RELIABILITY OF LAND MARKET SAMPLING TECHNIQUES, PAYNE AND GRADY COUNTIES OKLAHOMA, 1941-1949

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Chapter I

INTRODUCTION

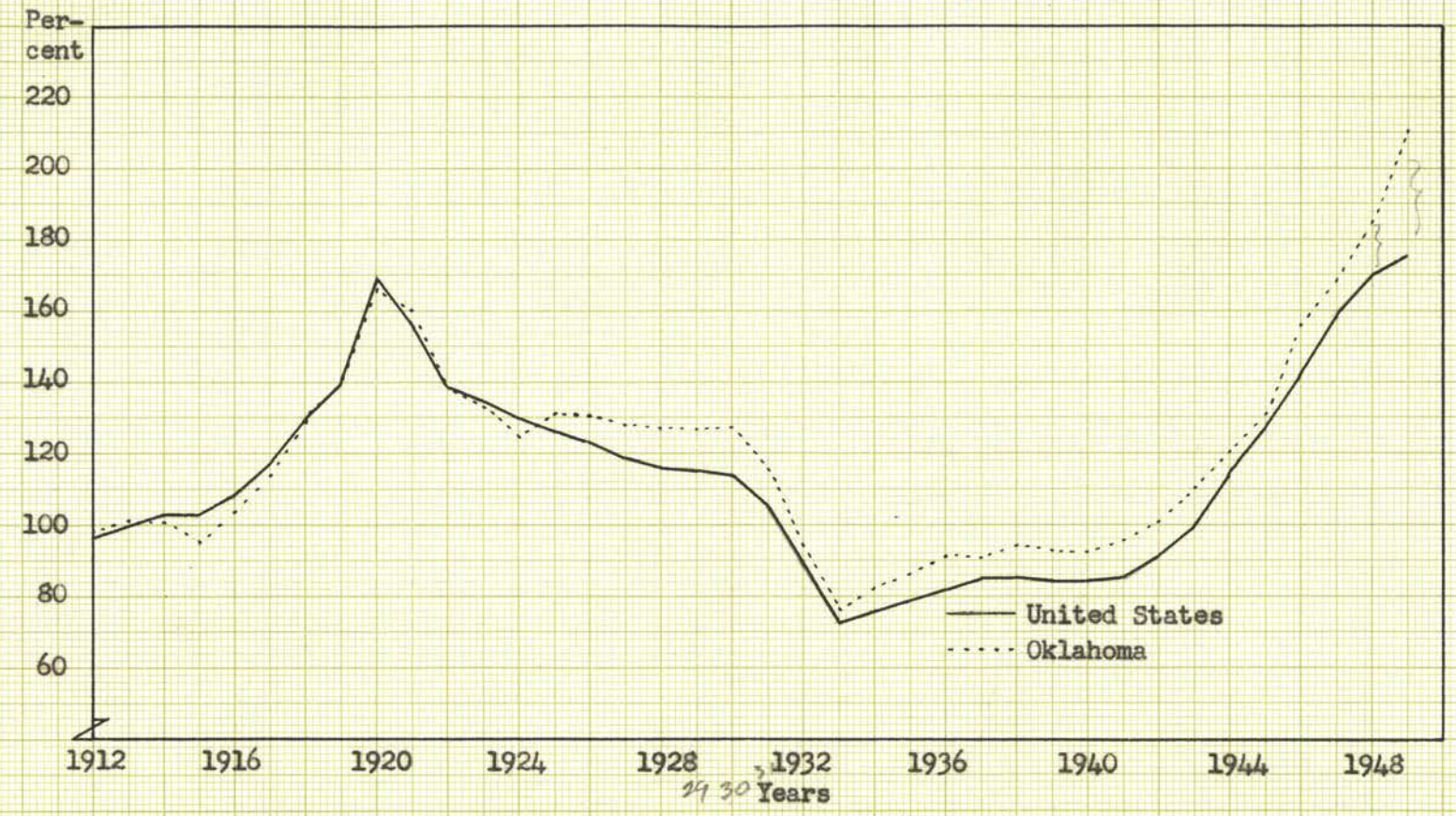
The trend in sale prices of farm real estate is of interest to owners, buyers, bankers, insurance companies, brokers, and others. Owners are interested because their equities in their farms are measured by what the farms would bring if offered for sale. Buyers are interested because an analysis of past trends may give some indications of probable future trends. Bankers and insurance companies are interested because they are seeking investments for surplus funds. Brokers are interested because they are economically dependent on real estate transactions. Other people are interested in the trend of farm real estate because they depend on farmers for the sale of their goods and services.

