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Study of America's Adopt-A-Horse (or Burro) Program

Peter A. Lawson
Utah State University

STUDY OF AMERICA'S ADOPT-A-HORSE (OR BURRO) PROGRAM

by

Peter A. Lawson

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Mustangs born wild to run free
With long tails and hides brand free.
Along came white man and staked his claim.
Mustangs lost their freedom to a roundup game
that had no love for the Mustang name.
Some Nevada born, but far from gambling sin
Mustangs and civilization was about to begin.
Round-ups with big iron humming birds
took the cream of the Mustang herds.
Freeze-brand with irons colder than hot,
born free blood, sucked into a holding pot.
Loaded on a rubber Mack with eighteen shod feet,
Wrangled by Big hat, branded Mustang Fleet.
As rubber foot separated from the loading dock
mamas' and papas' winnies drowned out round-up talk
with Mustang love for the cream of the crop.
When rubber foot got a rhythm on the right lead,
Big Hat got a love song in his heart.
Mustangs born wild to run free
never saw a lariat or tugged on a single tree,
will frolic no more on cactus tea.
For man stole their freedom with adopters' fee.
Rubber foot came to the end of the run.
They entered this new little man-made world of sin.
The only part of nature was the sun shining in.
This new little world had only one thing on their
side,
and that was nature on the outside looking in.
If you ever adopt one of our kin,
don't fence him in without love and nature within.
If you train a mustang with kindness in your heart
you'll be singing the Mustang love song,
"I got Mustang love in my heart"

C. F. Dawson
Wild Horse Adopter

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Peter A. Lawson

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ABSTRACT

Study Of America's Adopt-A-Horse

(or Burro) Program

by

Peter A. Lawson, Master of Science

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Major Professor: Dr. E. Bruce Godfrey
Department: Economics

This study analyzes aspects of Wild and Free-Roaming Horse and Burro adoptions. After primary data are gathered by a questionnaire sent to wild horse and burro adopters, various statistics, and regression test results are reported, which indicate that the demand for the wild horses is multifaceted and that the wild animals are not a homogeneous product. The results overwhelmingly indicate that young and female horses are preferred by the majority of adopters. This finding had supportive evidence in both a price determination model as well as adopters' responses to the survey that was conducted as a part of this study. This study found that many adopters value their adopted animals very highly, while others have not had the best experience.

Because of a combination of public laws and land use plans, there are about 10,000 unadopted animals being maintained by the Bureau of Land Management at an estimated cost of $10 million per year. Currently, there is no foreseeable solution for this situation.

(122 pages)

CHAPTER I

INTRODUCTION

The horse has a unique history in the development of America. Although there is evidence of prehistoric equids on the North American continent, the ancestry of today's American horses dates back to the early Spanish explorers. The horse was used by early Americans both settlers and Indians for travel, work, hunting and recreation. In addition to wild horse herds that had adapted to the American plains, farmers and ranchers raised horses to be their primary beast of burden. Wild horse populations varied sporadically from the early 1500's on, but seemed to peek at around two million head in the early eighteen hundreds [Godfrey]. Since then, due to various pressures, the population declined erratically until 1971. Although the horse and burro are not descendants of a native species to North America, there is a general prevalent attitude that they are culturally intertwined with the development of the West.

Like so many things the overall usefulness of the horse changed with the advent of newer machinery [Thomas]. Basically the horse's relative value fell with the introduction of the tractor. In the periods following World War I and II large numbers of horses were turned out on the open range by many farmers and ranchers. In modern times, since about 1940 wild horses and burros either for sport, development pressure or commercial value were subjected to removal or destruction by western ranchers and others. Not to apologize for the ranchers, but it has been tradition to set horses out on the range one year and round

them up the next. Many wild horses are the result of farmers and ranchers turning horses out. Its probably safe to say that this type of activity lead to a great number of the wild herds.

The wild bands of horses were in many ways detrimental to agriculture. In addition to eating pasture they would break fences and trample early spring crops. Its not hard to see why ranchers and farmers believed they were a nuisance and should be removed from the range.

Another pressure to remove horses from the range resulted from their commercial value. In the 1920's horse meat began to be used as chicken feed. In the 1940's horse meat was used in domestic pet food. Also in the 1940's a European export market opened up for horse meat.

The wild horse was viewed in two ways during this time. One it was disdained by farmers and ranchers as a pest eating valuable forage. Second it was seen as a commodity by mustangers, people who rounded up the horses and shipped them off to the slaughter house to be sold for horse meat. The results on the number of wild horses was predictable. Pushed by development pressure of American agriculture coupled with demand for horse flesh, the wild horse populations dwindled to an estimated low of about 16,000 head in 1970 [Thomas].

The treatment of wild horses need not be explored in great detail. It is generally accepted that humane treatment of the horses was not on the minds of most ranchers or the mustangers. During roundup, planes were often used and horses were often injured. In response to inhumane treatment of wild animals in roundups the first laws were passed to protect wild horses and burros.

In the early 1950's Mrs. Velma Johnson, commonly know as "Wild Horse Annie", started the campaign that eventually lead to protection of the wild horses and burros. She was a Nevada resident and a witness to inhumane treatment of horses during roundups. First on a local level she petitioned to eliminate the use of motorized vehicles in roundups. In order to get more protection she carried her fight to Congress. On a national scale voices of concern were first raised successfully by proponents of the Wild and Free-roaming Horses and Burros (WFHB) Act in 1959 with the passage of Public Law 86-234. The law was an attempt to stop the abuse of WFHB by restricting the use of motorized vehicles in wrangling on public lands or ranges.

Problems arose concerning jurisdiction and ownership of wild horses. Ranchers would claim they were rounding up their own branded or unbranded horses off the range. The law was vague on some of these points and the old methods of roundups continued. There probably was some effect of the new law on the roundup procedures but a case was made that abuses still existed. Also the wild horse populations were getting small, estimated at 16,000 animals. Some feared their eradication from western ranges. So again in 1971 the proponents of wild horses and burros achieved victory with the passage of Public Law 92-195. This later law also known as the Wild and Free-roaming Horse and Burro Act, further solidified the protection of the WFHB populations because it prohibited private individuals from removing or destroying any WFHB on the public range.

Why Study the Adopt-A-Horse (or Burro) Program

With the passage of Public Law 92-195 in 1971 the responsibility for wild and free-roaming horses and burros was given to the Secretaries of Interior and Agriculture. Each either through the Bureau of Land Management (Interior Department) or though the Forest Service (Agriculture Department) is mandated to protect and manage the wild and free-roaming horses and burros on their respective lands. (Because the bulk of the wild animals and adoption program is under BLM control throughout this paper it will be referred to as a BLM program, although some cost of the Forest Service will be included). The law stipulates that due to overpopulation in an area the Secretary may (1) "...order old and sick animals to be destroyed...", (2) "... cause additional excess wild and free-roaming horses and burros to be captured and removed for private maintenance..." or (3) if no other practical method is available they may be destroyed in the "... most humane manner possible." Due to foreseen pressure by WFHB advocates the BLM put a moratorium on the destruction of animals removed from the range but have remained unadopted. These animals are now maintained by the government.

This study is concerned with the period following enactment of Public Law 92-195 in 1971. This law created the adoption procedure:

> ". . .additional excess wild free-roaming horses and burros (are) to be captured and removed for private maintenance under humane conditions and care." [Public Law 92-195]

Regardless of the intent (which seems to be a mixture of protection from abuse and preservation of a part of our heritage) the law is generally thought to have had substantial effects on increasing WFHB

populations. Estimates in 1972 place the populations of wild horses around 26,000. Population estimates in 1976 put the figure over 56,000 [Godfrey]. The 1972 figure is probably understated, as it would take either large infusions of horses to account for so many horses in 1976, or an improbably large growth rate. While precise growth rates for wild horses have not been established [Wolfe, 1980], it is unlikely that this increase would be physically possible. Problems encountered in estimating horse population growth rates include variations in social behavior, demographics, range and weather conditions. It is believed that a shortage in the data base and control techniques exits. As a consequence it is difficult to accurately predict a rate of growth for wild horses. Regardless, estimated annual rates tend to be in a range from eight to thirty percent [National Research Council]. Several alternative strategies for population control ranging from birth control drugs for mares, vasectomies for stallions or removing a high proportion of mares have been suggested [Wolfe, 1982]. So far none of the proposals either because of cost, logistics, ineffectiveness or doubts about undesirable social effects on the animals have proven to be of great use in population control.

Regardless of the long-term solutions to the population control issue, currently the only effective means of control is to remove large numbers of these animals from the public ranges. The Bureau of Land Management and the Forest Service who manage the WFHB have determined that removal is necessary. Basically this action is to minimize the ecological and economic effects of the WFHB.

Detrimental activities of WFHB exist in two major forms. One is from excessive tramping, and the other results from overgrazing pressure

and its associated impacts on other uses [American Farm Bureau Federation]. Both tramping and grazing can lead to loss of grass cover and hasten erosion. Tramping can do two things. One is the break up of the top layer of soil, making it more susceptible to damage from run off. The other is the tramping under of plants and killing them. Spring is the season when the range is most vulnerable to tramping. It is at this time when the range gets most of its rainfall and new growth of plants. Both breaking up the soil and killing vegetation by WFHB have the potential to increase erosion on the range. Other ecological effects from WFHB stem from competition with other critters for the use of public lands. Most noticeable might be the detrimental effects of the burro on habitat of the bighorn sheep [National Park Service 1976, 1981].

The BLM and Forest Service through multiple use planning have developed a land use plan for many areas. Part of the land use includes determining a "target population" for WFHB. Generally the populations will be allowed to grow to a certain size and then be reduced. The reductions may be reoccurring on a two, three or four year basis, but reductions in the same area or herd would probably not happen in consecutive years (John Boyle, BLM WFHB Administrator and Dick Stark, BLM WFHB Specialist, personal communication May, 1985).

Agency personnel generally agree that the target population will be around 25,000 animals (John Boyle and Dick Stark, personal communication). Although most agree this will be the final target population, so far it is not in writing. The target population figures determined by the BLM and FS are by no means accepted by all persons concerned with the project. The views of advocates of more WFHB on the

range can be read in a publication called The Wild Horse and Burro Diary.

Proponents of WFHB who think the limits proposed are too small have on occasion taken the BLM to court. For what ever reason they do not want the number of animals to be as restricted as the BLM or FS land use plans would indicate. They argue that the 1985 estimated 62,000 wild horses on the public lands is not large when compared to other big game animals or the number of privately owned livestock that use the public range every year. On the other hand, ranchers have joined together in grazing associations and have also taken the BLM to court. They state that the number of WFHB on the public range is too high and have asked the courts to mandate reductions in the horse herds [U. S. Department of the Interior, BLM, Wild Horse and Burro Report, August, 1982]. They see the horses on the range as having direct negative economic effects on their welfare and want the number of head reduced.

Given this background, the BLM in an attempt to control the WFHB has over the years removed them from the range. The adoption policy was developed in some respect to provide a place for these animals to go. By September, 1983 over 12,000 burros and 46,000 horses had been adopted. In 1983 the FS and the BLM were appropriated in excess of $5 million to run this program. The removal and adoption trend has continued with projections of over 16,000 horses removed and 9,500 adopted in 1985 [U. S Department of the Interior; U. S. Department of Agriculture, Administration of the Wild Free-Roaming Horse and Burro Act:Fifth Report To Congress, hereafter Fifth Report to Congress]. A problem has developed as there have been more horses removed than have been adopted. This trend will most likely continue in the future.

Very little is known about the outcome of these adoptions. The BLM until very recently had a nonuniform pricing policy with regard to wild animal adoption fees. Until 1982 the prices were very low, typically from zero to $100 [U. S Department of the Interior; U. S. Department of Agriculture, Administration of the Wild Free-Roaming Horse and Burro Act: Fourth Report To Congress, hereafter Fourth Report to Congress]. The focus of the program at this time seemed to be more oriented to the management of the range and to securing private maintenance for the horses rather than recovering the cost necessary to make the horses available for adoption. In the beginning of 1982 the focus changed to that of recovery of a larger portion of the cost of capturing and making the animals available for adoption. Adoption fees were more than tripled with provisions for recovery of transportation cost. In 1981 the average fee was reported to be $62. On January 2, 1982 the base fee was raised to $200 plus transportation charges. It was not uncommon for fees in 1982 to be over $200. In March of 1983 the horse adoption fee was reduced to $125 plus transportation. The effect of raising the adoption fee from the 1981 level, cut the adoption demand by more than half [Wagner]. The BLM was left with 2,600 unadoptable animals at the end of Fiscal Year 1983.

What is to be done with the horses gathered from the range that no one wants to adopt for the price of one hundred twenty five dollars? The law stipulates that the excess animals that are not adopted will be destroyed in a humane and cost efficient manner. In January 1982 the director of the BLM placed a moratorium on the destruction of healthy animals. It is safe to say that large scale killing of wild horses would

not be popular. Because of the moratorium on destruction, animals that were not adopted were being fed in 1985 at an estimated cost of $2.14 per head per day. This only covers maintenance, the cost goes to $2.40 per day when veterinarian and transportation costs are included [Dick Stark personal communication]. Data in Appendix E updates this information for Fiscal Year 1986.

The higher adoption fee affected the amount of money BLM received as well as the cost of maintaining the adoptable animals. The following table presents the cost of adoption and the revenues from adoption fees for the years 1981, 1982 and 1983. The adoption costs include costs incurred by the BLM to maintain and adopt the animals. These are costs incurred after roundup and are separate from roundup cost. Revenue from fees is the amount paid by adopters through their adoption fee (i.e. adoption fee receipts).

Table 1. Maintenance Cost of WFHB Adoptions and Revenues from Fees

	Year		
Item	1981	1982	1983
Maintenance Cost	$2,695,000	$3,760,000	$3,052,000
Revenues from Fees	625,000	859,000	765,000
Net Cost	$2,070,000	$2,901,000	$2,287,000

This table shows the increase in the net cost that resulted after the adoption fees increased. Higher fees did not mean a less costly program. Even though the adoption fee receipts increased, even with less animals adopted, the net difference between the revenues and adoption cost expanded because the cost increased even more.

Another way to look at the cost of the program is to consider the net expenditures per year and the number of adoptions. In 1981 at the lower adoption, fee 11,329 animals (8,835 horses and 2,494 burros) were adopted. In 1982 during the highest fee period, 6,928 animals (5,278 horses and 1650 burros) were adopted. In 1983, a period of somewhat lower adoption fees than existed in 1982, the number of animals adopted dropped to only 5,095 (3,592 horses and 1,503 burros) [Fourth and Fifth Report to Congress and U. S. Department of the Interior, BLM, Public Land Statistics 1981,1982,1983]. Net expenditure is the gross amount expended less the receipts the BLM received. The areas of expenditure by the BLM, for this program include in addition to maintenance, the costs of removal, adoption, compliance and title transfers. Compliance costs are costs incurred as a result of checking on the condition of adopted animals to see if they are being treated humanely. The other expenditures seem self explanatory. Receipts that the BLM collects are from the adoption fees adopters are charged. Net expenditures were $3,938,000 for 1981, $4,180,000 for 1982 and $4,164,000 for 1983. By dividing the net expenditure per year by the number of animals adopted the expenditure per adoption is obtained.

Table 2. Net Expenditure Per Adoption Per Year

	Year		
Item	1981	1982	1983
Net Expenditure	$3,938,000	$4,180,000	$4,164,000
Animals Adopted	11,329	6,928	5,095
Net Expenditure per Adoption	$348	$603	$817

The adoption program does not make money on adoptions. The adoption fees have never covered the cost of roundups, maintenance, and transportation of the animals. What we see in table 2 is that although the adoption fees were raised and revenue went up, the net cost per adoption also went up because of the increase in cost. The net cost per adoption has not been improved by the higher adoption fees.

Currently the BLM has a uniform pricing policy of $125 for horses and $75 for burros. The transportation cost is no longer added on to the base adoption fee thereby decreasing the adoption fee paid by adopters. This fee schedule was implemented on October 24, 1984.

Fiscal year 1985 was entered with about 3,000 unadoptable animals. Current projections are that approximately 16,800 animals will be removed from the range in 1985 with about 9,500 of these being adopted (Dick Stark personal communication also Fifth Report to Congress). That would leave over 10,000 to be maintained. At current costs 10,000 animals maintained for a year will cost over 8.5 million dollars (10,000 animals x 365 days x $2.00/animal/day). (For an update concerning fiscal year 1986 see Appendix E.)

Problem Statement

It is evident that the adoption fee has an effect on the number of animals adopted and the cost of the adoption program. It is interesting that the past policies have increased the cost and reduced the number of animals adopted. This, we have seen, is caused by an increase in cost by holding unadopted animals.

One complication in this case is that the adoption fee is not determined by a market process. Rather adoption fees are determined by

policy decisions. Typically in a market system the price of a good or service is said to be determined by supply and demand. Economists suggest that if the supply of a good exceeds the demand at a given price a surplus occurs. Producers faced with the surplus inventory cut prices to reduce the surplus. The lower prices will decrease the amount that producers will supply and increase the amount buyers will demand. If on the other hand, the quantity demanded by buyers exceeds the amount supplied a shortage exists. In a shortage situation the buyers bid up the price. At the higher price, buyers will demand less and producers will supply more. In both cases, a properly working market system will result in a market clearing price in which the quantity demanded will equal the quantity supplied.

