the farmland increases the strength of the attachment value is also likely to increase.

The number of generations the farmland has been in the family (h_i) may also be an important component of the production function. It is reasonable to assume that agents feel social capital with their family members. If the farmland has been passed down from generation to generation evidence suggests that the farmland in essence becomes a symbol of the farm family and thus embedded with attachment value. The farmland is a symbol of relationships or identity that the owner shares with past generations. One would expect that the longer a farm has been in a family the more attachment value it has for the farmland owners and their family members.

Children (c_i) is a variable that reports how many children the farmland owner has. This may be a component of the production of attachment value if the owner wishes to save the farmland for the next generation. If the owner has children that (s)he wishes to inherit the farmland attachment value to the farmland may increase.

Community involvement (r) adds another level of social capital relationships associated with farmland. Reciprocal bridging and linking social capital relationships may provide a sense of belonging and identity to the farmland owner and thus add to the attachment value connected with the farmland.

Family closeness (f_i) is likely an important component of attachment value production. If a family is close the strength of their social capital relationships are likely to be greater and thus may contribute to greater attachment value. Conversely, if a family is not close attachment to the farmland is likely to be weaker. Family closeness is a measure of the strength of reciprocal bonding social capital relationships.

3.3 Willingness to Accept Price Model

Social capital has been examined in the context of farmland sales by Robison, Myers, and Siles (forthcoming). The authors characterize the effect of relationships between buyers and sellers of farmland on the minimum sale price. The model presented in this section differs because it considers how the seller's attachment value to the land can potentially alter the terms of trade. Attachment value is measured as the differential between the perceived value of the land (WTA) and the market value of the land.

Suppose potential seller i is considering selling parcel of land δ to a potential buyer, j. The WTA, P_{ij}^{t}, can be defined as $P_{ij}^{t} = P_i^M + P_i^A + \textit{altruism effect}$. The total price i is willing to accept from j is a sum of the market price, plus a premium (discount) equal to the value of the positive (negative) socio-emotional goods received from the attachment value of the land, plus the altruism effect. The altruism effect is the discount (premium) the agent charges based on a previous relationship with the buyer. The WTA, P_{ij} that i would accept for the parcel of the land would be the price that makes the agent indifferent between selling and keeping the land, characterized by (3):

$$\pi_i(l_i)+A_i(l_i)+A_j(l_j)+K_{ij}[\pi_j(l_j)]=\pi_i(l_i-\delta)+\delta P_{ij}+A_i(l_i-\delta)+A_j(l_j+\delta)+K_{ij}[\pi_j(l_j+\delta)-\delta P_{ij}$$

Combining terms yields (4):

$$\Delta\pi_i+\Delta A_i=\delta P_{ij}+\Delta A_j+K_{ij}[\Delta\pi_j-\delta P_{ij}]$$

where $\Delta\pi_i = \pi_i(l_i) - \pi_i(l_i - \delta)$ is the positive reduction in i's net present value due to selling the parcel and $\Delta a_i = a_i(l_i) - a_i(l_i - \delta)$ is the positive reduction in i's attachment value due to selling the parcel, $\Delta\pi_j = \pi_j(l_j) - \pi_j(l_j + \delta)$ is the positive gain in j's net present value due to

buying the parcel and $\Delta a_j = a_j(l_j) - a_j(l_j + \delta)$ is the positive gain in j's attachment value due to buying the parcel. If there is no attachment value to the land the WTA will be equivalent to $\Delta\pi_i$. Further if there is no relationship between i and j the price will be equal to the market price plus the attachment value premium. Substituting prices into equation (3) yields (5):

$$\delta P^A + \delta(P_i^S - P_i^A) = \delta P_{ij} + \lambda\delta(P^A - P_{ij}) + K_{ij}[\delta(P^A - P_{ij}) - \delta P_{ij}]$$

where

$$\Delta\pi_i = \delta P_i^A$$
$$\Delta A_i = \delta(P_i^S - P_i^A)$$
$$\Delta\pi_j = \delta(P^A - P_{ij})$$
$$\Delta A_j = \lambda\delta(P^A - P_{ij})$$

where P_i^A is the estimated assessed price and P_i^S is the WTA price that i would accept from a stranger. By including prices in this model an empirical model can be derived from the conceptual indifference model. Solving for P_i^S yields (6)

$$P_i^S = P_{ij}(1-\lambda-2K_{ij}) + P^A(\lambda + K_{ij})$$

Using this model it is possible to obtain coefficients for both P^A and P_{ij} and then solve for both lamda and K_{ij}.

