1975

A Philatelic Price Model

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A PHILATELIC PRICE MODEL

BY

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A PHILATELIC PRICE MODEL

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Advisor Date

Head, Economics Department Date

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Chapter 1

INTRODUCTION

Estimates indicate that at the present time the United States has over 6,000,000 philatelists. A philatelist is a stamp collector. Proceeding from this, philately is the proper name of stamp collecting and philatelic means pertaining to stamp collecting. This thesis is concerned with the price that philatelists must pay for stamps to add to their collection.

CATALOG VALUE SYSTEM

Use of Catalog Value

The catalog value is the basis of stamp transactions. Mail orders from dealers are at catalog value or percentages of catalog value. Stamp auctions are bid by individuals, usually at their acceptable percentage of catalog value. Stamp stores and hobby shops sell at catalog value and they buy at percentages of catalog value or flat rates for mixed lots of stamps. Obviously the catalog value is important to nearly everyone involved in philately.

Selection of Catalog

Several catalogs are available. Probably the most widely used by small collectors is H.E. Harris and Co.'s, The Harris Catalog. This catalog is based on the Scott Specialized Catalogue of United States Stamps. Harris uses

Scott's catalog numbers (identification numbers) and generally Scott's prices. The Scott catalog is accepted as an authoritative reference by serious collectors. Other available catalogs are for dealers or less used by collectors than Scott, thus the 1975 data for this thesis is based on the 1975 Scott Specialized Catalogue of United States Stamps. Prices quoted by Scott and used in this thesis are based on stamps of fine condition. Fine condition is defined as follows: A stamp that has at least part of the original gum (except for varieties which were issued without gum), does not have poor centering, fading, stains, and is not torn, mutilated or seriously defective.[1]

PURPOSE

The purpose of this thesis is to develop a model which will explain the 1975 market price of single, uncancelled, United States postage stamps of regular or commemorative issue to philatelists. This model was also tested for ability to predict future prices of these stamps. Commemorative stamps are special issues which commemorate some anniversary or event of local, national or international importance, or which honor some person. Usually such stamps are used for

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[1] Scott Specialized Catalogue of United States Stamps, Fifty-third edition, 1975, p. v.

a limited period concurrently with the ordinary series (regular issue).[2]

SIGNIFICANCE

The significance of this work is best demonstrated by an example. Scott Catalogue number 287 (the stamp identification number) was issued in 1898. The number of stamps of this variety issued was 4,924,500. The face value of the stamp (value for postal use) is 4¢; however, the uncancelled catalog value of this stamp to a collector is $40.[3] Obviously a significant difference exists (magnitude of 1000) in the prices. This thesis was undertaken to provide information on the large price differential.

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[2]Ibid., p. 1.

[3]Ibid., p. 77.

Chapter 2

DATA AND MODEL SPECIFICATION

Presented in this chapter is an explanation of the method used to select the data for the model. Next, the general function for the model is shown and the variables are specified. The chapter is concluded with an explanation of how the function was analyzed.

DATA SPECIFICATION

Data exclusions are of two types, definitional and operational. These exclusions are not necessarily complete, but they do convey the type of stamps not included in the analysis. Essentially, any stamp for which data was available, which met the definitional criteria, and did not induce some operational difficulty was included in the analysis.

Definitional Exclusions

The definitional exclusions are based on the following scope: This analysis is concerned with single, uncancelled, United States postage stamps of regular or commemorative issue. In essence, stamps which did not qualify under any component of the definition were excluded from the data. These definitional exclusions are listed by the applicable component of the definition.

Single exclusions. Included in this category are those stamps which are listed in catalogs with more than one stamp connected to each other. The single exclusions are:

Blocks
Coil Pairs
Booklet Panes

Uncancelled exclusions. These exclusions include those stamps which have been cancelled by the post office. These include first day covers which is a philatelic term to designate the use of a certain stamp (on cover) on the first day of sale at a place officially designated for such sale and so postmarked.[1] Uncancelled exclusions are as follows:

Cancelled
First Day Covers

United States exclusions. These exclusions are:

Confederate States of America
Foreign
Past or Present U.S. Possessions
United Nations

Postage exclusions. Included in this category are those stamps used for revenue, government regulation or purposes other than postage. Postage exclusions are as follows:

Boating Stamps
Christmas Seals
Consular Service Fee Stamps
Customs Stamps
Distilled Spirits Excise Tax Stamps
Hunting Permit Stamps
Motor Vehicle Revenue Stamps

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[1] Scott Specialized Catalogue of United States Stamps, Fifty-third edition, 1975, p. 1.