In our topic of study, the supplied product is not a "market good". This is so because the supply of WFHB is not affected by the adoption fee or other cost. Rather the quantity supplied each year is the product of policy decisions concerning funding and public land management plans.

It is generally accepted that there are currently more WFHB on the public lands than land management plans call for. In addition, the population growth rate of WFHB is positive. It then appears that the BLM will continue to remove excess WFHB in the foreseeable future. From the estimates of WFHB and land use plans, there appears to be approximately 37,000 animals to be removed. In a sense therefore, the supply will be dictated by land management decisions and some funding restrictions.

Secondly, given the current feeling held by many against killing excess WFHB, it is anticipated that all excess WFHB will be placed up

for adoption. The primary reason for removal of WFHB appears to be land management plans. So, it is assumed that once the animals are removed (in accordance with the land management plans) will be placed for adoption.

This brings up another point that needs clarification. What is the purpose of Public Law 92-195? It seems that proponents of wild horses see it as a guarantee of any horse's right to existence on federal lands. The current policy of the BLM while not openly endorsing this position, is in no way rejecting it. Healthy horses that are removed from the wild and unadopted are maintained indefinitely.

Assuming, that the major purpose is to place animals in private maintenance for the well being of the horse and the enjoyment of the adopter. To suggest this implies that there is some value to owning a WFHB. In fact, by placing an adoption fee on the horse we are assuming that the value of the horse is at least as high as the adoption fee. Ideally the fee would be the market clearing price for the quantity of horses supplied. But at the present time the fee is so high that a surplus number of wild horses exists.

It should be noted that the BLM has reduced the adoption fee from the 1982 level. Reductions in the fees also coincide with a surplus of removed and unadopted animals. As indicated above, maintaining these animals is costly. What would be the best situation for the BLM? Obviously it would like to raise as much revenue as possible without incurring extra maintenance costs. This would mean matching the quantity of WFHB to the demand of adopters and determining what price to charge for the adoption fee. But this brings us to the point of trying to reveal price determining factors for the WFHB by adopters.

Objectives of the Study

> "Settle back in your chair and let me tell you about my wild horse experience."
>
> Wild horse adopter

This is a study of adoption demand for WFHB. Foremost, this study will try to to determine what are the important factors that determine what adoption price (fee) adopters are willing to pay for these animals. Secondly, the adoption experience and preference of adopters will be examined. Very little is known about the retention rate, preference, use or final disposition of WFHB. Primary data is lacking in this area and therefore it is one which this study will focus on.

From this information it is hoped that a better understanding of demand preference, use and value of the WFHB is possible. At that point the discussion of the pricing policy can begin.

Currently, the problem of unadoptable animals is primarily with horses and not burros. Burros' adoptions have keep pace with the removal efforts of the BLM, and at this time there is no surplus. As a result, the focus of this study will be on the wild horse adoption process. Our objective is to determine relevant factors of demand, which can be used as a basis for a pricing policy for this nonmarket good.

CHAPTER II

DEMAND THEORY

When the demand for any good is examined, several variables are generally expected to affect it. It is usually stated that the demand for product x is a function of several variables. Most important in determining the quantity demanded is the price of a product. If the price of coke-a-cola doubles the quantity demanded will become smaller. This describes the law of demand which states that the relationship of price and quantity demanded is an inverse one. At higher prices smaller quantities are demanded and at lower prices greater quantities are demanded. When graphed with price on the vertical axis and quantity on the horizontal axis this relationship gives a downward sloping demand curve. The general form of this relationship is: $Q_d = f (P_d)$. It is assumed that all other variables are held constant, therefore only the price is changing.

But this law only describes the relationship between two variables. As stated before quantity demanded is generally a function of more than just the price of the product. For example if rainfall is heavy, the quantity of umbrellas demanded will increase at a given price. Or, if a person becomes suddenly wealthy they will spend more money on vacations. In these examples rain and income are influencing the demand for umbrellas and vacations. The demand for vacations is related to the income of a person as well as the price of the vacation. We can say that vacation demand is a function of price and income. Not only does it say they are related but, with enough information concerning people's

income, the prices of vacations and respective quantity of demand, the relationship can be generalized.

If we want, we can also consider the inverse demand function, which is a way of saying you are looking at the price of some product as being a function of a set of independent variables including quantity. The results are the same in both cases, greater quantities supplied decrease price and smaller quantities supplied increase price.

The price we are willing to spend on a product can be a function of other variables besides quantity. For example income may influence the amount a person is willing to spend on beer. It may be that a person's occupation is a factor in how much he'll spend on beer. Perhaps if he comes from Wisconsin the quality of the beer will effect the price he is willing to spend. The price of beer may also be related to the price of wine or soda pop. If the price of wine and soda pop both go up this person might drink more beer. Obviously the price will be related to the quantity available, but other variables will also influence price.

Theoretically then, the price demand function can be broken down in the following manner. The price of a product is determined by the quantity of the product in the market as well as the following variables.

1) Prices of substitute goods.
2) Prices of complement goods.
3) Individuals income.
4) Individuals tastes and preferences.

A mathematical statement of the relationship of the independent variable to the dependent variable is written in the following form.

$$P_d = f (Q_x , P_s , P_c , Y , T)$$

where P_d = demand price

Q_x = quantity demanded

P_s = price of substitutes

P_c = price of complements

Y = individuals income

T = individuals taste and preferences

This is considered the general form of the price (inverse) demand function. Theory has explored the effects of the above independent variables. The above variables generally have the following effects on the price.

Quantity has been discussed in the section dealing with the law of demand. It is generally accepted that there is an inverse relationship between price and quantity.

The price of substitutes is generally thought to have a positive effect on the demand price. Therefore, a higher price for substitutes will lead to a higher demand price and lower substitute prices will decrease demand price. This is caused by exchanging the use of one good for the other. Logically people would buy the lower priced substitute. For example, personal computers and dedicated word processors can be viewed as substitutes.

The price of complements has an inverse effect on the demand price. Complements are goods that are used in association or concert with one another. If one of these goods becomes cheaper there is an incentive to

buy more of the other because the cost associated with using both has decreased. Records and stereos are seen as complement goods.

An individuals income can have two effects on the demand price of a good. If the good is a normal good, an increase in income will tend to increase its price. If the good is an inferior good, the increase in income will tend to decrease the demand price. For example, margarine is generally thought to be an inferior good because as a persons income goes up the amount of money spent on margarine will decrease. Therefore the relationship between the change in income and the change in the expenditure on the product is negative. Other normal goods will have a positive relationship between the change in income and the change in the amount spent on the product. Cars are generally considered to be normal goods. As peoples income increases they spend more money on automobiles.

Individuals tastes and preferences are generally very difficult to determine. General trends such as an increased awareness in health may lead to demand changes away from foods high in saturated fats and more toward foods with high fiber content. This is an example of individuals taste and preference affecting demand for products. Product differentiation by manufacturers may be an attempt to capture a segment of demand because of differences in peoples tastes and preferences. Cars with sun-roofs may have a higher demand price because they appeal to peoples taste and preferences for sporty cars.

This completes our general discussion of the theory of demand. It defines the area in which our analysis must begin. The task set out at the end of the last chapter to was derive information about the demand

for wild horses. In order to give foundation to the study the data must be developed with regard to the preceding demand theory. How the study moves from the theory of variable interaction to horse adoption case variables is the topic of the next section.

Application of Demand Theory

Applying demand theory to wild horse adoption leads to questions about what are the significant independent variables that will influence the adoption (price) fee that adopters pay. What this study will primarily try to determine is the factors that may influence the adoption price. This will allow the construction of an adoption price (fee) determination model. In order to continue, the adoption fee and other variables which affect the demand for wild horses will need to be identified and collected.

To apply demand theory to the observation of variables in the horse adoption case, two basic approaches for our study could be used. The first deals with determining how price and quantity are related over a period of time. This is considered a time series approach. The second method deals with determining the relationship between price and the multiple independent variables discussed in our above model. This approach examines how these variables are related over individual occurrences or individual observations. This is considered a cross sectional approach.

The time series approach of determining demand that is employed in this study assumes that only price and quantity are relevant variables to the demand function. This is a simplified approach and not our primary task. However in this approach the price for a period of time

is associated to a quantity sold. For example, if the adoption fee were $50 for the first month and the number of adoptions were 15, $50 and 15 adoptions would be our first observation. For the second month, if the fee moved to $65 and the number of adoptions were 12 animals then $65 and 12 would be our second observation and so on. After compiling the price and quantity occurrences over our period of time one could determine the association between price and quantity. This is considered time series because the observation of price and quantity are made over time. The empirical evidence found in this manner would be expected to conform to our law of demand as previously stated. In this case it is assumed that all other things remain equal over the period of time considered.

In the second case a different approach is taken. In it the multiple variables involved in each adoption would be recorded when the adoption occurred. Using this method a record of each variable is kept for every observation or adoption. This is done for every adoption occurrence during the period of study. This is a cross sectional approach. In adapting the previous theory section to the horse adoption case a price determination model is constructed but first demand theory is considered to identify which variables should be recorded and included in the adoption records. From these records it will be possible to use regression techniques to determine if significant relationships between the variables exist. In other words do certain variables effect the adoption fee adopter are willing to pay.

In the adoption case, the question becomes what variables effect the adoption fee people are willing to spend, or the the quantity people

will adopt? Theoretically, the price of substitutes, price of complements, income levels and tastes and preferences all should play a part. The problem becomes how to identify and measure the other variables when adoptions take place. If the adoption fee and other important variables can be recorded then relationships between them man be estimated.

Imagine that each time an adoption takes place the adoption fee and also the income of the adopter is recorded. Perhaps it would be found that higher fees are paid by higher income people. Higher income may be related to a higher demand price.

What would happen if measures were recorded of the quantity available, the price of substitutes, the price of complements, income and personal tastes and preferences of the adopter each time an adoption occurred? Empirical evidence on which to base an evaluation of what effects the variables have on the demand price of the animal would be gathered.

The problem becomes finding the measures of the various independent variables theory suggests would influence the demand price for wild horses. First, it is assumed that a wild horse is a normal good. Although the horse has been historically an animal used for work, it is now assumed that adopted horses are used primarily for recreational pursuits. Recreational uses will be from breeding, riding and enjoying owning the animal. The small percentage that may be used for work will be ignored. If we specify variables in the broad classifications of income, taste and preferences, price of complements and price of substitutes, what would the price determination model look like? Using the inverse form of the model, as stated above, the price demand function may be as follows: P_d = f (quantity of horses available,

price of other horses, income, type of animal, occupation, adopters experience with horses, cost of maintenance). If this information was available we could determine the effects of these variables on the adoption fee adopters are willing to spend for animals. This would be done using a cross sectional approach. Every time an adoption occurred measures of each variable would be recorded. By analyzing many of these records the relationships between the variables could be determined. This model is in many ways similar to the wage determination models used in labor studies [Lewis].

Obviously to develop a model built on the theory of demand it would be necessary to have all variables relevant to the inverse demand function. Adoption fee would need to be known for every adoption. The quantity available in the market place at the time of the adoption of the horses would also be a relevant variable. Income would be included in the list, as would the type of animal, occupation of the adopter, prices of other horses, cost of maintenance, adopters experience with animals and any additional cost of adopting to the adopter. In this model measures of all relevant variables would be included.

The following is a list of variables which would be expected to be in our model. Each one presented is followed with a brief explanation of why in theory it is expected to effect demand price. Later specific problems of measuring these various variables will be discussed.

Quantity available in the market would have to be the first consideration of the model. The effect of changes in the quantity variable is would be considered to be inversely related to price and should be included in the model.

Another variable that would easily fit to theoretical demand analysis is income of the adopter. One would expect a horse as a recreational good to be a normal good. But whether or not its a normal or inferior good, income clearly would be thought to be one of the factors of demand.

Age of the adopted animal could be a variable in our model. Personal taste and preference is a bit more difficult to explain, but it is hypothesized, that people prefer young horses to old. Young horses live longer on average and are easier to to train. If this is true, older horses would tend to be associated with lower adoption fees. Younger horses would be associated with higher fees. This would indicate higher demand for younger horses and lower demand for older horses. Regardless of the effect at this time, age of the animal could be thought of as a variable that would capture some measure of personal taste and preference for adopters of WFHB.

Personal tastes and preferences may be captured in other variables concerning characteristics of the horse. One sex may be more in demand than another. If this is true higher adoption fees would be observed with adoptions of that sex. Again, considering the disposition of stallions compared to mares one would expect mares to be more in demand and command a higher fee. Also stallions would most likely need to be gelded and that would represent some cost either in paying for it, or the time and effort in doing it. Personal taste and preference may then be represented in the sex of the horse. In our cross section data sex of the horse will be recorded.

Personal taste may be captured in the weight of the horse. For example, other than recreation use, another purpose of adopting a horse

may be for commercial products. It may be in the back of adopters minds that a larger horse would be of greater value if sold for its commercial value. In this case weight of the horse would be expected to have a positive effect on the adoption fee of the horse. If the intent of an adopter was to consider the commercial value of the horse (i. e. the slaughter price). In this case, the larger horses would command a higher price. Weight then is also a variable that would be likely considered in the demand equation.

The occupation of the adopter may be important to the form of the demand model. If occupation of the adopter could be recorded at the time of each adoption it would be seen if this variable plays any part in the demand for horses. One could speculate that a ranching/farming occupation may lead to a different demand function for an individual than a nonranching/farm occupation. A possible reason for a positive effect would be that ranchers and farmers would be better suited to care for the animals. Occupation could be a proxy variable for some set of taste and preference variables. The effect of occupation of the adopter may be of importance in the demand for wild horses. In addition to occupation, experience with horses may be an important variable. It's possible that people with greater experience would have a greater demand for wild horses. Experience or knowledge of horses would be on the list of influencing variables.

Distance from the adoption site is another cost associated with the adoption that may affect the adoption price. Distance hauled could be considered in the model to see if there is any effect on adoption fee for people who travel greater distances. In a sense it can be considered

an additional cost and therefore may lower the amount these people would be willing to spend on the adoption fee.

Price of substitutes is a variable suggested by theory. If possible the price of other horses would be in the model. Demand theory says that prices of substitutes will effect the price paid.

Price of complementary goods would also be necessary for the complete model. At the time of each recorded adoption, the price of complement good would be relevant. For horses this may be the price of feed. For example, we could use the price of hay.

Theory points to developing a demand function built on all of these variables. Some of these variables pose specific problems for analysis because data on the variables is not readily available. The following section discusses some particular problems that the independent variables effecting the demand price present.

Specific Variable Problems

As stated earlier, one of the variables we would like to measure in order to determine the demand for horses is the supply of horses. Theoretically we would like to know the rate of supply of horses during any demand occurrence. Perhaps the biggest problem is determining the quantity available in the adoption market during an adoption occurrence. Not to be discouraged, this problem may not be so critical in this market situation. One reason is that the supply is not determined by market conditions. Supply is based more on the land use plans than on the market price (and therefore not effected by the adoption price). In addition, the supply has been relatively constant over the period. Over the period of time being considered, it is known that that there has

always been a surplus of animals not a shortage. Also the supply data is not available on a detailed enough basis to be grouped with a particular adoption observation. Because of these reasons the supply will be assumed to be constant over the period of time. By making this assumption changes in the adoption fee are ascribed to demand factors and not to changes in supply. Any conclusions must be tempered by this assumption.

The price of substitutes is a variable that would be incorporated into our demand function, but it is difficult to obtain a good measure of it. Prices for horses that are sold at auction would be a good variable except for a few major objections. The first problem in using this possible data is that these data are rarely available. For example, if you talk to regional auctioneers, they can give you a rough idea as to the general trend of horse prices over a given period of time, give or take fifty to a hundred dollars and give or take a couple of months. In addition, there is essentially no incentive for them to record these prices. Most auctioneers will tell you yesterdays price is as obsolete as last weeks newspaper. The other problem is that even if you had the data, horse auctions vary depending on the type of animals sold. For example, if you have high quality riding horses the prices can get rather high, but most of the price involves training. The underlying price of the raw untrained horse may decrease, say from $200 to $100 but the auctioned horse may still sell for a thousand dollars because it has been trained. The price difference wouldn't show the price change in the unbroken horse.

A good approximation of prices of the substitutes may be the low end of the horse auction range. These horses commonly have been rode

for less than 30 days or they are old animals people are selling after years of service. Some of these low priced horses are not too far from taking their last trailer ride. In a sense the commercial meat price of horses may be an indicator of the movement of the price of substitutes. If it is assumed that horse meat prices are some direct function of the price of the low end unbroken horse prices, then they may be a means of detecting changes in the price of substitutes. Since the demand theory is concerned with the change in relative prices it may be alright to use horse meat prices to mirror the price changes in substitutes. These data are generally not available. However due to the goodwill of a certain meat packer these prices were obtained for this study.