4.0 Methodology

This section provides an overview and description of the quantitative data and survey instrument and procedures used to collected the data. Quantitative data is used from a the Farmland Values and Relationships Survey, previously implemented survey by Michigan

State University. A description and justification of relevant variables contained in the data set is also presented.

4.1 Description of the Survey Instrument

Data from an 1997 MSU survey entitled, "Farmland Values and Relationships Survey" is used for the empirical analysis. This survey was intended to measure the importance of social capital in terms of trade for farmland. In this survey, 1,500 farm owner-operators in Illinois, Michigan, and Nebraska were selected by random sampling across the geographic distribution of farmland in three states. The survey included a pre-survey card describing the survey and its purpose, followed by a mailed survey, and then a follow up post card. A second mailing took place for non-respondents. From these surveys 40% or 604 surveys were completed and returned, 39% for Illinois, 49% for Michigan, and 33% for Nebraska (Robison, Myers, Siles, forthcoming).

The questionnaire began by describing a plot of land for sale specified by the following characteristics:

1. The farmland is average quality non-irrigated cropland and is being offered for sale in either 20, 40, or 80 acre plots. There are no buildings or other improvements on the land.
2. The farmland is located in the buyer's area near serviceable roads and within 5 miles of a town of nearly 5,000 persons. The land does not have residential value.
3. The buyer intends to use the land for farming and will provide his/her own financing.

4. The seller will pay five percent of the farmland sale price for commissions and other legal fees associated with the sale.
5. Payment for the sale of the land will be provided by the buyer to the seller in the form of a cashier's check.
6. The land being sold is not adjacent to where the seller lives.

The survey then aims to establish a market price by asking the respondent to determine the estimated assessed value and the appraised value of the land. They were then asked to state the WTA price from a stranger. The survey also collected data on WTA prices from buyers of varying social capital relationships. In addition the survey asked questions to gather general respondent characteristics including age, education, community participation, if the person has ever bought farmland, if the respondent has dependents, and income level.

Since this data was not originally intended to measure attachment value there are several key variables and several potential problems using the data to measure attachment value. First, many of the key production variables for attachment value discussed in section 3.2 were not collected. This means that key variables were either excluded in the following empirical analysis or proxies were used where appropriate.

Secondly, the survey is framed in a way that asks respondents about a specifically defined piece of farmland and does not explicitly indicate that the farmland in question is that of the farmland owner. If the farmland owner does not associate the land with their own, this may cause a problem in the measurement of attachment value. However, there is some justification in using this data to measure attachment value. Since the farmland owner was asked to indicate different selling prices they would accept it is reasonable to

assume that the farmland owner is associating the land described in the survey with the land (s)he owns.

Given the problems with the data set it is necessary to discuss the variables used specifically in the empirical model to explain the differential between the estimated assessed price and the WTA from a stranger.

4.2 Relevant attachment value production variables used in the empirical model and justification

This section defines and justifies the relevant variables used in this analysis and the potential limitations in their measurement.

Professional appraiser price will be used as an approximation of the market price. It will be used to determine if there is a significant difference between the appraised price and the WTA from a stranger. The limitations of this variable are that the appraised price may not be an exact estimation of the market given that the appraised price is a static price and the market price is dynamic. Also, social capital relationships between farmland owners and town assessing committees may also influence the estimated assessed price of land.

WTA from a stranger will be used as the arms-length sale price. The usefulness of this variable may be hindered by respondents' perception of the question as discussed in the introduction.

Age will be used as an explanatory variable. Age of the respondents will be used as a proxy for years on the farm. By using this variable as a proxy for length of time on the farm, it is assumed that most farmland owners have been on their farmland since their

early adult life and therefore relative age will also give us relative length of time on the farmland.

Previous purchase of farmland will be used in as a proxy for the question of inheritance. Theoretically, we assume that if the farmland is passed down from generation to generation, attachment value will be greater. If the farmland owner inherited the land, the land could possibly be a symbol of relationships or identity that the owner shares with past generations. It is reasonable to assume that if the farm owner has never purchased land then the farmland was inherited. A priori expectation is that this variable will have a positive effect on the attachment value.