Postal Insurance Labels
Postage Currency
Post Office Seals
Proprietary Stamps
Rectification Tax Stamps
Revenue Stamps
Specimen Stamps
Souvenir Cards
Souvenir Sheets (including sections)
Telegraph Stamps

Regular or commemorative issue exclusions. This category includes special issues which commemorate some anniversary or event of local, national or international importance, or which honor some person. Usually such stamps are used for a limited period concurrently with the ordinary series (regular issue).[2] These exclusions are:

Air Mail
Air Postal Cards
Air Mail Special Delivery
Carrier Stamps
Certified Mail
International Reply Coupons
Local Stamps
Local Hand Stamped Covers
Newspaper Stamps
Official Stamps
Parcel Post Stamps
Parcel Post Postage Due Stamps
Periodical Stamps
Postage Due Stamps
Postal Notes
Postal Savings Mail
Sanitary Fair Stamps
Savings Stamps
Special Delivery Stamps
Special Handling Stamps

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[2]Ibid., p. 1.

Operational Exclusions

Operational exclusions are stamps that were excluded as they presented operating difficulties such as insufficient information, or problems which the model was not designed to handle. These exclusions are listed by reason for excluding.

Artificial value inducement. This category contains stamps which the model was not designed to handle. These include rarities and errors. A stamp is called an error when it differs from the normal variety by some mistake of omission in the inscription, color, paper, impression, watermark or perforation.[3] Stamps excluded for artificial value inducement are:

Errors
Proofs
Trial Color Proofs

Further price segregation required. These stamps involve the value of more than the stamp and no basis for segregating the values is provided in the model. These stamps are:

Encased Postage Stamps (Value of Mica Process)
Envelopes (Value of Envelopes)
Postal Cards (Value of Cards)

Sample homogeneity. This exclusion is for stamps of very limited samples which appear to have large deviations from other stamps in the sample. This was the case for coil

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[3]Ibid., p.l.

stamps of which only one was available to the data set. Coil stamps are essentially the same as regular issues except they are printed on strips rather than sheets.

Quantity data. Data is further limited to stamps for which quantities were listed in the 1975 Scott Specialized Catalogue of United States Stamps.

FUNCTION SPECIFICATION

The first step in analysis was to specify the function which was as follows: C = f(A,Q,F) or specifically

$$C = F + k\,A^{n} + j\,\frac{1}{Q^{m}}$$

where:

C = Catalog Value ($)

F = Face Value ($)

A = Age (years)

Q = Quantity Issued

k,n,j,m = Constant Coefficients

This function says that catalog value is directly related to age and inversely related to quantity issued. Further, both age and quantity were not necessarily linearly related to catalog value. Items which were not included in the model were the number of colors on the stamps and whether the stamps were issued in a series or individually. Due to the complexity of the model as stated above, these variables were not introduced.

VARIABLE SPECIFICATION

The variables handled in the model are defined more fully as follows:

C = Catalog Price of 1975 Scott's catalog for single, uncancelled, United States, regular or commemorative issue postage stamps. Scott's catalog price represents proper normal price basis for fine specimens when offered by an informed dealer to an informed buyer. Sales at lower prices are attributable to individual bargaining, changes in popularity, temporary oversupply, local custom or many other reasons. Sales at higher prices are usually because of exceptionally fine condition, unusual postal markings or newly discovered information.[4]

F = Face Value; value printed on the face of the stamp (postal value).

A = Age in years, from date of first issue.

Q = Quantity issued (Data on the number of stamps still in the market was unavailable.)

FUNCTION ANALYSIS

Analysis was accomplished by use of a multiple regression computer program which would run combinations of incremental values of n and m, solving for values of k and j which would minimize the error terms, thus best satisfying the equality for the combination of increments selected. Presented in Table 1 is a listing of the combinations of n and m which were analyzed. As an example, one run used values of m from .7 to .9 in increments of .1 and values of

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[4] Ibid., p. v.