The other price of a related good that is said to have an effect in demand theory is the price of complement goods. What are the complement goods for a horse. Saddles and bridles are obvious examples, but somehow they don't appear to be significant. If when talking about complements for cars it wouldn't take long for the idea of gas and oil to come to mind as complement goods. If the price of gas goes down the demand for cars would tend to go up. The logic of the theory seems obvious. Hay and other feeds are potential complementary goods of horses. The problem is that historical hay prices are not readily available on a national basis. Even if they were, large regional variations in hay prices exist, which would limit their usefulness.

An aspect of the adoption process that is not covered directly in the demand theory previously outlined is the effect of variable transaction costs incurred by individual buyers. Generally demand theory assumes that all people trading in the market face the same transaction

cost. In the case of the horse adoptions this assumption is not valid. Some people travel ten miles to pick up the adopted animal, others may travel hundreds to over a thousand miles. If each pays the same adoption fee, is the total cost to each the same? Obviously the answer is no if any cost is attributed to the distance traveled. What is the effect of the longer distances traveled? This variable because of the possible effect of the different transaction cost is included in the analysis.

Other variables that are difficult to find a measure of include the knowledge and experience of an adopter, the cost of maintenance and the cost of complementary goods.

This chapter then gives the theoretical base for attempting to observe these variables in the adoption process. The next step is to develop the primary data of the available variables that, in theory, would be expected to have some explanation on the adoption demand. Once the primary data are collected, a model, including our dependent and independent variables outlined above, will be specified. Once this is done the testing of our intuition on the influences of the independent variables can begin. These tests will indicate the coefficients of the various variables and their relative significance.

In the following chapters, the methods used to develop our primary data and the general statistics of the primary data will be reported. Then simple time series models followed by the price determination model will be reported.

CHAPTER III

DATA GENERATION

From the discussion on the application of demand theory, several variables were pointed out as candidates for measurement in our demand analysis. Briefly these variables are the adoption fee, age, weight, and sex of the horse, income and occupation of the owner, hauling distance by the adopter as well as horse meat and hay prices. The next step is to be able to gather reliable data on these variables. Sources for the data must be found. Although it is impossible to derive all of the information, it is possible to gather what information is available and through demand analysis see what if any conclusions can be arrived at concerning the demand for wild horses. Directed by theory, an attempt to make a fair approximation of the demand market will be made, recognizing the data and model limitations.

What is needed is to capture information concerning each of the variables when an adoption occurs. One initial source of deriving the data is the BLM. Each horse that goes through the adoption process is branded with a coded angle brand that is referred to as a freeze mark. This nine digit number uniquely identifies the horse and its adoption record. Included in the adoption record is the date of the adoption, the name and address of the adopter, and also a signalment key of the adopted animal, and other information concerning the adoption. A signalment key contains related information on characteristics of the animal (e.g. color, sex). While government records provide some of the data we need for demand analysis, clearly more information is needed.

Given the names of the people in the adoption records a survey could ask them their income and occupation as well as the distance they had hauled the animal. Also from the adopters the adoption fee, the age and weight of the animal could be obtained. From government records and a survey of the adopters all variables except the horse meat price and hay price variables could be obtained.

Horsemeat prices in general are not kept by the U. S. Department of Agriculture. Detailed horsemeat statistics are not included in the annual livestock production figures. Efforts have been made to introduce horse meat to U. S. consumers, but so far resistance from horse advocates have for the most part kept horse meat off store shelves. However, the trade of horse meat does go on. Although most people associate horse meat production with pet food a considerable amount of horse meat is exported for human consumption. Horsemeat accounted for 40% of the European Community imports of meat from this country during the years 1977-79 [U.S. Department of Agriculture, Economic Research Service, The EC Market for U. S. Agricultural Exports]. In 1979 over 60,000 metric tons of horsemeat were exported to Europe, half of which goes to France. As it turns out horsemeat prices are much affected by and inversely related to the strength of the U. S. dollar.

Since the government does not keep records of horsemeat a private source had to be found. After locating and talking with several commercial packing plants that process horsemeat, M & R Packing Company, Hartford, Connecticut was kind enough to go through their records and provided the historical data concerning horsemeat prices that were required for the analysis [Later]. The horsemeat price obtained was the average price per month over our study period.

Hay prices are also a variable that we would like to have access to. As already stated hay prices are not readily available and subject to regional variation. If hay is assumed to be the major complementary good for horses, it might be asked if certain people have a relative less expensive supply of it than others? The obvious answer is that farmers and ranchers do. The occupation variable may then be an indication of a difference in the availability of this complementary good. Therefore, a breakdown by occupation as either being a farmer/rancher or otherwise may indicate a difference in demand. If farmers/ranchers do face a lower price for hay they may have a greater demand for the horses.

But still there is need for developing a major portion of the data for our analysis, and to do that the adopters must be contacted. The following section discusses the survey techniques used.

Survey Method

In order to obtain information on the experience and characteristics adopters of WFHB, a survey of adopters was needed. Several steps had to be taken in order to prepare the survey. First, adoption records were obtained from the BLM. Second, a time period of adoptions that were to be studied was determined. A random sample of adoptions from the time period was taken. A questionnaire was designed and sent to capture the key variables needed in the analysis.

Getting the adoption records from the BLM was a matter of doing it. This was accomplished by Dr. E. Bruce Godfrey. He was aware of the existence of the records and after much cajoling the BLM released the data. Once the data arrived the question became what time period would

be best to study. From various correspondence about the adoption program opinion varied greatly on its success. One internal memorandum of the BLM from an Oregon office indicated that only 46% of adopters of animals could be contacted with respect to receiving title to their animals. In addition, 20% of past adopters could not be located. The time period between the adoptions and this effort to contact them is not known. The memorandum suggested that any attempt to study adoptions that occurred more than four or five years ago could be a problem.

Another point that would influence the selection of time would be the fee structure. A time period with variable adoption fees would be preferred because the influence of different prices, as they affect adoptions, is the focus of this study. Imagine if every adoption record had the same price, could any relationship be built between the variables?

A study of fees showed that the period between January 1981 and July 1983 had the greatest degree of of variation. It is a period in which the basic fee charged by the BLM went through a number of major changes. It also is a period of relatively low inflation so that concerns about real verses nominal prices are mitigated. This problem was ignored in this study. From the perspective of the adopter, the length of time from the adoption of the animals until the survey was received ranged from a minimum of 1.5, to a maximum of 4 years. This seems a reasonable length of time on which responses could be considered. It also takes one year of maintenance before the title is granted to the adopter. Thus, adoptions of less than one year would not be desirable because disposition data was desired. It was hoped that not too many of the adopters would have moved or became otherwise unreachable.

During this time there was also some variation in the horsemeat price variable. This is may prove to be beneficial if there is some causation between the horsemeat prices (a proxy for substitute good prices) and wild horse adoption demand.

Population and Sample

The population contained 17,106 adoptions on record with the BLM from the period of January 1, 1981 up through July 23, 1983. It was believed that this population would be able to indicate how the adoptions were working out as well as provide the other information that was needed to understand the demand for WFHB. The question at this point is, how to go about studying all of these adoptions. One could certainly not study them all in any reasonable time, but more importantly it is not necessary.

What is needed is a sample group of the adoptions considerably smaller than the population. When selected if every sample record has an equal chance of being chosen the resulting sample is considered to be a random sample. If the random sample group is a fair or unbiased representation of the group, studying the relationship of its variables can be as informative as studying the whole population. This is the purpose of sampling, to reduce the task but still retain the accuracy of analysis.

Size of the sample had to be determined. To reduce the sample to just a few variables could not be justified. In addition, the primary data was dependent on the adopters responding to the survey. Estimated response rates by adopters to this type of survey was difficult to

accurately judge ex ante because no one had previously surveyed WFHB adopters.

Other considerations such as time and budget had to be considered. The sample population would need at least one questionnaire and a cover letter and return envelope. Those who do not respond to the first mailing would be included in a second. Data once returned would have to be coded and entered on a computer to be analyzed. This may not seem important to all, but to those who did the work it was understandably important.

In terms of a primary data base it was believed that at least 160 records would be needed to do meaningful analysis. About one-fourth of these would be burro adoptions as they represent about that fraction of WFHB adoptions. Split between horses and burros it would give about 40 records for the burro adoptions and 120 for the horse adoptions. Given the number of variables and expected variance of them these seemed like reasonable figures. If one assumes a net response rate of 30% one would need to send out about 530 questionnaires. Considering not all questionnaires returned would be usable, say 10 percent, the number of samples needed moves up close to 600.

It was decided that a sample of 600 WFHB adoptions would be taken. Each recorded adopter sampled would receive our cover letter explaining the study and would be asked to respond to the enclosed questionnaire.

The method for choosing the sample would be sampling without replacement. The data tape received from the government containing the records had the records in no particular order. So systematic selection of records could be done without biasing the sample. In order to arrive

at the 600 records wanted, for the sample size, every 28th record could be taken. But if the systematic selection of every 28th record was taken starting with the first record, then the last 306 records would be left without a chance of being selected. This violates one of the criteria for a random sample. In order to solve this problem of bias, a number between one and 306 inclusive was chosen at random. This number represented the first population record to be selected for the sample. From that record on, every 28th record would be selected. Therefore, depending on the number chosen for the first record any record could be chosen for our sample. Each record had an equal opportunity of being selected.

The sample once taken consisted of 600 records selected at random from the population. Of the six hundred records 454 horse, 145 burro and one mule adoption was selected. For the sample then, there were approximately 76% horse and 24% burro adoptions. Summary of WFHB for adoptions in fiscal year 82 and 83 had a percentage of 74% horse and 26% burros. The sample was therefore judged to be a good representation of the adoption population.

Questionnaire

The questionnaire was designed to address several areas of the adoption experience. Its purpose was to derive information concerning the age, weight, adoption fee and distance hauled of the WFHB. These questions were asked to determine what type of animals have been adopted and at what fee. Also some information about the adopter, their preference for adoption animals as well as information concerning the disposition of the adopted animals was wanted.

The purpose was to obtain an understanding of the use and value as well as an idea of how many people keep their adopted animal for an extended period of time. Concerning animals that had been disposed, similar information on use and value was asked for. An inquiry of the adopters preference for type, sex and age was also made in this section of the survey. This was an attempt to find out the adopters expressed preference. Finally information of the adopter themselves was asked to see if there is any relationship between demographics and successful adoptions or demand functions.

In conclusion, the survey was used to develop data for general statistics along with our price determination model for these animals. In terms of the horse adoptions, information was developed concerning variables that could possibly be determinants of the adopters demand function. The variables include the adoption fee, age, weight and sex of the horse, occupation and income of the adopter and distance the animal would be hauled. Other questions were asked because they were of interest to the general question of "What makes a successful adoption?"

The first mailing was completed in the first week of December, 1984 and the follow up mailing the second week of January, 1985.

Response

Over fifty percent of the those mailed a questionnaire responded to our survey. Of the 600 questionnaires that were mailed out 510 were delivered and 258 responded. This included 176 horse, one mule and 81 burro adoption responses. One hundred seventy seven of the 258 responded to the first mailing. Eighty-one responded to the second mailing.

Not all of the questionnaires returned were used in the data analysis. The data for both the horses and burros were screened by the following methods. One test was a positive response to the adoption fee. Blank or unknown adoption fees were eliminated. The same was true for distance hauled. It was thought that it was important to establish the cost of the animals to the adopters. These two criteria eliminated 35 adoption records. Also the total cost was an estimate which uses the adoption fee and distance the animal was hauled. Any adoption that had a total cost in excess of $750 was also eliminated. It was thought that any cost over $750 for an unbroken wild horse was irrational behavior. This eliminated another 4 records. As a result, the data base used for most of our analysis included 137 horse adoptions and 64 burro adoptions. With respect to the regression results reported in Chapter 5, an addition 6 records were eliminated because values for the weight variable were missing. Regression analysis included 131 horse adoption records. This elimination did not have a material effect on the regression results.

It is interesting to note that the response rate was higher than had been expected. The amount of unusable returned responses was also higher than expected. The biggest reason for eliminating a response from our study was the adopter leaving the adoption fee blank or answering with a question mark? Because this is such a key variable to the analysis these responses were eliminated. Even so, the outcome of the survey surpassed our initial estimated need for our primary data base with approximately 200 usable adoption records.

CHAPTER IV

GENERAL STATISTICS

The results of the survey in this chapter deal only with the horse adoptions. The major portion of the adoption program deals with horses, and frankly it appears to be the bigger problem as most burros are apparently successfully adopted. The major thrust of this study is to analyze the demand for wild horses. To promote continuity, first general statistics of horse adoptions are discussed in this chapter. Aspects of demand are discussed in the following chapter.

Results are organized in the following fashion. First, is a brief summary of statistics of animals adopted. These statistics include average fee, age, weight, and of sex of the adopted horses. Also an estimate of total cost to the adopter by considering a hauling cost of transporting the animal to where it would be maintained is developed in this chapter. Second, in this chapter the value and uses of adopted animals is considered. This is done by the estimated current market value of the horse or the amount received if the animal is sold. Uses of the animal (i.e. broke for riding or if used for breeding stock) are also reported as a consideration of value. Finally, the percentage of people still maintaining their adopted animal is examined.

Statistics of Adopted Horses

The following tables are derived from horse adoption data gathered through the survey method discussed in Chapter 3. The data in Table 3

expresses various statistics of adopted horses, including age, weight, sex, adoption fee, distance hauled and total cost.

Table 3. Selected Statistics of Sampled Wild Horse Adoptions

Group	Mean	Std Dev	Min	Max
Age of adopted horses.	3.4	3.1	1.0	17.0
Weight of adopted horses.	701.6	249.0	125.0	1300.0
Adoption fee for horses.	107.1	90.3	0.0	315.0
Distance adopted horse was hauled.	188.0	179.0	0.0	980.0
Estimated total cost of adoption.	201.1	126.9	1.5	638.0

As is shown in Table 3 the mean age of horses adopted is quite young. Later in the section on preference and demand it is reported that adopters prefer younger animals. The average weight points out the size of the adopted animals, at 700 pounds is not large.

Table 4 lists a breakdown by sex of adopted animals for responses to our questionnaire. The sex percentage is presented to give some idea of what the sample population is like in terms of its ratio of stallions, mares and geldings to the total population. In the sample population approximately 3% of the adopted horses were geldings, 41% were stallions and 57% were female. Again the mares are more dominating the responses in the survey and this is indicative of the preference of adopters as reported later.

Table 4. Sex of Adopted Horses and Percentage of Adopters Paying Fee

Variable	Class	Percent
Sex	Gelding	1.5
	Mare	61.3
	Stallion	37.2
Fee	Yes	76.7
	No	26.3

In the area of the adoption fee the survey covers a period of time when a uniform fee was and was not in effect. Therefore the fee question has two parts. First was there a fee and second if so, how much? The data in Tables 3 and 4 deal with these aspects of this question. The range of the adoption fee (Table 3) is in part explained by the different basic adoption fees charged, and also by the transportation charge the BLM added to some adoption fees. The practice of adding a transportation cost on to the basic fee has dropped as of October 24, 1984. Starting from October 24th all adoption fees for horses were set at $125 per animal.

Another aspect of the cost of adoption would be the expense incurred by the adopter in picking up the animal and hauling to where it would be kept. In order to assess this cost, the rate of $ .50 per mile was used. The distance the adopter hauled the adopted animal was multiplied by $ .50 to arrive at this cost. The estimated total cost of each adoption was then considered to be the addition of the adoption fee to the hauling cost incurred. Table 3 shows the distance component and the estimated average total cost. The range of the estimated total cost

shows the relatively high amount some people are willing to spend for these animals.

The total cost is a derived variable determined by adding the adoption fee plus an estimated hauling cost. Hauling cost is computed by multiplying $ .50 times the miles the animal is hauled from the adoption site to where it is maintained by the owner. The total cost is an estimate based on an assumption of a uniform hauling cost to all adopters. The validity of this assumption is open to question. The rate however, seems reasonable. It is conservative and only gives an approximation of the true cost for any adopter. The adoption fee on the other hand was the amount people did pay to obtain these animals. It represents a verifiable cost to the adopters.

The data in Figure 1 shows that the estimated travel cost stayed relatively stable and the adoption fees varied over the time period of the study. It reports the average adoption fee and average estimated travel cost for the period this studied broken down by years (1983 is a partial year, January to July). Although the average adoption fee changes the average estimated one way travel cost is roughly constant between $92 - $95.