Dependents is a variable determining if the respondent has dependents in their household. This may be a component of the production of attachment value if the owner wishes to save the farmland for the next generation. It is expected that this variable will have a positive effect on attachment value.

Income level (INC) is an explanatory variable included in empirical model two. Income was reported as a range. The justification of including income is that it is possible that income levels affect the price a farmer is willing to accept. If a farmer has a high income, they might have the luxury of holding onto land with attachment value for a higher MSP than that of a lower income owner. Given this, a priori expectations indicate that higher income would have a positive effect on the differential. It is important to note that the income variable may not be a measure of attachment value.

PTA, Church, Service Club, Local Government, Environmental Organizations, will be used to assess the level of community involvement by the farmland owners. The survey asked if the respondent was involved in any community activities and listed,

parent-teacher association or school board, church organization, service club, local government organization, environmental organization or other as possible community organizations. A priori expectation is that each of these variables will have a positive effect on the attachment value.

5.0 Empirical Models and Results

The empirical section is divided into two primary sections. The first section aims to determine if a significant differential exists between P^A and P_{ij}. The second section tests the hypothesis that these differentials, at least partially, represent some kind of attachment value. Both empirical investigations use variables from the farmland values and relationship data set. Variables were chosen based on the theoretical models presented in section 3. Specifically, in the second empirical section, which attempts to explain the differential, variables consistent with the formation of attachment value are chosen. The third component of the conceptual model will not be dealt with empirically. Given the weakness of the data set for estimating attachment value, robust results for lamda and K_{ij} included in section 3.3 were not able to be derived.

5.1 Testing for Significant Differentials

The differential between P_{ij}- P^A is formally tested in this section, where j is 1,2,3,4,5 representing differing social capital relationships such as a stranger, friendly relative, influential person, unfriendly neighbor, and friendly neighbor respectively. On average, respondents indicated a 6.1% premium to a stranger from the estimated assessed value, a 1.1% discount from the estimated assessed price to a friendly relative, a 10.9% premium to an influential person from the estimated assessed value, and a 25.6%

premium to an unfriendly neighbor. These preliminary results support findings by Robison, Myers, and Siles (forthcoming) that relationships do effect farmland prices. While the altruism effect was investigated in the formation of a minimum sale price, the previous study did not include the potential effect of attachment value. Thus, further investigation into the formation of land prices, including attachment value is warranted.

Formal statistical analysis is provided in this section to test if a significant differential exists between P_{ij}- P^A . Both t-tests and paired t-tests are conducted for the means and the differences in means under differing social capital relationships. The sample size is sufficiently large ($n = 514$) such that the asymptotic distribution of the t-statistics (standard normal) are used. A 10% significance level is chosen with a critical value of +/- 1.65. The standard t-statistics tests the null hypothesis that that $P_{ij} = P^A$, against the alternative that $P_{ij} \neq P^A$. Results are reported in Table 2. Both t-tests and paired t-tests are reported.

Table 1. Report of t-tests and paired t-tests

Variable Description	Differential	t-score	Paired t-test score
P_{i1}- P^A *stranger- estimated assessed*	103.83 (496.04)	1.81*	4.74*
P_{i2}- P^A *friendly relative – estimated assessed*	-19.54 (470.47)	0.35	.94
P_{i3}- P^A *influential person – estimated assessed*	186.41 (677.69)	2.94*	6.24*
P_{i4}- P^A *unfriendly neighbor – estimated assessed*	434.19 (1592.84)	4.83*	6.18*
P_{i5}- P^A *friendly neighbor- estimated assessed*	2.91 (466.31)	.052	.14

* means significant at the 10% significance level
standard errors are reported in parentheses.

Table 1 indicates that there is a significant difference, at the 10 percent level, between the WTA from a stranger and the estimated assessed price. This differential

indicates that farmland sellers would consistently charge a higher than estimated assessed price to a stranger in the market. This differential may point to several things. The differential could represent a difference in information across the market. Another possibility is that the estimated assessed price is consistently valued below the market price. A third possibility is that this differential measures an attachment value that the farmland owner has for the land.

The tests indicate that there is not a significant difference between the estimated assessed price and the price charged to a friendly relative at the 10 percent level. This result is consistent with our a priori expectations because the estimated assessed value does not account for attachment value. However, when a sale takes place between friendly relatives there is presumably an altruism effect and at least part of the pre-existing attachment value is retained. It is reasonable to assume that not all of the attachment value is retained. If we consider the price charged to a stranger the complete price, including both the market value and the attachment value, a friendly relative is receiving a discount from this complete price. This discount may be comprised of both retained attachment value and altruism. The owner retains attachment value since the land is remaining in the family and they are likely practicing altruism by discounting the price even further than their retained attachment value.