Table 1

Combinations of m and n Analyzed

m	n	m	n
.2	.2	.9	1.0
.2	.4	.9	1.1
.2	.6	.9	1.2
.2	.8	.9	1.3
.2	1.0	.9	1.4
.4	1.2	1.0	1.0
.4	1.4	1.0	4.1
.4	1.6	1.0	4.2
.4	1.8	1.0	4.3
.4	2.0	1.0	4.4
.6	2.2	1.0	4.5
.6	2.4	1.0	4.6
.6	2.6	1.0	4.8
.6	2.8	1.0	5.0
.6	3.0	1.6	4.1
.7	.5	1.6	4.2
.7	.6	1.6	4.3
.7	.7	1.6	4.4
.7	.8	1.6	4.5
.7	.9	1.6	4.6
.7	1.0	2.0	2.0
.7	1.1	2.0	3.0
.7	1.2	2.0	4.0
.7	1.3	2.0	5.0
.7	1.4	2.0	6.0
.8	.5	3.0	2.0
.8	.6	3.0	3.0
.8	.7	3.0	4.0
.8	.8	3.0	5.0
.8	.9	3.0	6.0
.8	1.0	4.0	2.0
.8	1.1	4.0	3.0
.8	1.2	4.0	4.0
.8	1.3	4.0	5.0
.8	1.4	4.0	6.0
.8	3.2	5.0	2.0
.8	3.4	5.0	3.0
.8	3.6	5.0	4.0
.8	3.8	5.0	5.0
.8	4.0	5.0	6.0
.9	.5	6.0	2.0
.9	.6	6.0	3.0
.9	.7	6.0	4.0
.9	.8	6.0	5.0
.9	.9	6.0	6.0

n from .5 to 1.4 in increments of .1. All combinations of these values were run and an output of each combination listed the best values for k and j, and the correlation coefficient for the model with those values of k, n, j, and m.

Chapter 3

RESULTS

Presented initially in this chapter is the model that was determined from the analysis. The model is explained to demonstrate the validity of the extreme values of parameter estimates in the model. A brief analysis is presented on the predicting ability and the chapter is concluded with a discussion of possible sources of error in the model.

MODEL DETERMINED

The best results occurred at the combination of N = 4.3 and M = 1.0, yielding k = .0000002090 and j = 2.1194763347 with t values of 75.36969 and 8.87766, respectively, and simple correlations of .95741 and .54188, respectively. This yielded the following results for the overall model:

Adjusted Coefficient of Determination	.9250
Adjusted Correlation Coefficient	.9618
Standard Error of the Estimate	18.3284

These results were the highest t values, simple correlations, correlation, coefficient of determination and lowest standard error of the estimate of any combination tested. The resulting model appears as follows:

$$C = F + .0000002090\, A^{4.3} + 2.1194763347\, \frac{1}{Q}$$

MODEL EXPLANATION

Considering the extreme values of the coefficients, an explanation seems appropriate. This explanation must handle age and quantity independently due to the graphic limitations; however, the reasoning can be seen. Figure 1 depicts age with curves for the functions specified in Table 2. As can be seen from Figure 1, the exponent controls the curvature of the line and the coefficient shifts the line toward or away from the origin. Figure 2 depicts a graphical approximation of the data. The age function must adjust the exponent to match the slope of the data and the coefficient must shift the age function into the origin to equate to the data. It is imperative to realize that the extremely small coefficients of the model is not saying that age has a negligible effect in the model. This is evidenced by the t values. A t value of approximately 3.09 is significant at the .001 level. The t values achieved were 8.87766 for age and 75.36969 for quantity. Obviously both are highly significant.

Figure 3 shows the information presented in Table 3 for quantity. The same basic analysis may be used by comparing to the graphical approximation of the data in Figure 4. Note that when the two components are combined, any previous numerical results do not apply since only a portion of the value is explained by either component. The fitting process as previously described is for the specified