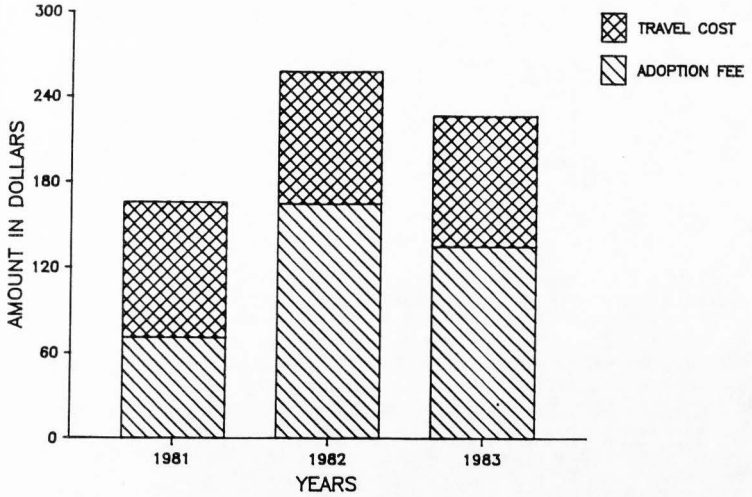

Figure 1. Average adoption fee and estimated travel cost incurred by adopters

Value and Uses of Adopted Horses

In order to assess value, the questionnaire asked a number of questions about the value of the adopted animal. If the animal was still owned, the survey inquired about its current market value. If the animal was sold, the survey asked the selling price. In addition to value, a number of questions dealing with the use of the adopted animal were asked. In these questions, the purpose was to ascertain trends in the use of adopted horses.

Many of the adopters included in the survey population have adopted more than one animal. Our survey basically is limited to information

about a single horse that was chosen in the random sample. In order to gather a bit more information of adopted animals, some questions were also asked about other adopted animals. These questions concerning other horses did not differ substantially from horses directly chosen in the sample and are not reported.

Table 5 reports the estimated current market value of the adopted animals that were still maintained by the adopters at the time of the survey, as well as those that had been sold. The large range and rather high standard deviation point to a high degree of variability in perceived value of adopted horses amongst adopters. Although the maximum appears to be high, it is possible for value of horses to be that high. In fact, one adopter commented that he would have paid a thousand dollars for the horse at the time of adoption, if he knew then how it was going to turn out.

Table 5. Value of Adopted Horses

Question	Mean	Std Dev	Min	Max
Market value of animals still maintained.	364.7	281.8	0.0	1750.0
Amount received for horses sold.	277.0	128.5	1.0	700.0

Also reported in Table 5 is the amount received for adopted horses that had been sold. The amounts reported in response to this question may give a better idea of the market value of the adopted horse than the previously reported estimated "current" value. This comment is based on the judgement that a market transaction is more objective than personal opinion. Again, the values reported reflect a large range and standard

deviation but relatively less than the previous estimates of value. This high standard deviation was not unexpected. It's common to see even physically similar horses at a horse sale go for a large difference in price. The difference is generally attributable to the amount of training the horse has been given. The difference in the two responses however may be the result of quality differences, with lower quality animals being sold off and higher quality horses being kept and trained.

Another area of interest is the use of the adopted animal. For this area three different classes of horses were compared. One class would be adopted horses from the sample population that are still being maintained by the adopter. Two other classes would involve horses that have been sold. One of these would be the adopters' use of the horse before the sale. The other would be the use of the horse after the sale. The data in Table 6 indicates the use of horses that are still maintained by adopter, the use of disposed horses both before and after they were sold. The break down of use is quite similar in all cases. Perhaps most surprising are the few cases reported of the use of commercial products in disposed animals. It should be noted however, that those individuals who didn't return questionnaires may have a higher proportion of sold animals that went into commercial products. However, there is no way to know if this is really the case. Regardless these results show a high proportion of adopted horses are used for riding and breeding purposes.

Table 6. Primary Use of Adopted Horses

Class of animal	Use	Percent
Horses still maintained.	Riding	70.0
	Breeding	25.0
	Pet	1.3
	Other	3.8
Use of Horse before sale.	Riding	68.9
	Breeding	21.5
	Commercial products	4.1
	Other	2.7
	Don't know	2.7
Use of Horse after sale.	Riding	48.1
	Breeding	32.7
	Pet	7.7
	Commercial products	1.9
	Other	7.7
	Don't know	1.9

The following table is a frequency of the comments people added to their surveys. Each was judged to be either positive or negative. However, many adopters did not send any comment. As a result a percentage of satisfied adopters was difficult to determine. Of the 137 adoption records 117 adopters or 85% responded yes to the following question, "Was the adopted animal the age and sex they wanted?" Also eighty (58% of adoptions) were still maintaining their adopted animal. Out of a total of 137 animals 57 were disposed, of which 41 were sold.

Table 7. Subjective Comments Of Adopters

Comment	Percent
Positive	38.0
Negative	9.5
No response	52.6

CHAPTER V

DEMAND FOR WILD HORSES

In this chapter the demand for adopted horses is analyzed in three ways. First, the data is reviewed very generally to determine an approximate horse adoption price and quantity relationship. This test uses yearly quantity and price figures. Second, the previously described multiple variable model is used to test the association of several independent variables, on the dependent adoption fee variable. This is done in a process called multiple regression analysis. In multiple regression analysis association between variables is revealed. This analysis estimates several parameters associated with the dependent and independent variables. These parameters include coefficients which indicate the power of the independent variables on the dependent variable, and t-statistics which indicate the confidence level that a coefficient is significant. Third, the responses of the random sample of adopters are reported. This section it is interesting as the expressed preferences of our sample population matches the revealed preference determined in our regression test.

Test of Empirical Data to the Law of Demand

In order to test the law of demand, one needs observations of the quantity of horses adopted at various prices for specified periods of time. This is somewhat complicated by the fact that there is not direct control over the price variable. If direct control were possible, the adoption fee could be set at one price for a specified time and the

quantity of adoptions recorded. Then the price could then be changed and the number of adoptions for the specified time recorded again. The change in the number of the adoptions compared to the change in price would indicate the relationship of price to quantity. Theory suggests that a negative relationship is to be expected. Thus, if the adoption price increases, the number of horses adopted, over a given period of time, is expected to decrease. One method that can be used to test the relationship of price and quantity is to use aggregate quantity and price data.

First, in order to establish a relationship between price and quantity, at least two equal time periods with differing prices and quantity data are needed. Noting the price and quantity change (assuming other things equal), gives the relationship between the price and quantity. It just so happens that over the time period studied, there are two years which meet this criteria. Years 1981 and 1982 give this type of price quantity comparison. Between these years price went from one level to another. All that is needed is to is compare the price change to the quantity change. The quantity change (derived from the official data) in adopted horses is rather straightforward. Surprisingly, the price data is not as straightforward.

A prominent publication in current literature on WFHB is the Administration of the Wild and Free-Roaming Horse and Burro Act: Fifth Report to Congress, June 1984. This publication is a joint effort by the Department of Interior and the Department of Agriculture. In this publication, the net revenues of the adoption fees as well as the policy of adoption fees over the last few years is reported. A problem occurs

when the two figures are tied together (i.e. the adoption receipts and the adoption fee policy). For 1982 the BLM's records state 5,278 horses were adopted. They also state the adoption fee was raised to a uniform fee of $200 plus transportation cost on January 2, 1982. Not considering the transportation fee, it is expected that the adoption fee revenue would equal the number of animals adopted times the adoption fee. At $200 per horse and 5,278 horses the adoption fee revenue should equal $1,055,600. The revenue figure for adoption receipts in the Fifth Report is stated at $859,000. If the burros are considered at their fee of $75 per head, and the reported 1,650 burro adoptions there is another another $123,750 to consider. The expected total receipts should be $1,179,350 exclusive of any transportation cost. The revenue figures reported fall short of what is expected by over $300,000. This suggest the average adoption fee for horses in 1982 fell somewhat short of two hundred dollars. If it is assumed that the burros account for a range of $0 - $100,000 of the $859,000, and the revenue is divided by the number of horses adopted a range of possible average horse adoption fees is derived. This gives us a range from a low of $144 to a high of $163 for the average adoption fee per horse.

Similarly, the published data for 1981 adoptions pose the same problem. The Administration of the WFHB Act: Fourth Report to Congress, June, 1982, reports the average fee at $62 per animal. This average fee does not match the stated adoption revenues either, nor does it distinguish between horses or burros. Estimating a range of possible horse adoption prices is not possible from the published data.

Regardless of the shortcomings of the official data, estimates of the adoption fees for the two years can be made from the survey data.

Quantity figures are available from the published data. In the data sample, estimates for the adoption fee for the two years was obtained. The reliability of the primary data should be high for two reasons. First, the two years had consistent fee policies, and secondly, the size of the sample is quite large. In light of the inconsistency in the official data, the sample estimates of the adoption fee appears to be a reasonable alternative. Figure 2 shows the average adoption fee for the years 1981 and 1982 as developed data supplied by those adopters surveyed as a part of this study.

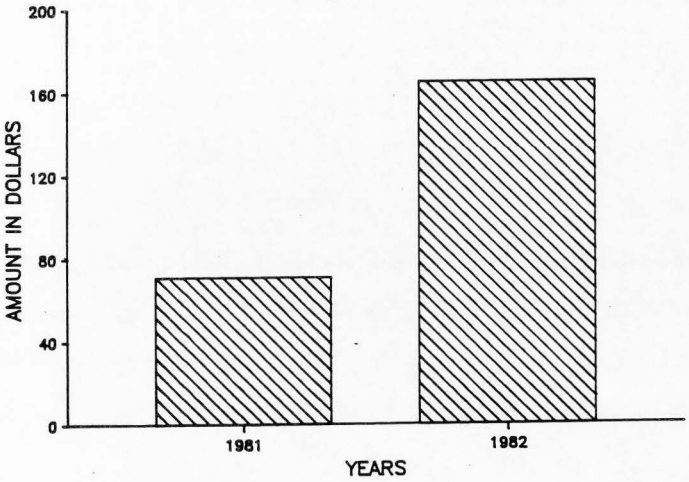

Figure 2. Average horse adoption fees 1981 - 1982

These average horse adoption fee estimates can be combined with the published quantity figures for the years 1981 and 1982 to construct

the graph shown in Figure 3. Figure 3 shows the demand relationship between price and quantity of horse adoptions.

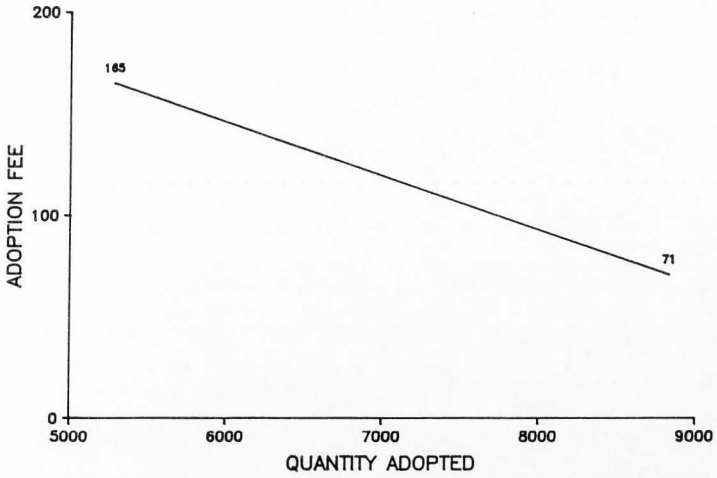

Figure 3. Wild horse adoption demand 1981 - 1982

As reported the law of demand for wild horses can be demonstrated to be the inverse function as expected. A slope is defined as follows: slope = ($price_1$ - $price_2$ / $quantity_1$ - quantity $_2$). From here the terms can be rearranged to a slope-intercept form to arrive at a linear estimation of the demand function. As shown it is an inverse relationship because the quantity coefficient is a negative 0.0264.

$$P = 304 - 0.0264 (Q)$$

where : P = adoption fee

Q = quantity adopted

In Chapter 2, time series analysis was indicated as one method that could be used to measure the demand function. The preceding exercise is a very limited form of time series demand analysis because only two years data were available. This approach can be carried out using smaller intervals of time and then regressing the price and quantity data. In the course of the study this was done using monthly price and quantity figures provided by the survey data. This analysis did not differ materially from the previous conclusion about the price quantity relationship. A summary of this work is found in Appendixes A and B.

The next section reports the model approach using the independent variables, to explain demand price for the adopted horses. The method used is multiple regression of the adoption fee against the several explanatory variables obtained in the research. Basically, the variables of the data base must now be tested for association with the independent variable price or adoption fee. It is hoped that the influence various factors (measured in our variables) have on the adoption fee adopters are willing to spend for these animals can be estimated. This next section discusses the form of the model and the results of this estimation process.

Cross Sectional Multiple Regression Model

As was stated in the previous discussion of demand (see Chapter 2), it is generally agreed that various independent variables have an effect on the demand price. In the (inverse) demand function the price of a good is thought to be affected by the quantity of the good, price of related goods (complements and substitutes), income and tastes and preferences. Through a logical extension of theory, several variables

were identified as being possible measures of these factors. The list of variables includes the adoption fee, age, weight and sex of the adopted horse, the income and occupation of the adopter, the distance the animal would be hauled and the horsemeat prices.

One aspect discussed before is the issue of quantity. Because of its importance a restatement of the problem is discussed here. It would be advantageous and desirable to have a quantity measure of adopted horses available for the adoption market. Breakdowns in a vector form by type, age and other characteristics would be useful, but it was not possible in this study. However the question then becomes can we get by without it? Perhaps we can, for the following reasons. First, the quantity of horses available for the adoption program is not a function of price. For goods that are traded in a market, the quantity supplied is a function of price. In the case of wild horses, horses are made available due to a number of reasons, including multiple use plans and/or budget constraints. Second, during any period of time, even though the adoption price has a range of fees, quantity is basically a constant. In addition, over the period this study covers there has generally been a surplus of horses. What this assumption means for the analysis is that the differing prices are attributed to the effect of a shifting demand curve, not changes in quantity supplied. The desire is to test the association of the shifts measured in our price variable adoption fee, to the occurrence/absence or magnitude of our independent variables. Due to the nature of the supply of the animals, this appears to be reasonable assumption.

Figure 4 shows the effect that is being tested. In this graph the quantity is assumed to be constant (for a given time), while changes in several of the independent variables (e.g. age, weight, sex, income) shift the demand curve. The assumption is that shifts in the demand curve will be associated with changes in the independent variables. The result of the shift in demand will be different observed adoption fees. It is the change in the fee paid that signals the demand shift, which is assumed to be attributable to the variables outlined in the demand analysis.

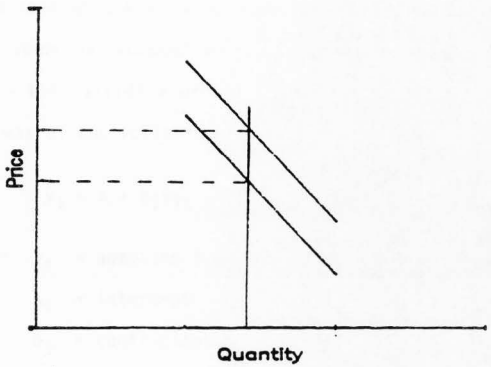

Figure 4. Hypothesized shift in demand with constant supply

A multiple regression model was developed to explain the various costs born by adopters in the adoption process. The model tested explanation in the independent variables on the dependent variable adoption fee. It is assumed that there may be some linear relationship between the independent variables and the adoption price. The independent variables used in the model were the horse's age, weight and sex, the

adopter's occupation and income, the current market value of horse meat at the time of the adoption and the distance the adopter would haul the animal to where it would be maintained. As discussed earlier, several other variables are suggested by theory and could be included if data were available. However, the study is constrained by the availability of these variables. The model then is as good as is possible in light of the data limitations. Hopefully, it may demonstrate some explanatory power over the dependent variable.

Logically it can be argued that each of the independent variables have some effect on the resulting fee or total cost adopters would be willing to spend on adopted animals. A multiple regression model has been used to test validity of the various arguments. The model used in this study was of the following form.

$$y_i = a + b_1x_{1i} + b_2x_{2i} + \ldots + b_8x_{8i} + u$$

where : y_i = adoption fee (model one)

a_i = intercept

b_j = coefficients (j = 1,2,...,8)

x_{1i} = adoption age

x_{2i} = adoption weight

x_{3i} = mare dummy

x_{4i} = occupation dummy

x_{5i} = income less than 14,999 dummy

x_{6i} = income 15,000 to 34,999 dummy

x_{7i} = horse meat price

x_{8i} = distance hauled

In a sense, by testing the association of the relatively higher fees and lower fees to the measurements in the independent variables, an estimate of the effects of the independent variables will be obtained. The effect will be reflected in a coefficient of the independent variable. The magnitude of the coefficient allows one to judge how much changes in the independent will affect the adoption fee.

Just because some measure of effect in the coefficient is obtained however, does not mean the relationship is significant. A statistic called the t-statistic must be considered. It indicates the confidence level that the coefficient is significant.

The dependent variable used in the model is the adoption fee paid by the adopter. This is a discrete variable. Even during time periods when a policy of a uniform fee was in effect, observations of differing adoption fees were provided by adopters (see appendix B). One factor that accounts for this is the transportation cost added on to the adoption fee. further the time period had differing basic rates. Even in periods when the policy was to have a minimum basic fee, observations can be found with adoption fees below the minimum level. Currently the uniform fee is in effect. For the study's purposes the nonuniform fee over the time period allows the association of the variables to be tested.