Yearly Land Market Changes

The measurement of land values is a difficult task because there are no standard grades of land as there are for commodities. The productivity of land is different from farm to farm. It is impossible to separate the value of the growing crop from the value of land. The value of buildings and other permanent improvements are not easy to separate from the value of land. Each of these factors varies widely from county to county, from township to township, and even from farm to farm, and makes it very difficult to say, "this is the price for that land".

The yearly indices of farm real estate values for the United States and for Oklahoma, 1912-1949, are shown in Figure 1. The indices followed each other fairly well from 1912 to 1924, but from that time up to 1949 the index for the United States was below the index for Oklahoma. Farm real estate

Figure 1. Yearly Index of Farm Real Estate Values, United States and Oklahoma, 1912-1949, (1912-1914=100)



Source: A.R. Johnson, The Farm Real Estate Situation 1946-1947, (United States Department of Agriculture, Circular 780, March, 1948).
Current Developments in the Farm Real Estate Market, (Bureau of Agricultural Economics, United States Department of Agriculture, December, 1950).

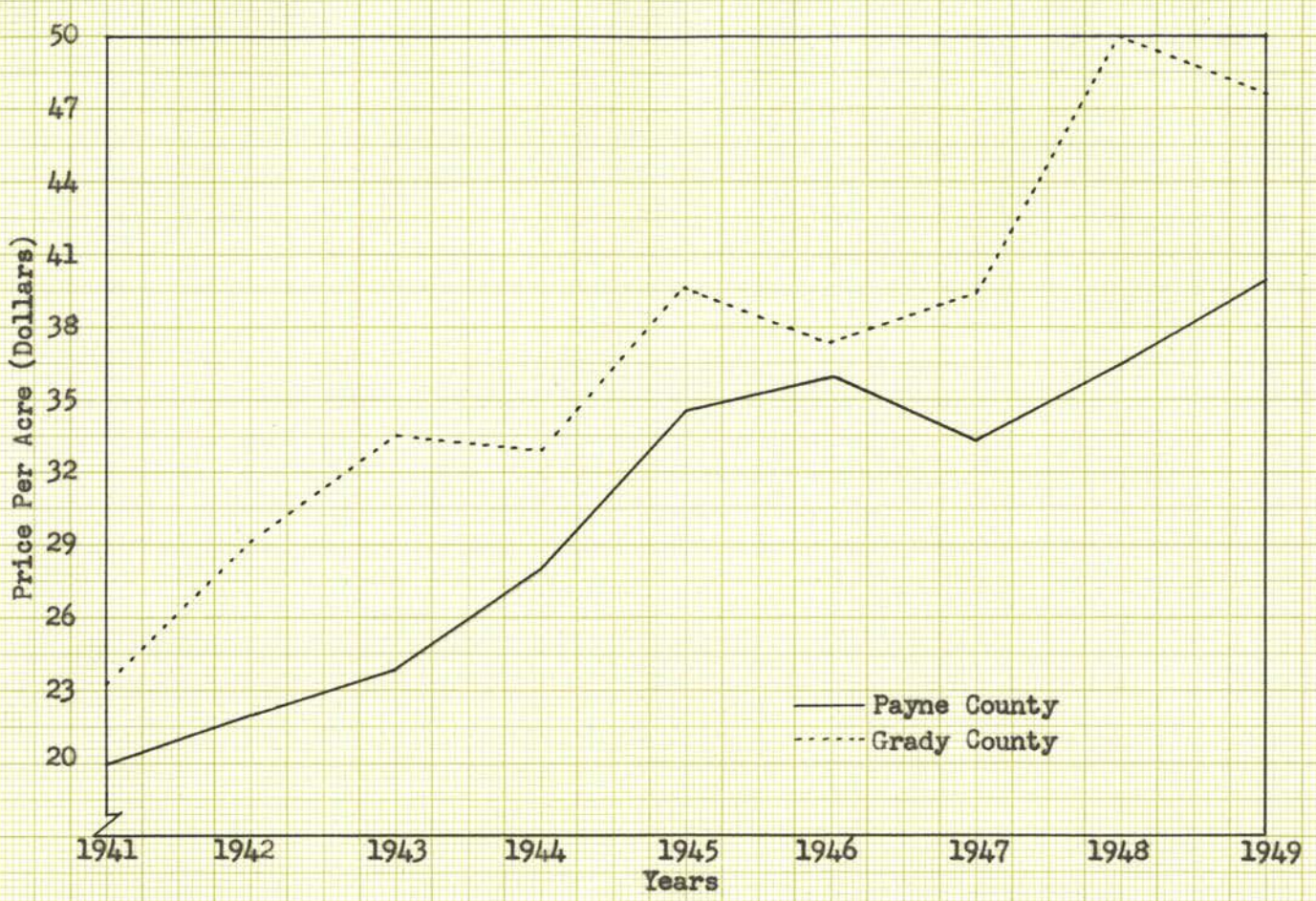
values for Oklahoma did not drop to as low a level in the 'thirties as the values for the nation. In the years after World War II, especially in 1948 and 1949 the values of farm real estate for Oklahoma increased considerably more than the values for the United States.