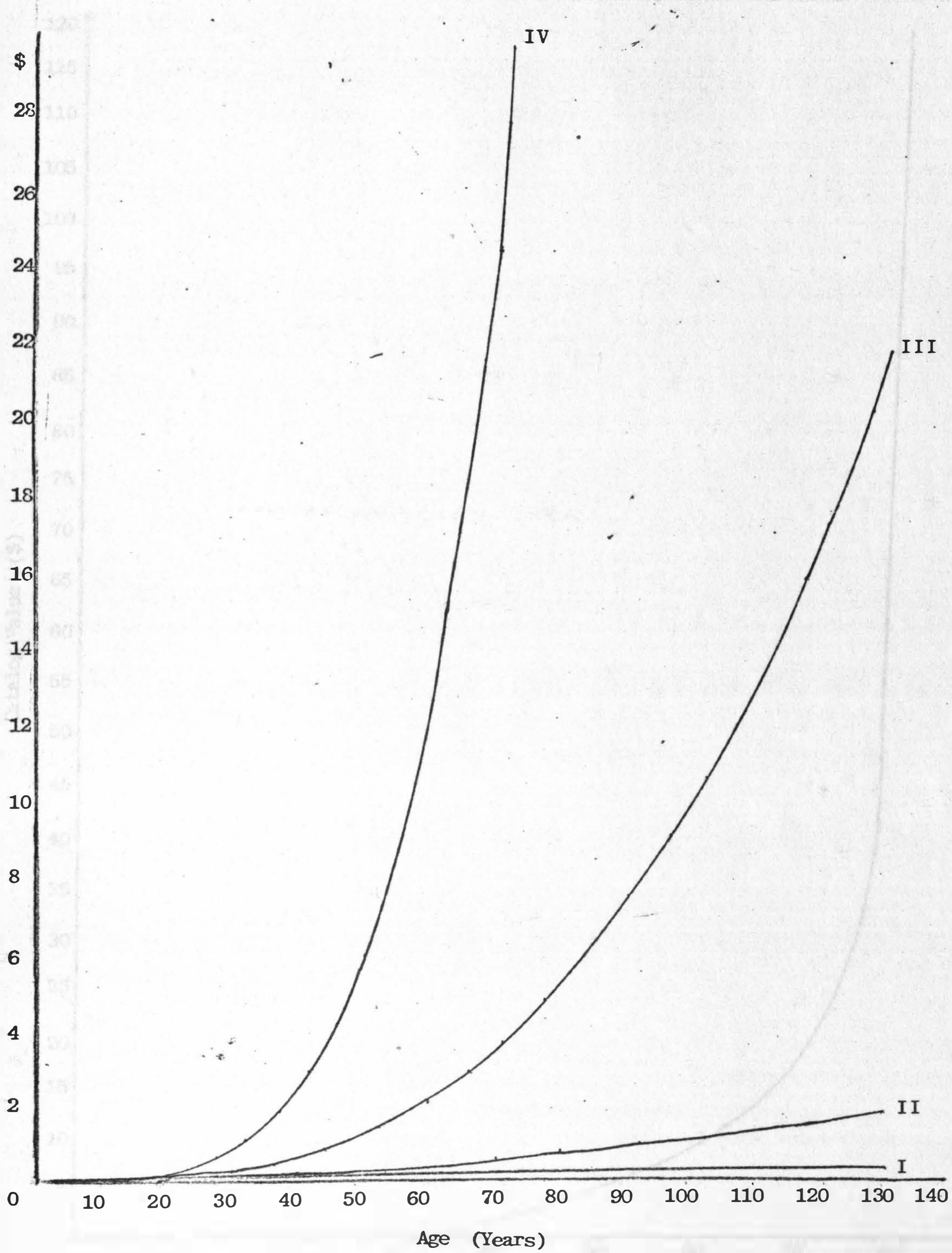

IV
III
II
I
$
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
Age (Years)