The independent variables include discrete as well as dummy variables. Dummy variables represent classes of a variable. These classes of the variable have a particular characteristic that can be distinguished. In using dummy variables in regression the test of association is to see if the presence of a particular attribute has an effect the on

independent variable [Gujarati, Chapter 13]. After regressing data, the coefficient of the dummy variable indicates the effect the independent variable has on the dependent variable. A t-statistic could also be derived for the dummy variable coefficient. A t-statistic again, is used to determine the likelihood that your coefficient is nonzero (therefore significant).

The adoption fee and age are two examples of discrete variables in our model. In recording these variables in an observed adoption, these variables are listed as one would normally think of them. The association of change in each is what the regression will test. The coefficients of the discrete independent variables (e.g. weight, age, distance hauled) give us the effect of a one unit change in the independent variable. With the dummy variable (e.g. sex), the test is on the effect that the presence of the independent variable has on the dependent variable.

The occupation dummy variable was used to represent two classes of occupations. The occupation classes were distinguished as either a rancher/farmer or not a rancher/farmer. This variable is a dummy because the characteristic of being a rancher/farmer might have an effect on the complementary good hays or pasture. The income dummy variables were used to represent three income classes, one from zero to $14,999, second from $15,000 to $34,999 and third over $35,000 income per year. A case could be made to test for more categories of income, but by doing so other problems arise concerning degrees of freedom in the model. For the purpose, which is to test whether higher incomes effect the adoption fee three classes should be sufficient. The sex dummy variable represented the sex characteristic of the adopted animal as either a

female or not female. In this dummy variable, the test is trying to capture the effect of the sex of the adopted horse on the adoption fee. Due to the small number of geldings (two out of 131) only two classes of sex were used either female or otherwise. The nonfemale class would include stallions as well as the two geldings.

It was hypothesized that increasing age of the horse would have a negative effect on the adoption fee. Younger horses are generally easier to tame and break, and could be expected to command a higher fee. Younger horses could also be expected to provide more service in the long run. Theoretically then, age coefficient is expected to be negative.

The weight of the horse would be expected to have a positive effect on the adoption fee of the horse. If the intent of an adopter was to consider the commercial value of the horse (i.e. the slaughter price), larger horses would be expected to command a higher price. Also, larger horses tend to be in better health, or at least they look better.

The sex dummy variable of mare or not mare was used to see if the sex characteristic had any explanatory power on the adoption fee. Mares are generally easier to manage than stallions. Most people believe the probability of breaking the mares to be higher. Also most adopters would be expected to geld stallions. The act of gelding a stallion would necessitate the incurrence of additional cost. In addition, mares could be bred and the offspring could be raised in a domestic environment. Therefore, it's believed that the mare characteristic would have a positive effect on the adoption fee.

The occupation dummy variable was employed in the model to see if a ranching or farming occupation would have an effect on the fee of the animal. In effect, two different theories on this variable indicate differing effects on the adoption fee and total cost. A possible reason for a positive effect would be that ranchers and farmers would be better suited to care for the animals. This approach implies that the marginal cost of maintaining the animal would be lower for farmers and ranchers than others. Another theory says that farmers and ranchers would be more shrewd in to buying horses and therefore pay less. Whatever theory is most dominant (perhaps there is a mixture of both at work) the effect of occupation of the adopter is interesting.

Yet another independent variable of our model, income class is concerned with a characteristic of the adopter. In this variable of classes of income, the effects of higher income levels is examined with respect to adoption fee. It was hypothesized that higher income groups would be able to pay more for the animals. So a positive coefficient is expected.

Distance hauled is considered in the model to see if there is any effect on adoption fee for people who travel greater distances. In a sense, it can be considered an additional cost and therefore may lower the amount these people would be willing to spend on the adoption fee.

The last independent variable included in the model is that of commercial horse meat prices. It is hypothesized that perhaps the willingness to pay higher fees is in some way effected by the commercial value of the horse. One would expect that the coefficient would be positive. In other words, as the base commercial value increases or

decreases so would the adoption fees. This coefficient in some ways will explain the intentions of our adopters. In other words, are adopters adopting at prices that are related to the commercial value of the horses or not?

Regression Results

Table 8 reports the results of regressing the dependent variable adoption fee on the independent variables. Two additional regressions are reported here. One is identical to the first except that horsemeat prices are not included in the independent variables. In the other regression, our model is changed slightly. In this case estimated total cost is the dependent variable with all but distance hauled and horsemeat prices included in the list of independent variables.

Table 8. Regression Results of Price Determination Model

Independent Variables	Dependent Variable: Adoption Fee		Adoption Fee		Total Cost	
	Coeff	T-Test	Coeff	T-Test	Coeff	T-Test
Constant	332.51	-	34.38	-	139.71	-
Adoption Age	-5.35	-1.84	-5.49	-1.76	-6.65	-1.43
Weight Adopted	0.07	2.01	0.06	1.66	0.05	0.87
Sex Dummy	37.44	2.44	35.82	2.22	12.67	0.53
Occupation Dummy	-6.14	-0.35	2.36	0.12	14.49	0.53
Horsemeat prices	-3.84	-3.78	-	-	-	-
Income Class < 15,000	22.29	1.07	20.70	0.94	51.83	1.60
Income Class >= 15,000 < 35,000	23.61	1.31	20.24	1.06	45.99	1.63
Distance Hauled	0.03	0.04	0.03	0.04	-	-
F		3.273		1.526		1.013
R-Sq		0.184		0.083		0.049
Adjusted R-Sq		0.127		0.028		0.006

The results provide some parameters on which an attempt may be made to explain the adoption fee adopters have paid. The f-statistic and several of the t-statistics are significant in the first model. This indicates that this model has some explanatory power over our independent variable (adoption fee).

The significant f-statistic (model one) basically indicates that the null hypothesis that $b_1 = b_2 = \ldots = b_8 = 0$ can be rejected. This means that there is some joint explanation of the dependent variable, by the independent variables, present in the model. The t-statistics point to the individual explanatory power of the independent variables. Basically the t-statistic with absolute values greater than 1.96 indicate an independent variable's coefficient is significantly different from zero with a 95% degree of confidence. T-statistics with absolute values greater than 1.645 indicate a coefficient significantly different from zero with confidence level of 90 per cent.

Initially four of the independent variables appear then to have some significance in explaining the adoption fee paid by adopters. Three of them, age, weight and sex are characteristics of the adopted horse and the other is horsemeat prices. Again, to interpret the results they must be related to the theory of demand.

The two coefficients on the characteristics of the adopted horse indicate that certain types of horses are preferred to others. These two variables were logically assumed to be taste and preference variables. The positive coefficient on the sex dummy indicates that the characteristics of being a mare in the adopted horse has a positive effect on the adoption price. Adopters, it appears, have tended to pay more on average for females than nonfemales. Not only that, but the t-statistic indicates that this coefficient is significant. This test statistic supports the common sense logic that was developed earlier concerning the relationship of sex of the horse and demand. The second significant variable coefficient concerning the horse is the age coefficient. As it turns out, this negative coefficient also supports the logical assump-

tion that was started out with concerning its effect on adoption demand. The results of these statistics are as expected. Weight of the horse also provides some explanation of the adoption fee. But as is reported later this indication may not be correct. The reason will be discussed later. But first a discussion of the horsemeat variable, and why it may be wise to slightly change our model.

The other significant variable, horsemeat price, is especially interesting because the sign of the coefficient can logically be considered wrong. Using demand analysis, it was previously concluded that this variable may have some positive effect on the adoption demand. How can this sign be negative? Acceptance of this sign we would mean saying that as the commercial value of horses goes down the demand for wild horses goes up. In our original demand analysis the horsemeat price was hypothesized to be a measure of a substitute good for wild horses. And still the logic of that argument seems as valid as it did before. Is there an explanation of what is happening in the model? Two possibilities follow. First, although the horsemeat price is a complement good which should effect the price, perhaps there are influences outside the model that are not measured in the variables. If this is true, these effects will not be detected in the model. Earlier reference was made to the export market for horsemeat. During the time period the data was collected, the U. S. dollar continually gained strength against other currencies. The effect is to reduce export demand for domestically produced commodities. This would affect commercial horsemeat demand. The reaction in the market is continually falling horsemeat prices as demand contracts. The effect of this

contracting demand for horsemeat caused the price of horsemeat to fall by a third over the time period of our study. At the same time the policy of the BLM was to raise the adoption fee. The effect of these actions taken together gives us the negative association we have seen in the model. As the horsemeat prices fell the adoption fees increased. The logical effect of an increasing demand with increasing horsemeat prices can not be supported. This suggests misspecification of the model.

This brings us to the second reported model. As shown earlier the first regression's horsemeat coefficient was contrary to demand theory. For that reason a model that eliminated the horsemeat price as an independent variable is also reported. In the second model there are some interesting changes, as well as similarities. The coefficients on the sex dummy and age remained significant and of the same sign. This suggest that these variables are robust. Meaning they show the same effects in variously specified models. It may be said that they are not dependent on model specification. Two interesting changes are, one the model looses its ability (over all) to explain the adoption fee (insignificant f-test) and second the coefficient on the horsemeat variable looses its significance. This suggest that the coefficient in the first model may be caused partly by specification bias. It seems safe to say that statistically adoptions cannot be tied to the commercial value of horsemeat. This conclusion is also indicated by the insignificant coefficient on the weight of the horse.

In our discussion of the demand for adopted horses it was stated that weight represented a taste and preference variable. The weight was a variable that may indicate a higher commercial value to those adopters

who saw the horse as a means for a monetary gain. However, the contrary coefficients of our two models cast doubt on this hypothesis.

Two variables that were related to characteristics of the adopter are also insignificant. The occupation dummy which indicated the adopter was a rancher/farmer does not explain the adoption fee. Although just over 24% of our adopters were farmers or ranchers, over 80% of the adopters responded that they keep the adopted animals on their own land. The availability of feed may not be a problem for many of these people. In any event, this variable did not have an effect on demand. The other variable concerning the adopter, income, did not have a significant effect on the adoption demand. The coefficient for income is interesting however, because it would indicate that the lower income adopters paid more on average. Perhaps a test of this variable using more classifications of income would reveal more of this variable's explanation. The break down of the income into only three groups reduces some sensitivity in the model. If income was entered as a continuous variable, the results might explain more about this relationship. When developing the questionnaire it was thought that adopters would object to disclosing their actual income figure. All that can be stated is that in this test the income did not explain change in the adoption fee.

The other test variable, the distance the adopter hauled the animal from the adoption site to where it would be maintained, had no significance in the model. One reason may be that adopters who traveled longer distances to the adoption site would feel that they should not go home with an empty trailer. Comments from adopters tended to support

this view. It is reasonable to assume that the distance they had traveled would appear to the adopter as a fixed cost to which they were already committed to. In this case, the distance would not affect the adoption fee as our model indicates.

Earlier in the paper, it was speculated that the independent variables may have some predictive power over estimated total cost as well. In order to test this hypothesis a third regression model is reported. The results do not support this hypothesis. One explanation for the loss of significance in our independent variables would be if those who travel farther did not exercise as much choice in adopting an animal as those who lived closer. People who had a certain amount of effort already invested may be less willing to go home empty handed. For people who live closer to the adoption site, going home without an animal would not lose as much if they returned home without a horse as those who traveled a long distance. These data indicates that the idea of a fixed cost may play an important part in adopters accepting what might otherwise be rejected animals.

From the regression technique it can be postulated that certain variables have an effect on the adopters' demand. These variables are age and sex of the horse. The results imply that adopters prefer to adopt younger to older horses and prefer females to males. The association between these variables and demand corresponds with what, in theory, is expected. Another method available to examine the findings and the theory of demand is to ask the adopters what their demand function is like. The next section discusses the preference of the sample adopters as indicated in responses to the questionnaire.

Expressed Preference of Adopters

From the results of the questionnaire basic descriptive statistics can be determined which point to expressed preference by the adopters. The questionnaire asked the adopters directly to indicate what type of horse they would prefer to adopt. In addition, the sample population can be broken down into subsets using sex and age as criteria for the divisions. Various statistics can be compared and interpreted to indicate the adopters' demand preference. The significance of these statistics is open to question, but they are statistics that give some indication of adopter preference. Furthermore, given the regression model results, the statistics are another method which can be used to indicate demand differences.

Clearly, the easiest way to see the demand preference of adopters is to look at the indicated preference of the sample adopters. Two questions in the questionnaire dealt with this issue directly. Adopters were asked to list the type, sex, and age they would prefer to adopt. The results overwhelmingly show the younger female horses are preferred. Table 9 shows the results to this question.

Table 9. WFHB Characteristics Adopters Prefer

Question	Response	Percent
What type preferred?	Horse	83.7
	Burro	3.3
	Mule	4.1
	Horse or Burro	8.1
What sex preferred?	Stallion	11.2
	Mare	54.4
	Gelding	16.0
	Stallion or Mare	18.4
What age preferred?	1	39.3
	2	27.9
	3	18.0
	4	7.4
	5	1.6
	6	1.6
	7	2.5
	8	0.8
	9 and over	0.8

It should be noted that these questions were asked of the horse adopters of our sample. As reported, in terms of sex, only 10% specified that they desired a stallion. Almost 50% preferred a mare. An even more telling statistic appears in the frequency analysis of the age preferred. Over 85% of the adopters prefer an animal 3 years or less in age. The preference for younger horses and mares coincides with the results obtained in the regression model. The results of this question were confirmed in another similar question in the questionnaire. Adopters were asked if the animal that the questionnaire was in reference to was the age and sex they preferred. If they answered no, they were asked to indicate their preference. The results follow in Table 10.

Table 10. Unsatisfied Adopters Characteristics They would Prefer

Question	Response	Percent
What type preferred?	Horse	83.3
	Horse or Burro	16.7
What sex preferred?	Stallion	15.8
	Mare	57.9
	Gelding	15.8
	Stallion or Mare	10.5
What age preferred?	1	38.9
	2	44.4
	3	5.6
	4	5.6
	5 and over	5.6

In this question, the responses were from people who have some objections to the animal they had adopted. From the results in the section dealing with sex, it is reported that most people would prefer a mare. In terms of age, people again expressed a preference for younger animals.

It may be interesting to create subsections in the data. These subsections could be based on the sex and age of the horses. One of the hypotheses that was tested in the regression model was that people had a higher demand function for younger and female animals. The data set can be divided by age and sex. The division for the sex will be determined by mare or nonmare characteristics of the adopted animal. The division for age will be made for horses adopted over five years old or five or fewer years old. (The tables will use the following symbols: the first > will represent greater than and <= will represent less than or equal to.) Our regression model would indicate that descriptive

statistics for the groups of horses divided on this basis would be different.

Obviously, one of the first tests one would want to make is of the adoption fee. Is there a difference in the average price people are willing to pay for these animals? The following table summarizes the average adoption fee for the subsections of our sample population.

Table 11. Adoption Fee by Sex and Age Subsections

Group	Mean	Std Dev	Min	Max
Nonmare > 5 years old.	59.9	66.3	0.0	145.0
Nonmare <= 5 years old.	93.2	84.0	0.0	240.0
Mare > 5 years old.	126.6	94.9	0.0	315.0
Mare <= 5 years old.	118.0	94.1	0.0	285.0

As reported in these statistics, the average adoption fees change quite dramatically for the group of our sample population which is nonmare and greater than five years of age than the group which is mare and less than five years of age. In fact, it looks like the biggest determination happens to be the mare/nonmare division.

The following statistic is reported to show that the weight of the animal and the adoption fee have little correlation. This table is a breakdown by weight of our sample population subgroupings.

Table 12. Weight by Sex and Age Subsections

Group	Mean	Std Dev	Min	Max
Nonmare > 5 years old.	925.0	185.9	500.0	1100.0
Nonmare <= 5 years old.	645.6	221.8	250.0	1100.0
Mare > 5 years old.	861.7	186.3	500.0	1300.0
Mare <= 5 years old.	661.7	256.1	125.0	1250.0

As reported, the group nonmare over five years of age weighs the most on average, but this group also had the lowest average adoption fee. When the group weight data are compared to the adoption fees little evidence of a positive relation between them can be seen. This tends to support the doubts raised by the regression models concerning a positive relationship between weight and adoption fees. This tends to refute the hypothesis that weight plays a part in determining an adopters willingness to pay a higher adoption fee or that they adopt for commercial value. If this were the case higher adoption should be associated with heavier animals.

Another aspect in trying to determine a revealed preference for animals, would be to examine the uses the people have for their animals. Table 12 reports the primary use of adopted animals (from our sample population) that are still maintained by their adopters.

Table 13. Primary Use by Sex and Age Subsections of Horses Still Maintained

Group	Use	Percent
Nonmare > 5 years old.	Riding	75.0
	Other	25.0
Nonmare <= 5 years old.	Riding	85.2
	Breeding	11.1
	Pet	3.7
Mare > 5 years old.	Riding	42.9
	Breeding	57.1
Mare <= 5 years old.	Riding	64.3
	Breeding	31.0
	Other	4.8

In terms of use of these subgroups of animals, there is not very much difference. This was expected because these are the animals that adopters have chosen to continue to maintain. The responses indicate that many of these animals are used to ride and breed. A higher percentage of mares appear to be used as breeding stock. The following table represents the responses of current owners of the adopted animals to the question what would be the use of the animal if you sold it?