Average values per acre for the two sample counties, Payne and Grady, used in this study are shown in Figure 2 for the years 1941 to 1949. It will be noted that the average price per acre for Grady county is a little higher than for Payne county. The trend for the two counties is the same although the price changes from year to year follow each other to only a limited extent. For instance, the price per acre in Payne county continued upward in 1946, whereas a small drop in price per acre occurred in Grady county. In 1947, the opposite is the case; the price per acre for Payne county goes down slightly whereas the price per acre for Grady county shows a small increase. A price drop in 1949 for Grady county was not accompanied by a similar drop in Payne county.

An impression of how the number of transfers fluctuates from year to year is evidenced in Figure 3. Apparently there was a slight upward trend from 1941 to 1946, followed by a very rapid decrease from 1946 to 1949, but large fluctuations occurred.

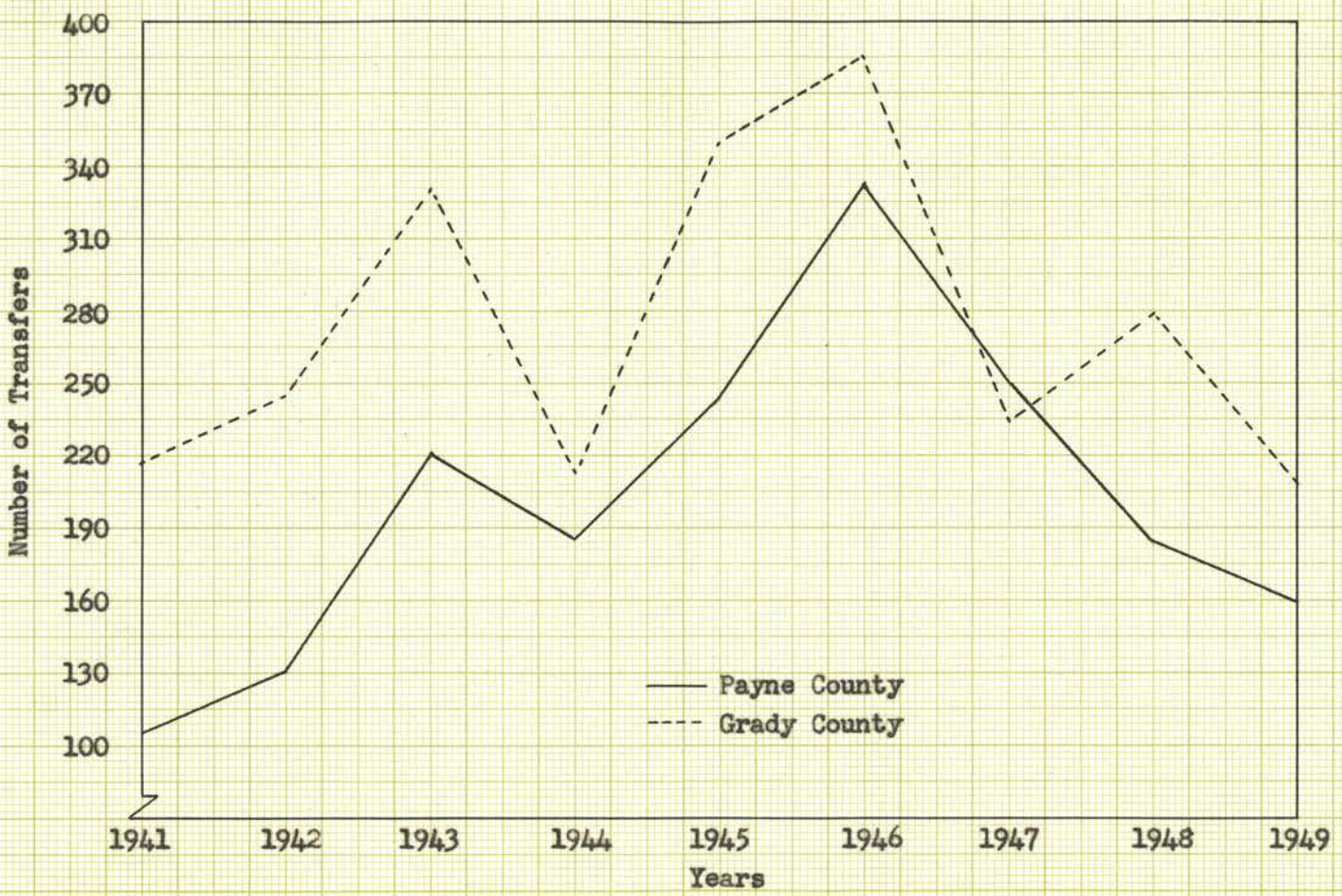
When interpreting results of studies made on the farm real estate market, it should be kept in mind that the rough trends, as indicated in the previous figures of indices, values per acre, and number of transfers, cover great variations. Some tracts of land are sold for only a few dollars per acre, while others may bring several hundred dollars per acre. It should also be remembered that only a very small percentage of the total number of farms changes hands in any one year, so the sample upon which broad statements about the farm real estate market is based is after all rather small.