There is also a significant difference at the 10 percent level between the WTA for an influential person in the community and the estimated assessed price. This differential may be a result again of mistakes in estimating the estimated assessed price or the WTA from an influential person. It may also indicate that linking social capital between buyer and seller results in a mark-up in WTA price. One explanation for the differential is that

the seller feels like (s)he is loosing all of the attachment value and further charges a premium above the level of this attachment value. This is supported by the fact that sellers consistently report higher WTA prices from influential people than strangers.

The differential between the estimated assessed price and the price charged to an unfriendly neighbor is also significant at the 10 percent level. The analysis of this differential is similar to that of the influential person. When farmland is sold to an unfriendly neighbor the seller looses the attachment value and charges a premium to compensate for that loss. In addition they gain negative socio-emotional goods from seeing their farmland in the hands of an unfriendly neighbor, thus charging an additional premium for the incurred socio-emotional cost of that sale.

The differential between the estimated assessed value and the price to a friendly neighbor is not significant. This is consistent with our a priori expectations as well, for similar reasons given to explain the non significant differential between a family member and the estimated assessed price. If an agent sells to a friendly neighbor it is likely that they will retain some attachment value and thus charge less of a premium above the estimated assessed value.

5.2 Empirical Results for the Production of Attachment Value

This section provides the second step in the empirical analysis by investigating the production of attachment value. The differential between $P_{ij} - P^A$ is used as the dependent variable. Using ordinary least squares (OLS) a linear model is estimated in the form:

(7) $Y_{ij} = \alpha_j + X_i\beta_j + e_{ij}$

Where Y_{ij} is the differential between estimated assessed price and WTA price from a stranger and X_i, is a vector of individual respondent characteristics. It is assumed that e_{ij} is constant across individuals. The inclusion of the variables reported in Table 2 were determined using a test for joint significance of variables using a standard F-test, inspection of the squared residuals, and standard t-tests on individual variables. The model is efficiently estimated by applying OLS. Results from these OLS estimations are reported in Table 2.

Table 2. OLS Results

	Coefficient Estimate	t-statistic	standard error
constant	94.47	0.66	142.54
age	0.61	0.32	1.88
previously purchased farmland	-69.14	1.07	64.08
dependents	14.86*	0.86	17.27
income	19.31	1.61	11.99
PTA	1.89	0.03	62.88
Church	-10.43	0.23	45.12
Service Club	8.45	0.17	49.48
Local Government	-4.66	0.09	49.44

$R^2 = .0111$
Standard Error = 469.5190
* indicates significant at the 10% level or less

Using the above results we can test the hypothesis that the coefficient β_i, is equal to zero.

H_o: $\beta_i = 0$

H_A: $\beta_i \neq 0$

By implementing these hypotheses we can assess which respondent characteristics are important in the formation or destruction of a differential. A positive sign on a slope coefficient indicates that there is a positive marginal expected change in the differential for a one unit change in the explanatory variable in question, holding the value of all

other variables constant. A negative sign on a coefficient indicates that there is a negative marginal expected change in attachment value for a one unit change in the explanatory variable in question, holding the value of all other variables constant.

5.3 Discussion of Results

The results reported in 5.2 do not provide conclusive evidence with regard to the role of attachment value in the formation of a differential between P_{II} -P^A. This section provides a discussion of these results.

The weak OLS results contribute minimally to the question of attachment values role in the formation of a differential. The only significant variable is income out of the eight explanatory variables included in the model. The significance and sign of the income variable are consistent with a priori expectations. OLS results indicate that there is a 19.3001 positive marginal expected change in the differential, $P_{II} - P^A$, for a one unit change in the price charged to a family member, holding all other explanatory variables constant. However, as discussed earlier income does not theoretically explain attachment value and thus does not support the hypothesis that attachment value contributes to the differential, $P_{II} - P^A$. Income likely has a positive effect on the differential for various reasons. It is possible that higher income levels indicate that the farmland owner has off-farm income and thus can afford to retain the farmland.