Figure 1

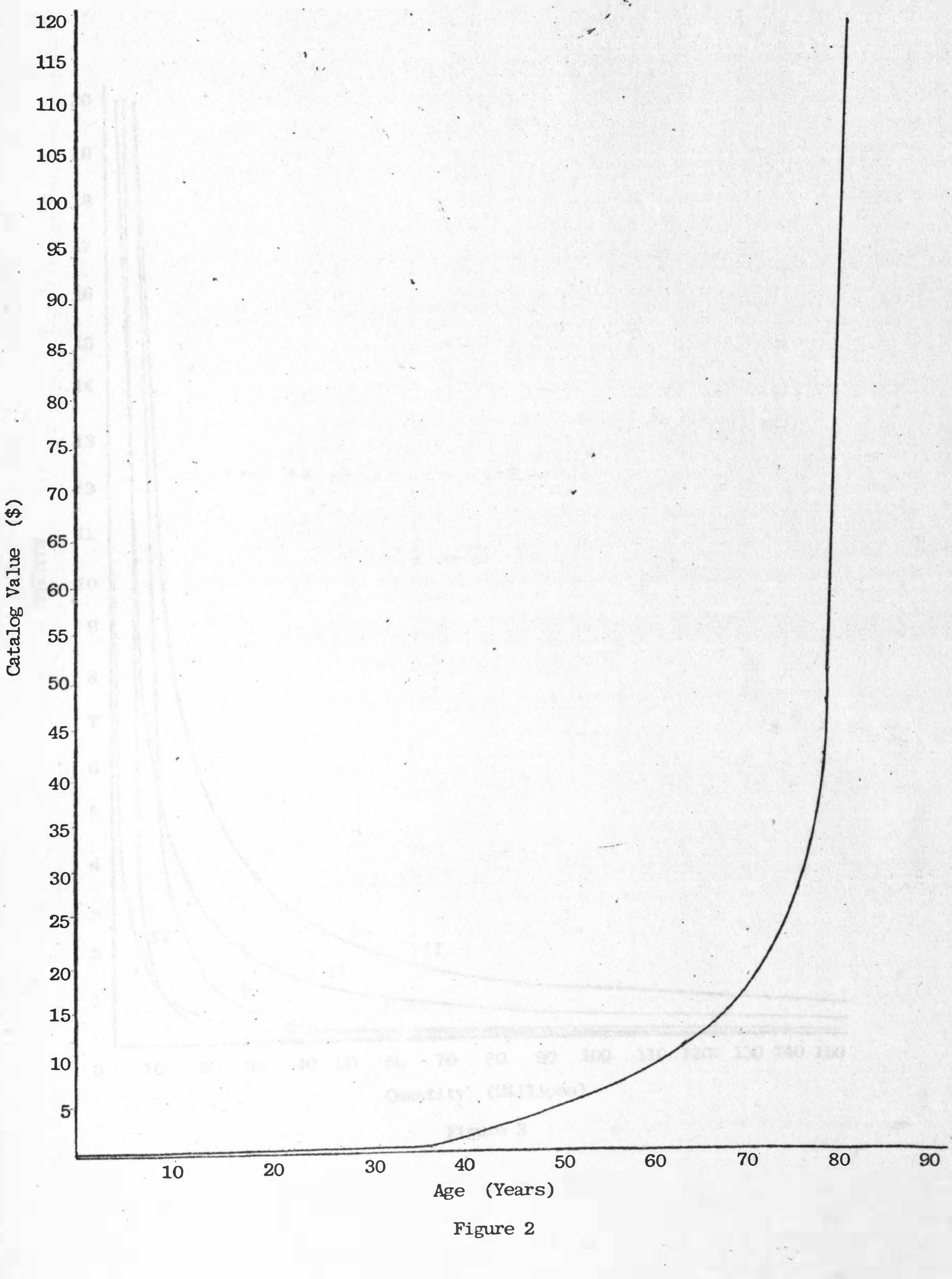