Figure 2. Yearly Values Per Acre for Payne and Grady Counties, Oklahoma, 1941-1949



Source: See Table 8.

Figure 3. Number of Transfers for Payne and Grady Counties, Oklahoma, 1941-1949



Source:See Table 8.

Purpose

Before stating the purpose of this study a short background about the use of sample counties in Oklahoma will be given.

The use of sample counties as the basis for studying the farm real estate market in Oklahoma was introduced about ten years ago when the Oklahoma Agricultural Experiment Station, in cooperation with the Bureau of Agricultural Economics, United States Department of Agriculture, began collecting data from the deed records in eight counties, each representing a different type of farming area.[1]

Assuming that land sales in a single county is representative of all land sales in a type of farming area,[2] the question arises whether it is possible to obtain reliable information about values and number of sales by studying a random sample of transfers instead of collecting all the data for a certain time period for the county. If a five-day, a ten-day, or a fifteen-day sample, picked at random and tested with regular statistical measures, indicates that there is no significant deviation from information obtained by studying all data, a considerable amount of time and money could be saved on collecting and analyzing data for a specific area.

The purpose of this study is to present an analysis of the reliability of random samples as indicators of farm real estate activity in Oklahoma.

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[1] R. T. Klemme and E. C. Ford, Oklahoma Farm Real Estate Activity, 1941-1944, Oklahoma Agricultural Experiment Station, Bulletin B-291, February, 1946.

[2] R. T. Klemme, L. A. Parcher, and E. C. Ford, Farm Real Estate Activity in Oklahoma, 1945, Oklahoma Agricultural Experiment Station, Bulletin B-301, September, 1946, p. 5.

Procedure

Data were taken from the deed records in the offices of the county clerks of these two counties on all usable land sales for 1941 to 1949.[3] If the total consideration was not recorded it was estimated from the amount of revenue stamps attached to the deed because a revenue stamp value of $0.55 has to be attached for each beginning $500. After that the total number of acres transferred, total "true" consideration (stated on the deeds, estimated from the amount of revenue stamps or a combination of the two) and number of sales were enumerated on daily, monthly, semi-annual, and yearly bases. Values per acre were computed for the monthly, semi-annual, and yearly data.

Before the sampling study was undertaken some distribution and price characteristics of the land market data were investigated. The first step was an analysis of the variability of the data in the month. The number of acres transferred, total consideration, and number of transfers were summarized by day of the transaction in each month for the nine years, 1941-1949, for Payne county.

An analysis of seasonal movements in values per acre and number of transfers was made in order to eliminate the effect of seasonality, if any, in the sampling study. This investigation of seasonal movements was based on monthly values per acre and number of transfers.

In addition, a test of the reliability of using the midpoint value, $250 of the $500 range when estimating considerations for the last $0.55 of revenue stamps attached to the deed, was made. In order to investigate the reliability

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[3] Excluded in this study are sales of ten acre tracts or less, sheriff's sales, foreclosures, settlements of estates, and some transfers between relatives. In addition to that it was necessary to exclude some sales with insufficient information about number of acres transferred, total consideration, or amount of revenue stamps.

all transfers with both a cash consideration and amount of revenue stamps stated on the deed were selected and arranged according to amount of stamps. The considerations estimated were tested against the "true" considerations.