Table 14. Primary Use by Sex and Age Subsections of Horses that were Sold

Group	Use	Percent
Nonmare > 5 years old.	Riding	50.0
	Commercial Products	25.0
	Don't know	25.0
Nonmare <= 5 years old.	Riding	83.3
	Breeding	8.3
	Other	4.2
	Don't know	4.2
Mare > 5 years old.	Riding	57.1
	Breeding	42.9
Mare <= 5 years old.	Riding	64.1
	Breeding	28.2
	Commercial Products	5.1
	Other	2.6

There appears to be a general agreement between this and the last table in terms of use of adopted animals. It appears that these are horses that have worked out well. The following indicates the responses of adopters who have sold their animals. They were asked what was the use of the animal before they sold it?

Table 15. Primary Use by Sex and Age Subsections of Horses that were Sold Before the Sale

Group	Use	Percent
Nonmare > 5 years old.	Riding	16.7
	Breeding	16.7
	Pet	16.7
	Commercial Products	16.7
	Other	33.3
Nonmare <= 5 years old.	Riding	61.5
	Breeding	15.4
	Pet	15.4
	Don't know	7.7
Mare > 5 years old.	Riding	20.0
	Breeding	70.0
	Other	10.0
Mare <= 5 years old.	Riding	60.9
	Breeding	30.4
	Pet	4.3
	Other	4.3

The results of this breakdown are not much different. In the following table we have the use of the animal after it was sold. The breakdown here gives us slightly different results for our age groups. These statistics show there is a definite increase in the commercial product use of older horses.

Table 16. Primary Use by Sex and Age Subsections of Horses that were Sold After the Sale

Group	Use	Percent
Nonmare > 5 years old.	Breeding	16.7
	Commercial Products	50.0
	Other	16.7
	Don't know	16.7
Nonmare <= 5 years old.	Riding	41.7
	Commercial Products	8.3
	Other	8.3
	Don't know	41.7
Mare > 5 years old.	Riding	11.1
	Breeding	11.1
	Commercial Products	22.2
	Don't Know	55.6
Mare <= 5 years old.	Riding	38.1
	Breeding	19.0
	Commercial Products	4.8
	Don't Know	14.3

Although the results are not conclusive, they tend to indicate that older horses end up in commercial products with greater frequency than younger horses. This could indicate that there is less recreational value in an older horse.

One other area that one would want to look at would be the title status of horses in the various classifications. An adopted horse can be in one of four classifications. The classifications are nontitled, dead, titled, or transferred. Of interest to the study, is the ratio of titled and nontitled adopted horses in the various sample population subgroupings. The following table represents these ratios.

The data reported in Table 17 represents an answer by adopters to the survey question of ownership (having a title issued by the BLM). Table 18 is a report of ownership records maintained by the BLM. The BLM figures were updated as of July 1983. The survey question was responded to December 1984 or January 1985, so there is a year and a half discrepancy in time that may account for the higher numbers being recorded for the responses in the questionnaire.

Table 17. Title Status by Sex and Age Subsections-Survey Results

Group	Title	Percent
Nonmare > 5 years old.	No	25.0
	Yes	75.0
Nonmare <= 5 years old.	No	11.1
	Yes	88.9
Mare > 5 years old.	No	42.9
	Yes	57.1
Mare <= 5 years old.	No	25.0
	Yes	75.0

Table 18. Title Status by Sex and Age Subsections-Government Records

Group	Title	Percent
Nonmare > 5 years old.	No	70.0
	Yes	30.0
Nonmare <= 5 years old.	No	51.2
	Yes	44.2
	Died	2.3
	Transferred	2.3
Mare > 5 years old.	No	41.2
	Yes	58.8
Mare <= 5 years old.	No	47.8
	Yes	43.3
	Died	1.5
	Transferred	7.5

This statistic reports the highest ratio of ownership is in the mare over five years old category. The lowest percentage of ownership is in the over five year old nonmare subgrouping.

One other area of interest concerns the commercial value of horses. Basically, the study has two measures of this. One would be how much people received for horses they had sold and the other would be current market value. These statistics are not really all that different for the age, sex categories. It is interesting to see that the amount received for animals is less for all age, sex classifications, than the estimated current market value of adopted horses that are still maintained.

Table 19. Amount Received from Sale by Sex and Age Subsections

Group	Mean	Std Dev	Min	Max
Nonmare > 5 years old.	236.7	77.7	150.0	300.0
Nonmare <= 5 years old.	255.2	189.7	100.0	700.0
Mare > 5 years old.	197.9	79.2	100.0	300.0
Mare <= 5 years old.	222.4	118.9	1.0	420.0

Table 20. Current Market Value by Sex and Age Subsections

Group	Mean	Std Dev	Min	Max
Nonmare > 5 years old.	475.0	35.6	450.0	500.0
Nonmare <= 5 years old.	394.0	267.4	0.0	1000.0
Mare > 5 years old.	300.0	209.2	100.0	650.0
Mare <= 5 years old.	348.6	311.6	45.0	1750.0

The descriptive statistics reported in this section support the two general conclusions indicated by the regression model. The first conclusion, supported by the descriptive statistics, is that the adoption fee or demand is greatest for younger female horses. The second conclusion that is borne out in the descriptive statistics, is that the weight of the horse is not correlated with higher adoption fees. This implies that adopters are not primarily interested in purchasing the animals for resale in the commercial market. If they were, it is logical to conclude that heavier animals would command a higher price. This conclusion, however, has not been shown by the survey data.

CHAPTER VI

ADOPTERS' COMMENTS

Current policy with regard to WFHB tends to be part of a broader BLM interest in maintaining the economic and ecological integrity of federal land under its control. This balance is in part defined by the wishes of proponents of WFHB, and other users of the land. As well as trying to balance these groups wishes, two other interest have emerged, those of the WFHB and adopters of them.

The purpose of this study has been to assess the demand of adopters. This has been done through examining the expressed and revealed preference of adopters. One other aspect which may throw additional information on the desires of adopters, are the adopters' comments included in response to the survey. Following are a sample of some of those comments. More complete comments are included in Appendix D.

> ". . . The problem was I did not have time to finish training him. I let a cowboy out of the sand hills of Nebraska, that was breaking horses locally, finish him out for riding, roping and loading. I gave him a hundred and sixty to handle him for a month. I went over in three weeks to see how he was coming along. The cowboy was in the hospital. He had gotten careless breaking two and three year olds. When he went to swing on my horse he inadvertently swung on while he was in the corner of the corral instead of the horse. The horse jumped out from under him -- turned and tried to stomp him under. His Dingu dog ran in and grabbed the horse by the nose. The horse killed his dog and he managed to roll under the fence. I payed him his money as his hospital bill was in excess of that. I sent the horse from there to the sale yard onto the dog food plant. ... The Stallions four years and older should not be adopted."

> "The mares I took were so screwed up genetically no amount of up breeding would have produced a decent horse either pleasing to the eye or possessing sound conformation."

". . . Her name is Marya (like the wind). All I ever expected was to gain her trust in me, but I have received much more. She is the finest animal I've ever had the chance to meet and smart, as a whip, and if I could I'd have a hundred because she's more than a horse she's a friend."

"I am writing this letter along with the form you sent about my Mustang Doneo. I have always been interested in mustangs and wanted to go catch one. In March, 1981, I adopted four mustangs, supposedly two were two years old and two were three years old. One was the oldest of all of them I'm sure because he could never be trusted. He was hard to catch and tried to run away and was mean to my other horses. He hit my Appaloosa in the chest and I had to have him put to death. I finally whip broke this mustang but this doesn't make for confidence between horse and rider. The other horse of the three year olds was an ideal pack horse, quarter horse style, and the right build and very strong but was a little lazy. ... A big improvement you could make is to get a new ear tagging system. Those tags make some mustangs very hard to work with around their heads. With the experience I've had with horses over many years I feel if you can handle their ears and feet you have made a big stride in training them. ...Horse named Elko is one of the most willing and affectionate horses I've ever worked with. Sometimes I think he wants to help me because he knows my knee isn't right . . . I wouldn't sell him for $1,000.00."

". . . I acquired two of these animals, both were mares, one a one year old and a two year old. I bred them to a Tennessee walking horse. I got two fine filly colts. I sold one and kept the other. I had to dispose of one of the mares when the colt was seven months old, as she went blind. I am most certain this was due to inbreeding. I was never able to tame the other mare as she was two years old when I got her."

"In order to preserve these animals I think it is necessary to castrate all males and bring in a new breed of males. These I recommend: Appaloosa, Morgan, Tennessee Walker, or Quarter Horse. Unless this is done most of these animals are worthless."

"Good old pet horses and working horses are sold for commercial products - why not wild horse???"

"The adoption program was and is a farce -- wild horses are a product of the land and should be managed as such. They should be gathered economically and put up for sale at the gathering corrals."

". . . I haven't the resources to obtain many of these animals but have found my mare to be an excellent riding horse. My 7 year old can handle her. She is even tempered and sure footed."

"I am proud to have gentled and become an owner of a wild horse."

". . . The horse I adopted at 18 months was already stunted. Adoptive horses should be adopted at 6 months of age to alleviate severe physical stress and make the animal more valuable at a later date."

". . . I would encourage people to adopt because these horses have proven they are more intelligent, more affectionate and more loyal than the average domestic horse. It took a lot of time, patience and love to make our horses what they are today. But it was worth it. People would come out here and after seeing them just could not believe they were wild mustangs. I am very proud of them."

Several things are apparent after looking at the responses found in the questionnaire and regression results. Adopters prefer certain types of horses over others. Most notably, they tend to prefer young and female horses. Second, the perceived value of adopted horses varies widely. This was indicated by our data, but it is stated emphatically by the adopters' comments.

Policy Considerations

One thing that is apparent from the data and responses is that WFHB are not uniform products. Is the BLM's uniform pricing policy the best choice? Is it in the best interest of the WFHB and adopters? At the current level of $125, the adoption fee creates a surplus of horses for the BLM. As reported earlier this costs the U. S. taxpayer about $2.40 per horse per day to care for unadopted horses.

The motivation for the fee was in part to create a barrier so that unaware (irresponsible ?) buyers would stay out of the market. But this also, in effect, keeps some responsible, but economically wise people out of the market. Some people pay too much for the horse that they get, some not enough. The data indicates that people would be willing

to spend relatively more for the horse of their choice. Should they have the opportunity to do so? Under the current system they do not.

What about the horses? No one can pretend to know what a horse wants, likes or dislikes. However, being corralled for a wild horse is probably not its idea of a party. It seems as though thousands of horses standing around in corrals is a tremendous waste. I think we have to address the issue of what is our commitment to WFHB. Most would agree that we should protect the wild status of a certain amount of horses. But does that commitment protect the individual horse? Are we obligated to provide for the maintenance of surplus horses indefinitely? Currently, by not addressing this issue we are doing exactly that. This is not to say that we shouldn't. But at least let us determine our commitment and not leave it to a default chosen by inaction.

Prior to the formal fee schedule, the horses were more or less given away. In order to prevent commercial gain, limitations were made on the the number of horses a person was allowed to adopt, and granting title to the animal was delayed. Enforcement of the law prohibiting sale of nontitled horses was difficult and expensive and not generally enforced. Instead current policies price the WFHB so high as to preclude any chance of a commercial use. While this may prevent individuals from profiting from adopted horses, it also eliminated many who would have adopted animals for recreational uses.

One of the things this study points out is that there is a multi-faceted demand function for WFHB. Further, for many the perceived recreational value of the horse is higher than any commercial product value anyway. Perhaps a trial with auction selling of WFHB should be

attempted for a period of time. Given some time it could be determined if the recreational value of the animal was high enough to warrant continued use of an auction system. This is not to say there might be abuses, but perhaps those social costs would be outweighed by other gains. For example, if we assume that the auction system would eliminate the surplus horses, the money currently used for maintenance could be used for other purposes. In terms of long range plans, the current money spent on maintaining surplus animals could conceivably be used to better blood lines, improve watering holes and create viewing areas. In this way, the money would be spent to improve the future of the wild horse and our enjoyment of them.

Some have said the adoption program is too expensive and adopters should pay the full cost of adoptions. First, the cost is prohibitively high. As we have reported the best yearly (1981) figure that we have puts the cost of getting a horse to the adoption site at around $350. Based on the response of adoptions in 1982 (when the price reached $200) its pretty clear that there would not be many adopters (for a fuller treatment of the elasticity of demand see Appendix C). At the $200 price, a surplus number of horses removed had to be maintained or killed. Estimates indicate that at the current adoption fee ($125) 15-20% of the animals taken off the range may be unadoptable. If adoption removals were at 10,000 animals per year, and 15% of those animals are unadopted, the cost of maintaining these animals at current rates is $1,340,000 per year. Second, it may not be fair to expect that adopters pay for the full cost of the adoption. Horses are removed as a result of land use plans developed by the BLM. These plans help to determine what level of horse removal is deemed to be beneficial to the land.

Other uses of the public land benefit more people than just the adopters. That may mean ranchers in many cases, but in many ways, directly and indirectly, all citizens are beneficiaries, even if its only through the lessening of land erosion. This makes the removed WFHB a joint good. Having adopters paying only a portion of the removal cost may be justified on this basis. Part of the cost should be born by the beneficiaries of the other service it provides, which is more socially valuable land.

When considering this data and study, perhaps it would be well to keep in mind that none of it would be possible without tremendous amounts of cooperation from many organizations and people. All of whom are linked by an interest in wild horses. This project started out as an objective study of the wild horse problem, but it wasn't long before the fascination of the relation of horses, man and the environment became extremely compelling. In response to the survey we received stories of new foals, loved pets, broken bones while breaking horses and several pictures of pleased owners and good looking horses. There really isn't any way to objectively report on the feelings people have for these animals. The poem listed in begining of this paper is just one example of many positive comments that were received about wild horses.

The sentiment expressed by Mr. Dawson reflects the concern many people have for these animals. It may capture much of the truth in dealing with wild horses. Often when reading comments by adopters of these animals, we find that if tamed these animals can rank with the best. At the same time however, some people believed they just got a

fence wrecking, bone breaking, raw deal. Whatever sentiments are held by the reader a sincere thank you to all of the people who contributed to this study.

REFERENCES

American Farm Bureau Federation, "Emergency Burro Reduction Program,"Natural Environmental Resources Report, April-May 1981.

Godfrey, E. Bruce, "Wild Horses: Are They Really Worth It?", Utah Science, 40 (June 1979) 24-36.

Gujarati, Damodar, "Basic Econometrics," McGraw-Hill Book Company, 1978.

Later, Morris P., Unpublished Historical horsemeat prices, Vice President, M & R Packing Company, P.O. Box 803, Hartford, Connecticut, 06101.

Lewis, H. Gregg, Unionism and Relative Wages in the United States, University of Chicago Press, Chicago 1963.

National Park Service, Death Valley National Monument, Management Options for Natural and Cultural Resources, February 1976.

National Park Service, Death Valley National Monument, Summary of Natural and Cultural Resources Management Plan and Draft Environmental Impact Statement, November 2, 1981.

National Research Council, Commission on Natural Resources, Wild and Free-Roaming Horses and Burros: Current Knowledge and Recommended Research, National Academy Press, Washington DC, 1980.

Public Law 86 - 234, U. S. Statutes at Large: 86th Congress First Session 1959, U. S. Printing Office, Washington DC.

Public Law 92 - 195, U. S. Statutes at Large: 95th Congress First Session 1977, Washington DC.

Thomas, Heather Smith, The Wild Horse Controversy, A.S. Barnes and Co., Inc., 1979.

U.S. Department of Agriculture, Economic Research Service The EC Market for U.S. Agricultural Exports: A Share Analysis, Editor Harold A. McNitt, Foreign Agricultural Economic Report 179, Washington DC, (March 1983) 64-68.

U.S. Department of the Interior, Bureau of Land Management, Managing the Nation's Public Land Fiscal Year 1983, Washington DC.

U.S. Department of the Interior, Bureau of Land Management, Managing the Nation's Public Land Fiscal Year 1985, Washington DC.

U.S. Department of the Interior, Bureau of Land Management, Public Land Statistics 1981, Washington DC.

U.S. Department of the Interior, Bureau of Land Management, Public Land Statistics 1982, Washington DC.

U.S. Department of the Interior, Bureau of Land Management, Public Land Statistics 1983, Washington DC.

U.S. Department of the Interior, Bureau of Land Management, Wild Horse and Burro Report, Washington DC, August 1982.

U.S. Department of the Interior; U.S. Department of Agriculture, Administration of the Wild Free-Roaming Horse and Burro Act, Fourth Report to Congress, Washington DC, June 1982.

U.S. Department of the Interior; U.S. Department of Agriculture, Administration of the Wild Free-Roaming Horse and Burro Act, 5th Report to Congress, Washington DC, June 1984.