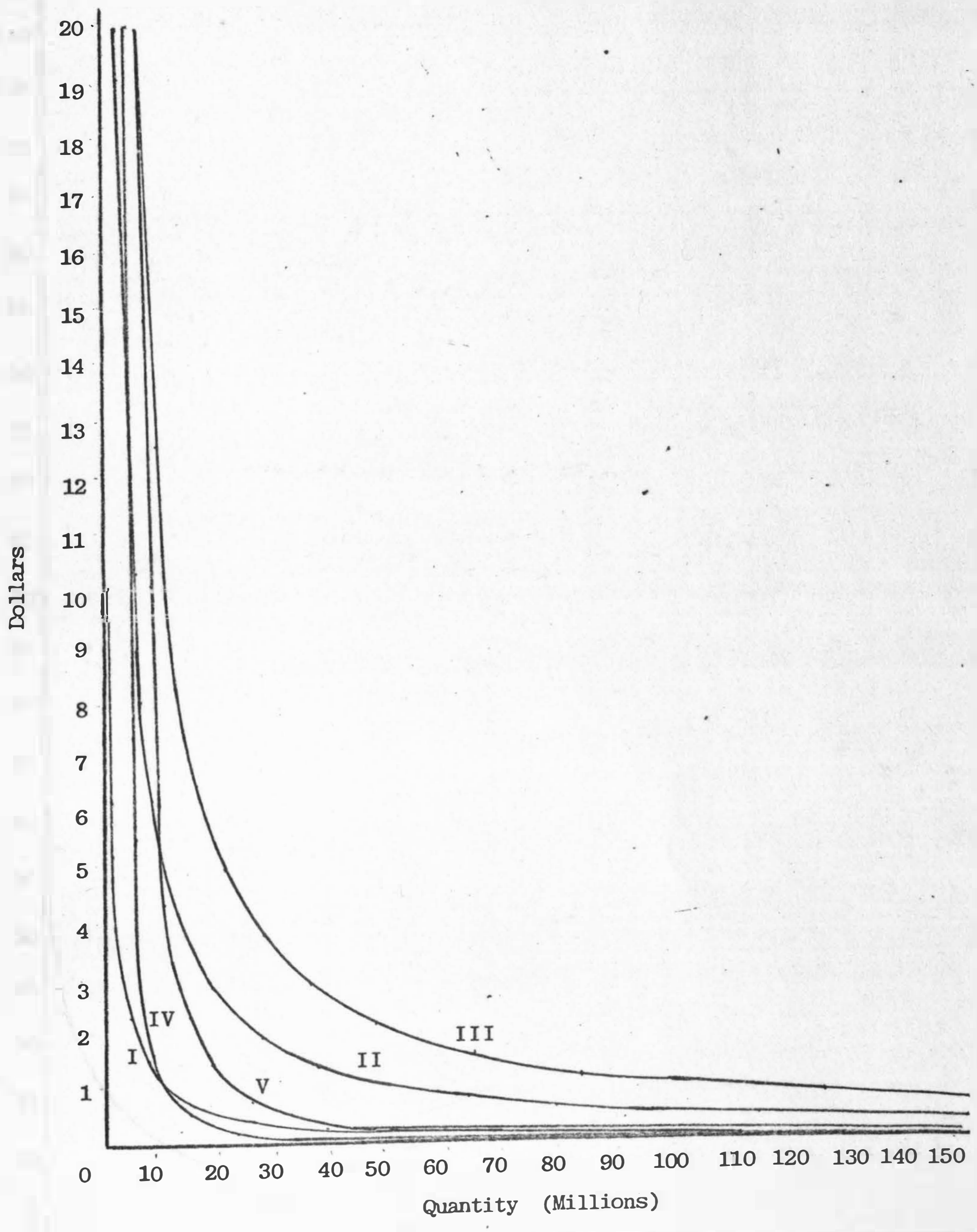