Before picking the samples, Sundays and national holidays were eliminated leaving only the business days for the sample study. This was necessary in order to obtain a satisfactory small sample.[4]

The business days were given consecutive numbers from one to twenty-four or twenty-five, for each month, depending on the number of holidays excluded. Then three different basic time periods of the months were selected: five-day, ten-day, and fifteen-day time periods. Five five-day time periods and three ten-day time periods were obtained by dividing the numbered business days in the month consecutively into five-day and ten-day time periods.[5] One fifteen-day time period was obtained by selecting the first fifteen business days of the month. Samples were obtained by adding the time periods semi-annually.

The samples were tested against the semi-annual data by statistical methods using chi-square and comparisons of regression coefficients to see if there were any significant deviations. A comparison of individual samples with the semi-annual data, representing the same six-month period, was also made in order to determine the range and extent of variations from actual values of individual samples of different time periods.

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[4] A discussion of this is found in Chapter V.

[5] The fifth five-day time period and the third ten-day time period in each month was picked from the last business day in the month and then five and ten days backwards respectively.

Chapter II

REVIEW OF LITERATURE

Since the purpose of this thesis is to test the reliability of sampling in analyzing the farm land market, the primary objective in reviewing completed research work is to study previous efforts of sampling and analyzing the land market.

Cable made a complete review of literature to obtain information about sampling methods used in the past and up to 1948.[1] The review of literature in this thesis is a brief summary of Cable's review supplemented with a review of sampling methods used in related reports and bulletins published since then.

Collecting and summarizing data on the farm land market has been going on for the last fifty years. Without doubt such information has been and still is very useful to anyone interested in the land market. The number of studies made available has increased steadily during the years, which indicates the importance of the information given.

Among the earliest studies, data were obtained from crop correspondents.[2,3] This has since represented the major source of information for almost all of the indices of farm land values and other studies published by the United States Department of Agriculture.

From 1906 to 1912 no important studies or investigations were undertaken. Beginning in 1912, the United States Department of Agriculture received annual

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[1] C. C. Cable, Land Market Sample Study in Choctaw, Payne, Jackson and Grady Counties, Oklahoma, 1941-1949, Department of Agricultural Economics, Oklahoma Agricultural and Mechanical College, 1949.

[2] George K. Holmes, Change in Farm Values, 1900-1905, United States Department of Agriculture, Bureau of Statistics, Bulletin 43, 1906.

[3] George K. Holmes, Local Conditions as Affecting Farm Values, 1900-1905, United States Department of Agriculture, Bureau of Statistics, Bulletin 44, 1906.

estimates on the value per acre of farm real estate,[4] obtained by the crop and livestock reporting service. Annual estimates on the number of sales were first secured in 1926 from crop reporters.[5] Since 1927, annual reports have been published from these estimates.[6]

The land boom period which followed World War I increased the number of studies in valuation of farm real estate, perhaps because the boom coincided with the establishment of the federal Division of Land Economics. "Immediately studies were undertaken in Iowa and Kentucky, which were centers of this unusual land selling activity."[7] It is important to note the detailed ways in which data were collected in the Iowa[8] and Kentucky[9] studies. In both cases schedule data were obtained from people participating in the sales. Besides this some information was received from farm management surveys collected in the areas studied, and other data were obtained by interviews of people not directly connected with the farm sales but in touch with the developments on the real estate market.

In 1922, Johnson reported results based upon actual farm sales.[10] This was a marked departure from previous efforts and was based largely upon crop

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[4] E. H. Wiecking, The Farm Real Estate Situation, 1926-1927, United States Department of Agriculture, Circular 15, October, 1927.

[5] Dudley Young, "Farm Land Values in the Southeast", Journal of Land and Public Utility Economics, XXII, August, 1946, pp. 213-222.

[6] E. H. Wiecking, Op. cit.

[7] Leonard A. Salter, Jr., A Critical Review of Research in Land Economics, 1948, p. 220.

[8] L. C. Gray and O. G. Lloyd, Farm Land Values in Iowa, Iowa Agricultural Experiment Station, Bulletin 874, 1920.

[9] C. W. Foster, Land Prices and Land Speculation in the Bluegrass Region of Kentucky, Kentucky Agricultural Experiment Station, Bulletin 240, 1922.