Wagner, Frederic H., "Progress and Problems, 1934-1984, In Improvement Of Wildlife Habitat," Paper presented before the National Celebration of the 50th Anniversary of the Taylor Grazing Act, Grand Junction, Colorado, July 8-10, 1984.

Wolfe, Michael L., "Feral Horse Demography: A Preliminary Report" Journal of Range Management, 33 (September 1980) 354-68.

Wolfe, Michael L., "The Wild Horse and Burro Issue, 1982," Department of Wildlife Science, Utah State University, 1982.

APPENDIXES

Appendix A. Time Series Analysis

In this model it is speculated that the price and quantity are related over time. In order to test this hypothesis the quantity of adoption can be regressed against the average price per month. For our purposes, a linear model approximation will be used. The function form of the model follows.

$$Q_d = a + b (P)$$

The following Table 21 shows the monthly average adoption fees and the occurrence of adoptions from our sample. It lists the number of adoptions per month and the average fee of those adoptions for the month. The months start with number one which would be January 1981.

Table 21. Monthly Average Fees and Quantity of Horses Adopted

Month	Average Fee	Quantity Adopted	Month	Average Fee	Quantity Adopted
1	95	9	16	215	5
2	139	5	17	125	1
3	116	7	18	125	2
4	82	5	19	128	9
6	8	3	20	196	8
7	38	11	21	157	9
8	72	13	22	200	1
9	64	22	24	155	6
10	70	6	25	125	4
11	98	11	26	72	3
12	43	14	27	125	2
13	143	5	28	145	3
14	154	7	29	160	3
15	58	2			

The assumption that is made to justify this regression is that the effect that we are seeing in the quantity adopted is dependent on the

average fee charged. In other words the fee change is causing the quantity reaction on the demand curve which is not effected by other variables, over the time period that we are studying this market. Following are the results of this regression analysis.

$$Q = \underset{(2.1839)}{9.9973} + \underset{(0.0173)}{-0.3022\ P} + u$$

In this model the t-statistic was significant for the price coefficient although the r-square was low (0.108). It does indicate that the empirical evidence derived from our data conforms to the downward sloping demand function. In order to verify the findings another method will be used to further check the correspondence of our empirical price and quantity relationships.

Appendix B. Frequency Analysis

This method uses a frequency analysis of the price or adoption fees and examines if the quantities of adoptions that occur, at lower adoption fees, is greater than the quantity of adoptions at higher adoption fees. This involves checking the number of adoptions (quantity) of horses at various prices (adoption fees), to see if they validate the theoretical assumptions of inverse relationship between price and quantity.

Frequency analysis takes the range of prices paid (adoption fees) and breaks it down into smaller sections. For example, the range of adoption fees if from $0 - 400 dollars can be broken up into smaller sections, say by increments of $40. Then any fees inbetween $0 - $40 would be in the first section, fees between $41 - $80 would be in the second section and so on. If we take a sample of adoptions and when we look at them find that ten of the adoption fees fall between $0 and $40 dollars, then the frequency of the occurrence of the first section of fees is 10. Then the count or the number of times that an adoption fee falls in the zero to $40 range, during an adoption, is the frequency of the number of occurrences of that section of the fee. By observing adoptions and counting the number of occurrences from each section from the range of fees, the relationship of price and quantity is revealed. The frequency of the observation of a section of the adoption fee can be associated with the mid point of the adoption fee section. The mid point approximates the price of the section and the frequency is the quantity related to it. By looking at the frequency of a series of these approximate prices, an estimated relationship of price and

quantity can be seen.

If the observations (of adoptions) are a random sample over a period of time during which the adoption fee shows some variation, the price and quantity relationship may be exposed. To do this type of analysis, we have to assume that the distribution of prices through time is uniform. For example, if the prices were very high for 90% of the time and low only 10% of the time, it is likely that the higher price would be associated with a larger quantity of adoptions, because of the discrepancy in time each price was allowed to be present in the market during the analysis. If on the other hand, the prices have equal time the frequency analysis would be fair to each. Time would be equal and the difference in adoptions could be attributable to the change in price. Then we could estimate the relationship between price and quantity over the period of time and see if the law of demand holds.

Given the time period used in this, the range of adoption fees does not look like any one fee is dominate. The uniformity of the distribution of adoption fees over time can not be guaranteed. However, this assumption may not be unreasonable.

First, the size of the divisions that the adoption fee will be broken up into must be determined. Before, this is done two factors are important to consider. The first is the range of the adoption fees, as the size of the divisions or sections of the adoption fee should be smaller than the range of the fees. If it is not, the analysis will only have a few sections of prices and frequencies of observations to consider. In this case the resulting analysis would not be very sensitive to changes in adoption fees. The second point to consider is the number of

observations in the data. Choosing a division that is relatively small, will increase the number of segments in the adoption fee range. If the sections become so numerous that many remain without any observations, the purpose of the frequency analysis is defeated. Given the adoption fee range from $0 - $315 and the number of observations in the data of 137, the choice was made to use $20 as the segment size. This resulted in 15 sections of adoption fees. The frequency of occurrences for each of the sections and its mid-point follows in Table 22.

Table 22. Price Frequency of Adoptions

Mid-point	Frequency
10	41
30	10
50	1
70	1
90	3
110	3
130	21
150	23
170	5
190	2
210	8
230	4
250	5
270	7
290	2
310	1

The following graph indicates a downward sloping demand curve. This demand curve agrees with our earlier findings. Even though the distribution of the adoption fees is not known, the net result of this analysis does tend to verify the demand curve that we expect to see from theory.

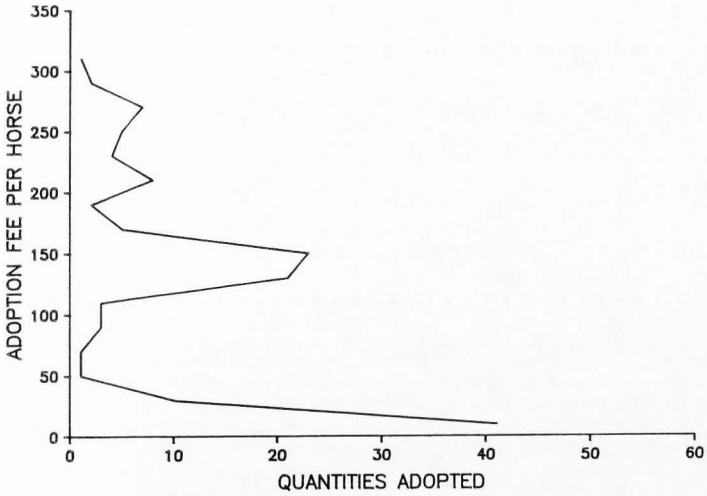

Figure 5. Frequency of adopted horses by adoption fee

It is possible to fit a line that approximates the relationship between what can be termed the best fit. The linear approximation follows. Due to the technique used, no level of significance can be determined with this model, however, it does indicate a general relationship between price and quantity that does agree with our previous findings. Note the negative coefficient of the quantity variable.

$$P = 191 - 3.61 (Q)$$

where : P = adoption fee

Q = quantity adopted

There are possible explanations for the lack of a better looking

fit of our frequency analysis to a typical demand curve that we expect. The relationship between quantity and prices of adopted horses is difficult to determine, as we can not control the prices over given periods of time. In a sense, we are talking about the distribution of price. Another factor in making the analysis difficult is the consideration of quality in the demand function of the adopter. Up to now the quality of the horses has been ignored or implicitly assumed to be constant. But not all horses are of the same quality. These two factors (i.e. the distribution of price and the quality variation issue) are the next topics for discussion.

The distribution of price problem is simply that the price variation over our period of time was not controlled. If price is a normal distribution, the prices with a greater probability of occurring have a greater likelihood of being present in the market than other prices. Likewise, observing a price of lower probability in the market would be less. As we have no way of knowing the price distribution, it is fairly obvious that the frequency analysis is lacking in its power to be a reliable judge of the demand for horses.

As stated before, one explanation for the lack of better conforming frequency analysis data could be quality variation in wild horses. The preceding analysis implicitly assumed all horses adopted were uniform. However, horses with better conformation, better health or preferred age and sex characteristics may be in greater demand than others. Stated differently, some horses having many undesirable characteristics may not be wanted at any price. As a result, if the price for these lower quality horses became low they still may not be adopted. On the other hand, if higher quality horses are available even at a higher price they

may be adopted. It is not hard to imagine an adopter who desires a certain level of quality before he will adopt a horse. To them even a low price will not induce adoption of a low quality animal. In this case, the higher adoption fees would be associated with greater demand. If we then looked at the evidence of only the recorded price and quantity and had no variable for the quality of the horse, the price quantity relationship would appear opposed to the law of demand. As it turns out, the frequency analysis results are not as bad as one might expect. They do tend to indicate the downward sloping demand function. The fit however, is not satisfactory. The concept of a distribution of price is interesting.

Why would the BLM have different prices over the period of study? One reason could be quality variation in the horses that they are providing for adoption. As already shown, the average price paid for horses in 1982 was not the stated uniform fee the BLM says was its adoption fee for the year. Following is a table showing the responses for adoption fees we receive from our sample population of adopters, from adoptions occurring in the first six months of 1982.

Table 23. Adoption Fees and Dates 1982

Fee	Date	Fee	Date
0	820114	225	820220
164	820114	0	820316
0	820119	115	820320
279	820124	250	820416
100	820201	225	820429
200	820208	165	820430
120	820209	220	820501
125	820211	125	820525
125	820212	0	820621
185	820213	250	820629

This shows a wide range of adoption fees over the time period. It raises the question of the adopters not reporting correctly the fees. Its also possible that unknowingly the BLM is discriminating in its price base on the quality of the horse. The better horses get the adoption fee the BLM asks for and the lower quality horses that are left get adopted only if the adoption fee drops. Why this happens can not be deduced from the information available. During 1981, the range of adoption prices is greater than that of 1982. As we recall 1981 fees preceded a uniform policy (set January 2, 1982). During this period of time there, was not a problem of unadopted horses. This could mean that prices were cut on lower quality horses in order to move them. It only seems fair that horses of lower quality would go for a lower price. Following is a table which shows the adoption fees for the first six months of 1981.

Table 24. Adoption Fees and Dates 1981

Adoption Fee	Adoption date	Adoption Fee	Adoption Date
400	810101	145	810313
145	810103	110	810314
121	810104	0	810316
0	810112	125	810325
0	810116	200	810325
0	810122	145	810326
0	810126	129	810408
0	810226	25	810413
25	810227	25	810414
265	810227	148	810418
265	810227	15	810617
87	810305	0	810624

It seems clear that over any given time period a range of adoption fees are possible. Again, this could be the result of quality differences in the animals. This quality consideration poses a problem in our simple demand analysis of how we can capture the quantity variables. But if the quality difference is related to age, weight or sex the multivariate model should reflect the association of these variables to the adoption price. In this way, the multivariate model (Chapter 5) may help us explain the different adoption fees people are willing to spend on a horse because of certain characteristics the horse possesses.

Appendix C. Elasticity of Demand

The demand we have demonstrated in this study is downward sloping. Given a downward sloping demand function, the government is faced with a situation in which increase in prices will decrease the quantity demanded. The question becomes one of elasticity of demand. The government finds it is possible to increase adoption fees but at the expense of quantity adopted. If the relative increase in the fees is larger than the relative reduction the total revenue raised from the fees will increase. An example taking the results of adoption fees and quantity for two years follows.

From looking at the aggregate figures from fiscal years 1981 and 1982 there is a negative effect in quantity to the adoption fee increase. So in aggregate the demand is downward sloping. Using a point slope form the elasticity of demand can be approximated as follows.

$$e_d = \frac{\text{change in quantity}}{\text{change in fee}} \times \frac{\text{average price}}{\text{average quantity}}$$

$$= \frac{q_{82}-q_{81}}{p_{82}-p_{81}} \times \frac{(p_{82}+p_{81})/2}{(q_{82}+p_{81})/2}$$

$$= \frac{5,278 - 8,835}{165 - 71} \times \frac{118}{7,656.5}$$

$$= -0.55$$

Which is clearly inelastic. The BLM has demonstrated that they can increase the adoption revenue by raising fees. However, the resulting

cost of maintaining the animals increases even more. Therefore in net terms, they incur larger operating deficit.

On October 24, 1984, the fee per horse was standardized at $125 per animal with no transportation cost added. Now any horse adopted any where in the States will have a $125 adoption fee.

Since all adopted horses come from the West some argue that this is a subsidization of adoptions in the East. Estimates of BLM cost of shipping from Palimino Valley Corral, Nevada to Lewisberry, Penn. or Crossplains, Tenn. are $101 and $93 respectively. At $2.40 a day for maintaining the animal these amounts would be used up in just 42 and 39 days, if the horses were not adopted. Because of the uniform rate, future studies of the adoption demand may be better able to use a transportation cost method in developing the amount of consumer surplus.

Appendix D. Adopters' Comments

Following are example of the comments received from adopters. These are just a sample, although I think they rather broadly represent the various opinions express in the comment section of the questionnaire.

"Settle back in your chair and let me tell you about my wild horse experiences. I'll also mention what I think should be done with your adoption program.

Several years back I adopted two horses out of the John Day area. When I went to pick them up at John Day I found the local inhabitants and surrounding Ranchers had them fairly well picked over. I took a in-bred gelding and an eleven year old bay stud. I was disappointed. These two horses I did not want but hated to drive all that way with a truck and then come back empty. The reason I picked the stud was that he was a true bay with black mane and tail, built like a Morgan. He stood off to the side watching the goings on and I saw that he was a thinking horse. The cowboys were scared of him and stayed on the fences popping whips until they had him run into my truck. We put a long rope and halter on him and I tied him close as I did the other.

I broke the in bred gelding and gave it to a fellow that needed a horse. I did this about a year and a half after picking him up. The stud was a tough fellow. I gelded him and called him Demon. that is what he was. Then I started gentle breaking him. His front shoulders were set out from his body. He used his front legs like a boxer and his back ones he could kick like a machine gun and could bring them up one at a time and kick as high as his front shoulders. It took me a long time to get his confidence. He finally decided that we were pals. When I led him to water he would keep his nose practically on my front shoulder. It bothered me a bit after the sessions we had had. After a while I turned him out with two gentle mares. I could walk up and catch him any place. I figured when I got to riding him steady I would have a mount that would travel every elk trail in the mountains. The problem was I did not have time to finish training him. I let a cowboy out of the sand hills of Nebraska, that was breaking horses locally, finish him out for riding, roping and loading. I gave him a hundred and sixty to handle him for a month. I went over in three weeks to see how he was coming along. The cowboy was in the hospital. He had gotten careless breaking two and three year olds. When he went to swing on my horse he inadvertently swung on while he was in the corner of the corral instead of the horse. The horse jumped

out from under him -- turned and tried to stomp him under. His Dingu dog ran in and grabbed the horse by the nose. The horse killed his dog and he managed to roll under the fence. I payed him his money as his hospital bill was in excess of that. I sent the horse from there to the sale yard onto the dog food plant."

"The mares my daughter and I picked up were fine horses. They have a number system for picking out horses that gives everyone an equal chance. I think that is great. Although we were far down the line, a lot of people that day did not know much about horses. Although these horses were for free to us there is a lot of outside expense. The hauling of these horses came to a hundred and eighty six dollars. I picked these horses up in August. You can not turn a wild horse out until it is gentled. I kept these horses up for about ten months. They ate around twenty ton of hay. I raise my own hay but figure that at an average of fifty five dollars a tone $1100 dollars. This is a total of $1286 plus the time I took to gentle break them. I had tough luck and lost three horses. You say they did not use that much hay. Pretending I had not lost them, this is what it would have cost."

"I think your adopt a horse program has gotten out of hand. You people have too many soft hearted people in your ranks. This is costing the taxpayers too much.

Your whole set-up is working about right up until the time they are ready to adopt. About the only thing I can say here is the round-up should be contracted by the head and it should be by bid. With a minimum bid.

After the horses are corralled a rancher or some one that has handled horses a good share of their life should cull them. The culled are mostly in-bred. These should be handled just like cattle. Sell them at auction to be processed for dog and cat food or a meat market that sells horse meat to customers. If this horse meat was used and mixed on about a fifty fifty basis with beef it could be sold for school lunch programs or to University's.

The rest of the horses should be put up for adopt a horse program on a graduated scale. Colts six months and younger should be fifty dollars. Six months to a year seventy five dollars. One year to three years a hundred and twenty five dollars. These are the easy horses to handle and respond easier when broke. From three years and older the price should go back to fifty dollars.

The Stallions four years and older should not be adopted. They should be sold to a Rodeo bucking string. A good bucking horse will bring fifteen hundred. They are kept and fed well. They do very little work. It doesn't hurt to buck them.

Fighting amongst themselves is a lot rougher than bucking. If they do not buck well enough, let them bring them back and send them to the rendering plant, dog and cat food, etc.