Catalog Value ($)
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
10
20
30
40
50
60
70
80
90
Age (Years)

Figure 2



20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Dollars
I
IV
V
II
III
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Quantity (Millions)

Figure 3

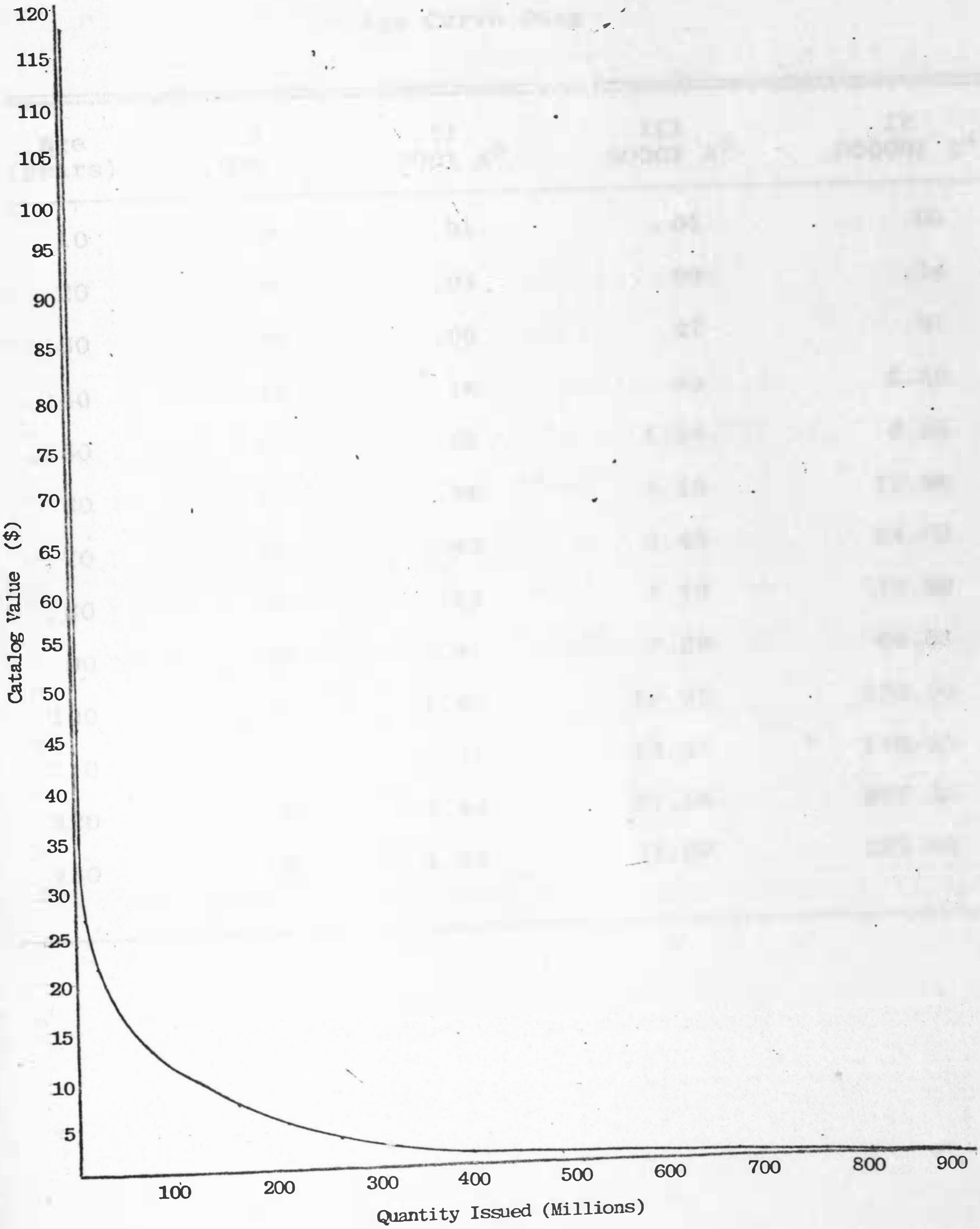

120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
Catalog Value ($)
100
200
300
400
500
600
700
800
900
Quantity Issued (Millions)

Figure 4

Table 2

Age Curve Data

Age (years)	I .001 A	II .0001 A^2	III .00001 A^3	IV .000001 A^4
10	.01	.01	.01	.01
20	.02	.04	.08	.16
30	.03	.09	.27	.81
40	.04	.16	.64	2.56
50	.05	.25	1.25	6.25
60	.06	.36	2.16	12.96
70	.07	.49	3.43	24.01
80	.08	.64	5.12	40.96
90	.09	.81	7.29	65.61
100	.10	1.00	10.00	100.00
110	.11	1.21	13.31	146.41
120	.12	1.44	17.28	207.36
130	.13	1.69	21.97	285.61

Table 3

Quantity Curve Data

Quantity (Millions)	I 10 1/Q	II 50 1/Q	III 100 1/Q	IV 100 $1/Q^2$	V 500 $1/Q^2$
.1	100	500	1000	10,000	50,000
1.0	10	50	100	100	500
5.0	2	10	20	4	20
10.0	1	5	10	1	5
20.0	.5	2.5	5	.25	1.25
30.0	.33	1.67	3.33	.11	.55
40.0	.25	1.25	2.50	.06	.31
100.0	.10	.50	1.0	.01	.05
150.0	.067	.33	.67	.004	.022

component attaining the entire explanation (similar to multiple vs. two simple regressions).

MODEL PREDICTION TESTING

If the model held through time it was capable of predicting. This was accomplished by inserting 1958 ages and catalog prices into the previously specified model and correlating the 1958 actual catalog value with the catalog value estimated by the specified model. The model was capable of predicting if the relationship was still significantly correlated using 1958 data.

Data Specification

Data were obtained from a 1958 Harris Catalog. This was the oldest available catalog, which would tend to yield more valid results than a catalog of less age. Only those stamps considered in developing the model were used to test the predicting ability. Necessarily, all stamps of less than seventeen years age were eliminated as they did not exist at that point in time. The remaining stamps simply had seventeen years subtracted from their 1975 age. The quantity issued and face value did not change. The catalog value was then taken from the Second 1958 Edition, the Harris Catalog. The change from a Scott catalog to a Harris catalog does not affect the catalog value. This fact may be seen by quoting from the Harris catalog.