[10] O. R. Johnson, "The Agricultural and Market Value of Missouri Farm Land", New Knowledge, Report of the Director, Missouri Agricultural Experiment Station, Bulletin 197, December, 1922, p. 80.

correspondent estimates. This study has since received increased attention and has represented a foundation model for future studies.

A similar study was made by Jenson and Russel in 1928 in South Carolina.[11] In the 'thirties further studies were made in Kansas,[12] Missouri,[13] Nebraska,[14] Minnesota,[15] Vermont,[16] Georgia,[17] and Iowa.[18] For all these studies the basic information was obtained from deed records. For Kansas, Missouri, and Iowa this was the only source mentioned. The studies for South Carolina, Nebraska, Minnesota, Vermont, and Georgia were to a certain extent based on information from newspapers, field records, and questionnaire forms.

Since 1941 the United States Department of Agriculture, in collaboration with state agricultural experiment stations, has used information collected from deeds on file in public records as sources to learn the actual sale prices

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[11] W. C. Jenson and B. A. Russel, Studies of Farm Land Prices and Ownership, South Carolina Agricultural Experiment Station, Bulletin 247, 1928.

[12] Harold Howe, Farm Land Values in Kansas, Kansas Agricultural Experiment Station, Circular 156, 1930.

[13] C. H. Hammar, The Missouri Farm Real Estate Situation for 1927-1930, Missouri Agricultural Experiment Station, Research Bulletin 154, 1931.
C. H. Hammar and R. P. Callaway, The Missouri Farm Real Estate Situation for 1930-1931, Missouri Agricultural Experiment Station, Research Bulletin 172, August, 1932.

[14] E. H. Hinam, A History of Farm Land Prices in Eleven Nebraska Counties, Nebraska Agricultural Experiment Station, Research Bulletin 72, 1934.

[15] E. C. Johnson, Farm Real Estate Values in Minnesota, Minnesota Agricultural Experiment Station, Bulletin 307, July, 1934.
A. A. Dowell, The Trend in Sale Prices of Farm Real Estate in Minnesota, Minnesota Agricultural Experiment Station, Bulletin 338, September, 1938.

[16] T. M. Adams, Prices of Vermont Farm Real Estate, Vermont Agricultural Experiment Station, Bulletin 391, 1935.

[17] "Farm Taxation, Farm Mortgages, and Land Transfers", Fifty-first Annual Report, Georgia Agricultural Experiment Station, 1938-1939.

[18] William G. Murray, Corporate Land Foreclosures, Mortgage Debt and Land Values in Iowa, 1939, Iowa Agricultural Experiment Station, Research Bulletin 266, December, 1939.

and financing arrangements for all farms sold. One hundred and twenty to one hundred and thirty sample counties, distributed in 41 different states, were selected. Each of the counties represented a major type of farming area.

According to one report,[19] these data should serve as a check on the estimates of the crop reporters which still represent the primary source for computing indices of value and volume of sales as published by the United States Department of Agriculture.

After the United States Department of Agriculture had started to use sample counties as an indicator of trends in land values, several of the state experiment stations, besides those previously discussed, began using the farm sales from selected counties as a basis of studying farm real estate developments within their boundaries. Indications of this development are revealed by the amount of reports published in the 'forties, based primarily upon actual farm sales within selected counties. Compared to the 'thirties, the 'forties witnessed an increased number of studies published. Reports have been made for Illinois,[20] South Dakota,[21] Ohio,[22] North Dakota,[23] Mississippi,[24] Tennessee,[25] Idaho,[26] Nevada,[27] Oklahoma,[28] Virginia,[29] Montana,[30] and Texas.[31]

All these studies were made for one or more representative counties and for one or more years. The highest number of counties used in this kind of study was 24, for which it was necessary to investigate in Texas to get a "more thorough study of the basic factors operating in the land market".[32] Most of the data were analyzed on a quarterly or yearly basis. Semi-annual summaries were made in Illinois and Ohio. Deed records were the main sources for the data, but in most cases supplementary information was obtained by questionnaire forms or by field records.

(See next page for footnotes 19 through 32)

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19 M. M. Regan, A. R. Johnson, and Fred Clarenbach, The Farm Real Estate Situation, 1944-1945, United States Department of Agriculture, Circular 743, October, 1943, p. 2.