I am retired. I use to farm a lot of ground, raised cattle and good horses. I think if you and others would pick some of these ideas out of this letter and cull the horses sharply. Sell these Culls, in-breeds, older horses, horses that are not built well, etc., these bring from ten cents to seventeen cents a pound on the hoof right now and the prices are about as low as they will ever get. Contract the round-up by the head. Sell the horses by a graduated scale like I mentioned and I'm sure this adopt a horse program will make money instead of losing money.

Thanks again for your inquiry about what can be done to improve the adopt a horse program. If I can be of further help please write."

"The mare I adopted was too old to do much with. I worked a lot with her. I don't feel it is a good idea to let horses this age go out for adoption."

"Adopting a wild horse is a very difficult and time consuming experience. I don't believe people who adopt are aware of this, not as much as they should be."

"I adopted my burrow because he was the most unadoptable one there. I always tried to take what others would not want to adopt. We still have our burrow and think he's great. He's just a pet, has been gelded and we adopted a Jenny so he has a friend.

We assist the BLM and NOWAH (a private organization out of Conifer, CO.) in adopting out wild horses and burrows in the northeast. We usually take animals with problems (physical) rehabilitate them and then place them in good homes for a minimal fee. We at least halter break the animals, usually they've had at least one hoof trim before being transferred."

"When I adopted him he was a two year old stallion. He turned out to be a fine horse. The man I hired to break him bought him for $600."

"This one was just a foal when we got her but we have another mare that did foal. We bred her to our mustang stallion and she delivered a nice male foal. We have a quarter horse that we bred to our mustang stallion.and she has had two beautiful foals."

"The adoption experience was fine but since giving up burros we have had problems with animal control. The people we gave the animals to either gave them away or let them loose and

subsequently animal control has sent us bills for $400 for board and feed. We have explained that we gave them away three years ago but to no avail. Matter is still pending."

"Now it is too much money and too much trouble."

"I think that the program has some real problems relating to the perception people have (especially trainers) of the mustang. We were hesitant to try to train them ourselves. Could not find anyone for a long time that would train them for riding. It was costly and we know that the market value of the horses is quite limited. We have kept them because we have the land and because we've had them since babies and they have excellent dispositions. Unless the adopter knows how to fully train a horse it is certainly not a cost-effective decision.

You might consider some kind of lease program to 4-H groups that are developed enough to be able to train the horses prior to their potential sale.

I suspect that a sad fate is delayed but not eliminated for many adopted horses."

"The stallion I adopted was easy to break. I just rode him a few times. I also adopted a filly at the same time, she had a filly colt two years later out of the stallion. The filly is going to be bigger than either. These wild horses are rather easy broken, it seems like they will look out for themselves more than a domestic horse will."

"As I have stated before, I primarily adopted my burro for a family pet. The horse I adopted before that, and which I still own, is the best investment I have ever made and I wouldn't trade her for anything.

All in all I have never had any bad feelings about the adoption program. I feel it is a success and should be continued. If the government would discharge their duties as mandated by law, this whole program wouldn't be this problem. Excess horses are keep and feed. If horse numbers were reduced to within reasonable population limits this adoption program wouldn't be the abortion it is now. The adopted horses would be more desirable generally and more adoptable. The mares I took were so screwed up genetically no amount of up breeding would have produced a decent horse either pleasing to the eye or possessing sound conformation."

"I have broken my mare, she is very gentle and has had one nice foal. Maybe the reason I've had such a good experience with mine is I had the first picks the morning we adopted, and have had some experience with judging horses."

"These horses are an excellent investment for persons desiring a pet type animal. However, any of the horses adopted should be three or younger if possible as the older horses are fairly set in their ways, unless only one person is planning to work with each horse."

"I would expect to adopt again if I ever needed more horses. The two mustangs I have are much more aware and intelligent than the average domestic horse.

I do feel that trying to save all wild horses is not the smartest or most economical program. Some wild horses are too old, injured, unhealthy and/or wild to ever be adoptable. In these situations I feel it is more humane to put them down rather than trying to move and get them adopted.

Also, if ever a healthy, reasonably adoptable horse or burro is ever disposed of because they haven't been adopted within a certain time frame, there must be developed a different plan."

"The adopted animal that I have really adjusted to the surroundings. I am very proud of my horses, you can really depend on them. They broke out to be very good trail riding horses and adjust to anything I do with them very quickly.

I would advise anyone to adopt one but you need to keep the price at reasonable rates, because they are very hard to get gentled and are very wild, but it takes a lot of patience and time and they are worth it."

"I put a lot of time and work into the horses I adopted. I also spent a lot of money on them. Still you have horses that are high strung. Especially the older horses remain part wild. I would not do this again. If you are going to charge a fee I suggest you keep it very low."

"Any adoption price higher than the base canner price is not reasonable as one could buy usable horses close to home at the same price the government asks for the wild ones a long way away. Becoming a bucking horse is a very practical use for some of these wild horses, as it is a much freer and more unrestricted type of life than being shut up in a little pen or being used as a pack or saddle horse. The horses become gentle and docile in bucking strings.

Our bucking horses are very special to us, they are well fed, their work is easy and natural to horses. They are free to run in large pastures about 95% of their life. It is not a cruel life for horses, but is easier than any other horses life."

"I am happy to say how well the mare broke and I am now using her as a cow horse on the ranch.

My opinion of people that have no luck with these horses is that they don't bother to take the little extra time and patience it takes to work with them, (and probably think they're not good for much anyway, which is a big mistake), have no idea what they're getting into, or don't have adequate facilities in other words, having a mustang is just a novelty to them. I think any questionable people should be checked up on after a year or so to see what, if any progress is being made and that adequate care is being provided.

While a higher price may discourage 'canner' buyers, the lower price has enabled me to buy one and prove they can be made into good using horses (cow work, pleasure) and I'd buy ten more if I had the funds and room for them.

One more plus I'd like to add is that a man that also works on this ranch bought two yearling stud colts the same time I bought mine. Though their dispositions are a contrast to the mares and are a little more skittish, they also turned out very well and have been broke to drive. Enclosed is a picture of them and one of myself on my mare.

Here's one satisfied customer."

"I think their horses should be sold at canner market price to the people and not put in these holding corrals to get sick and die. They should be disposed of immediately one way or another."

"I can go to the auction and purchase older broke quarter horses, etc., for $175 to $200 and get a good horse for pleasure riders.

I personally think your prices are way too high. I can't afford to travel, pick up, feed, break these wild horses then sell them or keep them for myself.

I enjoyed breaking and training the six month old buckskin we got from the government. She made a good pet. She was a return though, so someone else had tamed her down."

"I have been around horses all my life - bred, raised, trained and enjoyed, but when I adopted my two fillies I was extremely surprised at the amount of time it took before I could gain the confidence of the fillies. I spent hours and hours just grooming, feeding and talking to them, working to halter break them and be able to handle them without scaring them. Those hours have paid off-the fillies are as trustworthy as any horse I have ever handled, but I can certainly understand why a lot of

people have not found their adoption experience a successful one. Very few people can afford an investment of that kind of time for an animal of so minimal value. I would like to explain my reasons for adoption as I feel I'll be a minority. I have always wanted to break my own horse. I have a horse that I've had since I was in the 5th grade. I'm now 29 (almost) yes, she is still around. She was around 10 or a little older when I got her with all her bad habits and hard headedness. So from my experiences with her I felt I could do better with my own gentle breaking. Then one day my husband and I heard of the B/M program at the time I passed over because I felt I had no chance at a young one, but about one year or so later my husband saw on cable news advertising especially young colts. So he offered and I jumped and I got what I wanted plus a chance to save a wild animal from future extinction, which will be their outcome. Her name is Marya (like the wind). All I ever expected was to gain her trust in me, but I have received much more. She is the finest animal I've ever had the chance to meet and smart, as a whip, and if I could I'd have a hundred because she's more than a horse she's a friend."

"The BLM land belongs to taxpayer and wild horses. I do not believe that the wild horses should be put off the land by cattlemen. They were there first."

"The government should stop ranchers from hogging government range for their use free. They want horses all killed off so they get more free land. Soon no horses at all."

"It gave me great pleasure in taking two very scrawny, scared, and ragged animals, and let them become free to eat, rest, and become trusting of me to the fullest. Also they received many compliments of the many people who saw them. I also have raised two beautiful fillies from them, which I have sold to people for their children, who have stated they are the most intelligent horses they have ever known.

Now at Valley, Nebraska, where we picked up our horses it was well run and operated very effectively. But I have been to some of the others and looked over their operations and was not at all pleased or impressed, because of the commercial don't care atmosphere."

"Have temporary centers in out of way states so more people could adopt a horse or more advertisement on this program"

"The adoption program is great. It should be maintained and promoted."

"I feel I could buy a yearling that I know the background on for $100 or less. Therefore, I feel I would not pay to adopt a mustang."

"No real inspection of facilities provided by prospective adopters.

Adoption centers are basically private enterprises, which are pressured to move these animals. This tends to promote "hard selling" by these people rather than matching horses with a good home."

"We took a 2 1/2 year old more. Within the month she was like a big puppy following my husband everywhere. We still own this mare and even though her and I don't get along well, my husband wouldn't sell her for a million dollars. We've adopted three other mustangs since and have been happy with all."

"The thing I've learned is any horse over five years old is almost impossible to break to ride although I have a two year old gelding that rates up with some of the better cowponies I've ever had."

"We have been very pleased with our adopted animals, but feel strongly that adoption needs to be coupled with selective humane killing of some of the many excess wild animals. I am writing this letter along with the form you sent about my Mustang Doneo. I have always been interested in mustangs and wanted to go catch one. In March, 1981, I adopted four mustangs, supposedly two were two years old and two were three years old. One was the oldest of all of them I'm sure because he could never be trusted. He was hard to catch and tried to run away and was mean to my other horses. He hit my Appaloosa in the chest and I had to have him put to death. I finally whip broke this mustang but this doesn't make for confidence between horse and rider. The other horse of the three year olds was an ideal pack horse, quarter horse style, and the right build and very strong but was a little lazy. I believe he had a head injury at the time of branding because he was so hard to bridle and going uphill he tended to lose his equilibrium and fell over backwards twice with my son. The oldest horse was small but more mustang look by his head and small legs.

In June, 1983, I had a bad knee injury and wasn't able to work with the mustangs so sold the above two in June, 1984, because I was afraid I couldn't trust them. My knee still doesn't bend more than 70 degrees, but I can ride now.

A big improvement you could make is to get a new ear tagging system. Those tags make some mustangs very hard to work with around their heads. With the experience I've had with horses over many years I feel if you can handle their ears and feet you have made a big stride in training them.

The horse Doneo that you wrote about is a long-backed horse and not ideal for packing or riding. I may teach him to pull a buggy. He rides fair and is a good pack horse.

Horse # named Elko is one of the most willing and affectionate horses I've ever worked with. Sometimes I think he wants to help me because he knows my knee isn't right and I'm awkward walking. I got my knee hurt soon after I started riding him. His ears are good; he lost his ear tag naturally. I wouldn't sell him for $1,000.00. I dragged an elk about one-quarter mile on snow this past hunting season. Hooked a rope onto Elko's tail. He is also a good pack horse.

I also have two burros and the Jenny foaled so now have three. The Jack is very gentle and can pull a cart, chains, wood, etc. He and the Jenny will bray when I step out the door to have me feed them. I got these in April, 1984."

"A purchaser should be able to return animals that do not work out in the first year for a partial refund.

The two horses I adopted wrecked all my fences and were almost impossible to approach. I would have returned them if I could have."

"She is the best broodmare I own; because of her experience as a mustang she passes her special techniques and intelligence on to her foals. We never attempted to break her to ride because we wanted breeding stock and also because she possesses great dignity that we felt we would destroy if she were broken. Our vet says she is at least 3/4 thoroughbred because of her size and characteristics. (She is 16.2 hands tall now). I registered her with the National Quarter Horse Registry in the identification section, so that I may then in turn register her goals. Her registered name is 3D's Ebony Mare; but we call her simply Ebony. I sold the other mare I adopted because she didn't conceive and as a breeding operation couldn't keep her, but she was a big pet and the people who bought her broke her and made a good riding horse out of her."

"What they should do with the horse problem is: what horses they gather up, any horse over the age of 5 years old send them to the glue factory, 1, 2, 3, 4 year olds adopt out for the fee of the veterinarian when working the horses, such as aging and worming the horse. Put the money from the horses you sell for killer horses back into the program. this might sound cruel but is the truth. I just canned two horses that I've had for 20 years."

"I support the program and think it should continue. I have had no problems with my horse, physically or temperamentally.

I found the staff at the adoption site helpful, kind and concerned with the animals well being.

Please let me know if I can be of further help."

"Our local burros have been neglected/abused according to some of the veterinarians. I think volunteers working with a government or other animal agency should check out status of adopted animals on a regular basis."

"They make very good stock horses. I don't no why more ranchers don't utilize the adoption program."

"We love them!"

"Wild donkeys and burros are just that wild. In my opinion the only purpose of adopting a wild animal is to keep it from going to the glue factory. The offspring can be tamed and put to use, but caring for the parent is just not worth the effort. I would never under any circumstances adopt another wild animal."

"I think you have been doing OK but it can be improved on. One there are some people that have adopted and have had some trouble with their horses. I think your people should instruct in a group session the simple way to communicate with their wild animals. I recommend that the halter and long rope be left on after getting it to their homes. They then would have much less trouble. This would not take too long for your people to tell the people this very simple procedure."

"I named the stallion in question "Meko," an ancient Indian name. He has proven more to me than any domesticated horse ever could. When he finally learned to trust us whole heartedly, it was as if his entire disposition changed. Meko went from a scared, nervous horse to a gentle, child-broken stallion. He has been ridden on trail rides, side-by-side, with other stallions, mares and geldings. As long as he has a saddle or rider on his back, he behaves like a gelding (could care less which animal was beside him). Of course, he still has a lot of the wild instincts and sometimes they surface, but not often. Meko is sire to a beautiful sorrel filly who has her dad's easy going, tolerant nature. I whole heartedly support the adoption program. Would adopt more if price wasn't as high as it is."

"I acquired two of these animals, both were mares, one a one year old and a two year old. I bred them to a Tennessee walking horse. I got two fine filly colts. I sold one and kept the other. I had to dispose of one of the mares when the colt was seven months old, as she went blind. I am most certain this was due to inbreeding. I was never able to tame the other mare as she was two years old when I got her.

In order to preserve these animals I think it is necessary to castrate all males and bring in a new breed of males. These I recommend: Appaloosa, Morgan, Tennessee walker, or quarter horse. Unless this is done most of these animals are worthless."

"We adopted four horses specifically for the purpose of riding. Only one of these could be broken for riding. In my opinion they're not worth the time and trouble. For you can buy a domestic horse not already broken, have it broken and you come out ahead money wise and time wise also."

"These wild horses are just that, wild. If one doesn't have a proper place to handle them they're asking for problems. I have a 7 foot pipe corral and they still tired to jump out. It's an experience and I enjoyed it but the price went too high. I turned out 3 good ones that are nice horses."

"Good old pet horses and working horses are sold for commercial products - why not wild horse???

The adoption program was and is a farce -- wild horses are a product of the land and should be managed as such. They should be gathered economically and put up for sale at the gathering corrals. The numbers on the range land should be held to a minimum. Possibly yearlings and colts could be adopted as there would not be much of a market for them - the fee should be low and ownership given in 6 months, if the adopter wants to keep it. The present program is costing the tax payers way too much money. Selling the horses could more than support a new streamlined program."

"I haven't the resources to obtain many of these animals but have found my mare to be an excellent riding horse. My 7 year old can handle her. She is even tempered and sure footed.

I am proud to have gentled and become an owner of a wild horse."

"The horse I adopted at 18 months was 1 already stunted. Adoptive horses should be adopted at 6 months of age to alleviate severe physical stress and make the animal more valuable at a later date."

"I wouldn't take anything for the experience we had with our horses, but I wouldn't go through it again.

I would encourage people to adopt because these horses have proven they are more intelligent, more affectionate and more loyal than the average domestic horse. It took a lot of time, patience and love to make our horses what they are today. But it was worth it. People would come out here and after seeing them just could not believe they were wild mustangs. I am very proud of them.

Anything else you wish to know I will be happy to help."

Appendix E. Program Cost 1986

On September 30, 1985, the BLM was maintaining 9,900 horses. Of these 7,600 were maintained by private contractors, while 2,300 were maintained by the BLM [Department of Interior, BLM, Managing Our Nation's Lands Fiscal Year 1985]. At the end of 1986 the total number maintained is estimated at 11,000 [Barbara Maxfield, BLM Public Relations, December 1986, personal communications]. Currently the cost of maintaining an animal ranges between $2.50 and $2.75 per day. At 11,000 animals maintained, the cost of maintaining animals on a yearly basis is over $10,000,000 (11,0000 x 2.50 x 365).

It is interesting to note that the total cost of the adoption program was 16.2 million dollars in FY 1986 and is estimated to be 17.7 million in FY 1987. This contrast with less than 5 million dollars in 1983 [Department of Interior, BLM, Managing Our Nation's Lands Fiscal Year 1983]. Over half of the current program cost is derived from maintaining removed but unadopted animals.