None of the other variables included in the OLS were significant. However, these results do not necessarily imply that these variables are not theoretically consistent. Inconclusive OLS results attempting to explain attachment value are reasonable given that the data set was not intended to measure or explain attachment value. Further, the variables used in the above OLS are not the ideal variables for measuring what they were

intended to measure. For example, age is used as a proxy for how long the owner has owned the land, and it is very possible that length of land ownership may not be consistent with a farmland owner's age. Number of dependents was used in place of the number of children, thus eliminating any children that are out of the house. The community involvement variables also did not come out to be significant. Given that some of these variables are theoretically consistent, their non-significance may point to a problem of using the differential, $P_{II} - P^A$, as a measurement of attachment value.

Given the low R^2 and the high standard error there is evidence that this model could be better specified with more theoretically relevant variables. Thus, it is difficult to confidently conclude that attachment value plays a significant role in the formation of the differential between the WTA from a stranger and the estimated assessed price. Perhaps with an empirical model using data that was collected specifically with the intent of attachment value measurement in mind would yield more theoretically consistent results.

5.4 Limitations of the Findings

The results of this study should be considered as a preliminary step. The survey used to collect this data was not intended to collect data on attachment value and as such did not collect all of the variables that would theoretically explain attachment value. For instance, variables such as the number of years the farmland has been in the family and the number of years the farmland has been owned by the current owner would likely be very informative in explaining attachment value. Similarly, this study used proxies for several important variables. It may be more effective to try to measure these variables more directly by using a other mechanisms to measure variables such as community and family closeness.

With the ideal data set one might be able to examine the differentials between all P_{ij}'s and decompose the attachment value, altruism effect, and other effects. With the current information it is nearly impossible to control for all of the effects that may be causing the differential however.

Recognizing that a better survey instrument may facilitate more conclusive information about the effects and production of attachment value a more appropriate survey example is provided in appendix 1. This survey instrument builds on the previous farmland and relationships survey but specifically targets attachment value as the unit of analysis. Literature on framing and contingent valuation is used to inform the survey. In the development of a new survey it is crucial to gather data not only on attachment value variables, but also on other variables that might explain this differential. If provided with a wide range of explanatory variables for the differential one might be better equipped to understand the different factors contributing to the formation of a differential.

6.0 Conclusion

Anecdotal and qualitative evidence suggest that many farmland owners have a strong connection with their farmland which may translate into a greater differential between P_{ij} - P^{A}. However, given the inadequacy of this data set in the measurement and explanation of attachment value, conclusive quantitative evidence was not provided to explain the formation of attachment value or if the differential contains an attachment value.

This paper provides a brief review of current literature specifically focusing on articles that discuss social capital and others that discuss varying asset valuation methods. In this review it is recognized that a gaps between WTA and WTP have various

explanations provided in previous literature. However, researchers have not considered the role of social capital in the formation of the differential between WTA and WTP. A conceptual framework, including a utility function, an attachment value production function, and a price model are all developed to provide a framework for analysis. Empirical analysis supports the hypothesis that there is a significant differential between WTA and estimated assessed price exists however does not support the hypothesis that social capital plays a role in the formation of this differential.

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Appendix 1

Methodology for Survey

A. Use of Focus Groups to test survey instrument
B. Mail survey to Centennial Farmers in Michigan

Survey Instruction

The goal of this survey is to identify prices that you would be willing to accept from different individuals for YOUR farmland. You will be asked a number of questions about your farmland, your family, and your farming history and operation. This survey should take no longer than 30 minutes to fill out. Your opinion is very important and your input is appreciated.

You may be assured that your responses to the survey will be kept strictly confidential. You indicate your voluntary participation in this survey by completing and returning the enclosed survey. Your name will never be associated with your answers.

Survey Background

You will be asked about your own farmland in this survey. The prices asked are based on the assumption that you are selling your entire property including houses, barns, and land. All prices should be reported on a Price Per Acre basis. The questions in this survey have to do with your farmland and attitudes and there are no right or wrong answers.

Section 1. Price for Farmland

Q1. What is the market price per acre for your farmland assuming all the farmland is sold together including houses and buildings for farming purposes? (Please write your answer in the blank below.)

$_____/ac.

Q2. At what price per acre would you expect a professional appraiser to value your land? (Please write your answer in the blank below.)

$_____/ac.

Section 2. Background information

Q3. Are you currently actively involved in any farming activity on your farmland?