20 C. L. Stewart, "Illinois Land Values in 1940 and Since", Illinois Farm Economics, No. 90, University of Illinois, December, 1942, pp. 397-399

21 N. I. Anderson, What Price for this Land?, South Dakota Agricultural Experiment Station, Bulletin 368, 1943.

22 H. R. Moore, "Some Trends in the Farm Real Estate Situation", Bimonthly Bulletin, XXIX, No. 226, Ohio Agricultural Experiment Station, January-February, 1944, pp. 74-76.
H. R. Moore, "Recent Trends in the Farm Real Estate Situation", Bimonthly Bulletin, XXX, No. 234, Ohio Agricultural Experiment Station, May-June, 1945, pp. 89-93.
H. R. Moore, "Recent Trends in the Farm Real Estate Situation", Bimonthly Bulletin, XXXI, No. 238, Ohio Agricultural Experiment Station, January-February, 1946, pp. 24-26.

23 Robert L. Berger, "Land Market Activity in North Dakota 4th Quarter", Bimonthly Bulletin, Volume 6, No. 4, North Dakota Agricultural Experiment Station, March, 1944, p. 19.

24 D. E. Young, M. A. Brooker, and F. L. Welch, Rural Land Market Activity in Mississippi, Mississippi Agricultural Experiment Station, Bulletin 406, 1944.

25 B. H. Luebke, A. H. Chambers, and M. B. Johnson, Farm Real Estate Situation in Five Areas of Tennessee, 1941-1944, Tennessee Agricultural Experiment Station, Rural Research Series 185, July 30, 1945.

26 A. N. Nybroten, The Rural Land Market in the Northern Idaho Grain-Pea Area, Idaho Agricultural Experiment Station, Bulletin 261, 1945.

27 H. V. Stonecipher, H. Mason, and D. Dunn, Wartime Land Market Activity in Northern Nevada, Nevada Agricultural Experiment Station, Bulletin 174, June, 1945.

28 Randall T. Klemme and E. C. Ford, Oklahoma Farm Real Estate Activity, 1941-1944, Oklahoma Agricultural Experiment Station, Bulletin B-291, 1946.
Randall T. Klemme, L. A. Parcher, and E. C. Ford, Farm Real Estate Activity in Oklahoma, 1945, Oklahoma Agricultural Experiment Station, Bulletin B-301, September, 1946.
Current information on Oklahoma Real Estate developments are published in bi-monthly reports of the Department of Agricultural Economics, Oklahoma Agricultural and Mechancial College. For instance: L. A. Parcher, "Farm Real Estate", Current Farm Economics, Vol. 22, No. 5, Oklahoma Agricultural Experiment Station, October, 1949; R. L. Tontz, "Farm Real Estate", Current Farm Economics, Vol. 23, No. 5, Oklahoma Agricultural Experiment Station, October, 1950, pp. 136-137.

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29 H. M. Love and W. H. Scofield, Virginia Farm Real Estate Trends in Seven Counties During 1941-1945, Virginia Agricultural Experiment Station, Bulletin 400, July, 1946.

30 L. S. Thompson, Changing Aspects of the Farm Real Estate Situation in Montana, 1940-1946, Montana Agricultural Experiment Station, Bulletin 440, January, 1947.

31 J. R. Motheral, J. H. Southern, and S. L. Crockett, The Price of Texas Farm and Ranch Lands, 1920-1945, Texas Agricultural Experiment Station, Bulletin 688, April, 1947.

32 Ibid., p. 7.

In a number of studies in Oklahoma the amount of revenue stamps attached to the deed has been used for estimating the total consideration, if not given on the deed. This was based on the assumption that the discrepancies from the actual consideration would tend to balance. Nybroten[33] tested the validity of using internal revenue stamps as a basis for estimating cash considerations. The study was based on 5,011 records (both rural and urban sales) in which both the amount of revenue stamps and cash considerations were given. He found that the average amount of cash for the last $0.55 internal revenue stamps tended to be higher than the assumed $250. Besides this, the difference increased with the amount of revenue stamps. The reason for the skewness was "that not only does the cash consideration tend to be rounded to multiples of $500 but also to multiples of $1000".[34] Sixty-two percent of the cash considerations in the range from $2,500 to $10,000 were multiples of $1,000.

In another Idaho study,[35] made in 1941, the validity of cash considerations obtained from questionnaire forms and cash considerations estimated from amount of internal revenue stamps were tested against the considerations given in the deed records for the same sales. The cash considerations stated on questionnaire forms were 14 percent higher than those estimated from revenue stamps. But considerations estimated from amount of internal revenue stamps were 2 percent lower than the considerations given in the deed, making the result from questionnaire forms 12 percent too high.