HOW TO KNOW THE VALUE OF STAMPS

> The (Scott) Standard Postage Stamp Catalog, which is well called the "encyclopedia of philately", illustrates and prices every known postage stamp. It is revised and republished annually to include new stamps and to record any price changes in old ones.[1]

Obviously Harris uses Scott's prices or at least a very close approximation.

Test Results

The model was tested by correlating the predicted values from the model and the actual catalog values. This was also accomplished for actual catalog value against the quantity factor and the age factor to determine, at least somewhat, which factor may be attributed as the cause of a change in the entire relationship. The following correlation coefficients were determined:

Estimated vs. Actual Catalog Value	.32985	(down .63200)
Quantity vs. Actual Catalog Value	.84644	(down .11097)
Age vs. Actual Catalog Value	.21699	(down .32489)

The overall correlation coefficient dropped so drastically that it must be taken that the relationship specified in the model does not hold through time, thus it cannot be used to predict. The age dropped so low as to be unrelated. In general appearance, the age factor does not hold through time, yielding a significant loss in ability to predict.

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[1] The Harris Catalog, Second 1958 Edition, p. 61.

ERROR FACTORS

In the 1975 model two specific factors were not included which may have yielded errors. These factors are the number of colors in the stamp and whether the stamp was issued as part of a series or only as a single stamp. Visual inspection of a catalog indicates the catalog price is higher for more colors. An example is: Scott Catalogue Number 1360 (124,775,000 issued, 7 years old, face value 6¢, non series). This stamp has one color and a catalog value of 14¢. Scott Catalogue Number 1361 (128,295,000 issued, 7 years old, face value 6¢, non series) is a multicolored stamp with a catalog value of 18¢.[2] Thus two stamps with an identical face value, age, nonseries and essentially the same quantity issued is more expensive if more colors are used on the stamp. An example for series vs. nonseries is: Scott Catalogue Number 871 (51,636,270 issued, 35 years old, face value 3¢, 1 color) and Scott Catalogue Number 896 (50,618,150 issued, 25 years old, face value 3¢, 1 color). The stamps only difference is series or nonseries. The series stamp (Scott Catalogue Number 871) has a catalog value of 30¢ but the nonseries stamp (Scott Catalogue Number 896) has a catalog value of 20¢.[3] Neither of these factors are incorporated into the model and are probable causes of error.

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[2]Ibid., pp. 220-221.

[3]Ibid., pp. 134, 138.

The lack of predicting ability may be due to price level changes which were not adjusted for in the correlation of the 1975 model to the 1958 data. This is indicated partially by the significant drop (.32489) in correlation for age and partially by intuitive judgement. Lack of computer availability did not allow testing of the model incorporating these adjustments. Errors in predicting ability may also be attributed to the serial vs. nonserial and number of colors deficiencies.

Chapter 4

CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

This chapter comments on the conclusions that may be drawn from this thesis followed by recommendations which may allow a more accurate model to be derived in the future.

CONCLUSIONS

The primary purpose of this thesis was to develop a model to explain the 1975 market price of single, uncancelled, United States postage stamps of regular or commemorative issue to philatelists. An adjusted correlation coefficient of .9618 indicates that this objective was accomplished, yielding the following model:

$$C = F + .0000002090\ A^{4.3} + 2.1194763347\ \frac{1}{Q}$$

A secondary purpose of this thesis was to predict future prices of single, uncancelled, United States postage stamps of regular and commemorative issue to philatelists. A correlation coefficient of .32985 indicates that this purpose was not accomplished. The model did not hold through time.

RECOMMENDATIONS FOR FURTHER STUDY

The first recommendation, in an attempt to gain more accuracy, is to segment the model into series and nonseries functions. This will yield two models with separate coefficients. The two specialized models would probably yield better predictions than the general model.

A factor to include the number of colors on a stamp may also yield more accurate results. A form such as iN where i = a constant coefficient and N = the number of colors on a stamp, would probably account for variations in price attributable to the colorfulness of the stamp.

An increase in predicting ability could possibly be achieved, with logical results, by inflating the 1958 prices to the 1975 price level.