Yes No

Q4. Do you have any children? (please circle)

Yes No

Q4a. If so, how many? _____

Q5. Please check the highest level of formal education you have completed.

____ Grade School
____ High School
____ Community College or Trade School
____ College
____ Graduate School

Q6. How many acres do you currently own?

_____ acres

Q7. Please indicate how you acquired your land in percentage terms. (For example, Mr. Smith purchased 50% of his land and acquired 50% of his land from family members).

_____ % acquired from family members

_____ % purchased more than 40 years ago

_____ % purchased between 20 and 40 years ago

_____ % purchased between 1 and 20 years ago

If you indicated that you acquired land from a family member in Q7 proceed to Q8. If you have never acquired land from a family member proceed to Q10.

Q8. How many years has the farmland you acquired from a family member been in your family?

_____ years

Q9. How many generations has the farmland acquired from a family member been in your family?

_____ generations

Family Closeness

The following questions attempt to identify a measure of family closeness for farm families.

Q10. In general, the following description best describes the relationship between me and my immediate family members (Please check what you feel is the more appropriate description below):

___ Extremely Close
___ Close
___ Somewhat close
___ Neutral
___ Not close

Q11. In general, the following description best describes the relationship between me and my extended family members (Please check what you feel is the more appropriate description below):

:

___ Extremely Close
___ Close
___ Somewhat close
___ Neutral
___ Not close

Q12. How many times a week on average does your immediate family (the people living in your household) eat dinner together?

_____ times/week

Q13. How many of your family members (both children and adults) live within 20 miles of your primary residence?

_____

Q14. The sense of tradition in farming varies from farm to farm. How important would say the tradition of farming is to you and your family?

a. very important
b. somewhat important
c. not very important
d. don't know

Q15. Do you expect that the next generation of you family will take over your farmland?

Yes No

Community Closeness

Q16. What is the population of the town or community you live in?

_____ people

Q17. How many other Centennial Farms are located in your community?

_____ farms

Q18. Would you say there is a particular group with common ancestry (ie. German, Dutch etc.) that dominates your town?

Yes No

Q18a. If you answered YES to Q18, what percentage of your town identifies with the same common ancestry?

_____ %

Q18b. Do you consider yourself to be affiliated with this group of people with common ancestry?

Yes No

Q19. Do you belong to any community organizations or groups?

Yes No

Q20. If Yes to Q19, which ones? Please Check.

___ PTA or school board
___ Church organization
___ Service club
___ Local government organizations
___ Environmental organizations
___ Other _____ (please list)

In this section of the questionnaire, you are going to be asked how much you and your family's connection to the land is worth to you in real dollars and cents. Since this is not something we usually think about several measurements will be asked to help determine this value.

Q21. What is the minimum price that you would accept for your land from a stranger who will keep the land in farming?

$_____/ac.

Q22. What is the minimum price that you would accept for your land from a stranger who will NOT keep the land in farming?

$_____/ac.

Q23. If there is a difference between the market price and the minimum price you would sell to a stranger which of the following reasons best explains why they are different?

a. The cost of selling the land is higher than it's market value.
b. I feel that attached to the land and therefore the market value doesn't capture its value to me.
c. I want to keep the land for my children, therefore it's worth more than the market value.
d. Other? Please Explain.

_____

_____

Q24. What is the minimum price that you would sell your farmland to a friendly relative?

$_____/ac.

Q25. Suppose that you are asked to relocate and told that you would be provided with land of the same value and rents, in your community, and further all of your costs of moving will be taken care of. What is the maximum price you are willing to pay to remain on the farmland you are currently on?

$_____/ac.

Q26. If there is a difference between the market value and the minimum price you would sell

to a family member which of the following best explains this difference? (Rank from 1-4, one being most important and 4 being least important).

_____ I feel affinity for my family and therefore will give them a discount out of good will.

_____ I will be able to visit the land and thus maintain some attachment to it.

_____ I know them and it would be less of a hassle to sell to a family member.

_____ Other. Please Explain_____

Q27. Suppose that you were required to pay a yearly fee to keep your land in your family. What is the maximum price you willing to pay per acre to keep your land in your family.

$_____/ac.

Q28. Do you think your emotional attachment to the land affects the price that you are willing to accept from a stranger?

Yes No

Q28a. If you answered yes to Q28, how much money, above the market price, would you need to be compensated to account for the emotional attachment per acre?

$_____ /ac.