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33 N. Nybroten, "Estimating Cash Considerations in Real Estate Transfers from Internal Revenue Stamps", Journal of Farm Economics, Volume 30, 1948, pp. 558-561.

34 Ibid., p. 560

35 N. Nybroten, Land Values, Mortgages, Rents and Wheat Yields of Northern Idaho Wheat Land, University of Idaho, Agricultural Experiment Station, Bulletin 249, 1941.

A study of "some influences and trends in land values, Twin Falls County, Idaho", was published in 1947.[36] Nybroten points out in this study that "strong trends either up or down in the land market make the task of assessment very difficult, because values of property of different types and in different locations do not change uniformly".[37] Further findings were that the quality of the land on the market was likely to be inversely related to the amount of land being transferred and the level of prices, which means that it is not enough to figure the trend in land prices by computing the price per acre over a certain time.

Twin Falls county was selected as a part of a larger study to represent trends in the farming area in south central Idaho. Other studies were published in 1946,[38] 1947,[39] 1948.[40] Index numbers were computed as indicators of the trend in land prices for three counties in the 1947 report.

Iowa State College uses a slightly different way in obtaining and analyzing data on the land market than other states. Information about number of sales and sales prices are collected from a number of brokers throughout Iowa. The

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36 N. Nybroten, Some Influences and Trends in Land Values in Twin Falls County, Idaho, Idaho Agricultural Experiment Station, Mimeo. Leaflet No. 109, July, 1947.

37 Ibid., p. 2.

38 N. Nybroten, Trend of Rural Land Prices in Bonner County, Idaho, Idaho Agricultural Experiment Station, Mimeo. Leaflet No. 102, 1946.

39 N. Nybroten, "Studies of Land Values Expanded", Agricultural Research, in Idaho, Idaho Agricultural Experiment Station, Bulletin No. 269, July, 1947, pp. 25-26.

40 N. Nybroten, Rural Land Prices in Idaho County, Idaho, From 1936-1946, Idaho Agricultural Experiment Station, Mimeo. Leaflet No. 108, 1948.

analysis is based on different grades of land such as excellent, good and fair-poor, or excellent and fair-poor as was the case in a study in 1949.[41]

Cable studied the reliability of sample periods of the month as indicators of farm real estate developments in selected counties of Oklahoma. He tested samples of the first five days, summarized quarterly and yearly against the "true" quarterly and yearly values. In a following analysis the sample periods used included the first ten days, the first fifteen days, the first twenty days, and the first twenty-five days of the month. These samples were summarized quarterly, semi-annually, and yearly and tested against the true values. It was found that "only the first twenty-five-day sample periods, the longest sample period used, had more than 70 percent of its estimates with values per acre and number of transfers in the 90 to 105 percent range of the true yearly market figures".[42] This means that it would hardly be warranted to study the data collected for less than the whole month, because the costs of collecting data from the first twenty-five days would only be slightly less.

In 1949, the United States Department of Agriculture published a report on farm land ownership in the United States.[43] "The source of data on ownership of farm land by individuals was a mail questionnaire."[44] Names of individuals were secured from the list of owners in the 1945 Census of Agriculture.

As evidenced by the review of these studies, the United States Department of Agriculture has published the major portion of reports on developments in the farm real estate market up to 1941. Beginning in 1912 annual estimates were obtained about the value per acre of farm land. From 1926 annual estimates

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[41] W. G. Murray, "Land Price Rise Slows Down", Iowa Farm Science, Volume 3, January, 1949, pp. 9-10.

[42] C. C. Cable, Op. cit., pp. 69-70.

[43] Buis T. Inman and William H. Fippin, Farm Land Ownership in the United States, United States Department of Agriculture, Bureau of Agricultural Economics, Miscellaneous Publication No. 699, December, 1949.

[44] Ibid., p. 70.

on number of transfers were secured. Since 1927, indices have been reported annually based on these estimates.

The major sources of data for the reports published by the United States Department of Agriculture have been and still are estimates from crop reporters. For instance, almost all the indices of farm land values are based on these estimates. "This source is frequently considerably cheaper and quicker and otherwise more satisfactory for current use than reliance upon county or other records."[45]

In 1941, the Bureau of Agricultural Economics, in collaboration with state agricultural experiment stations, began collecting data on land values and number of transfers from deed records. One hundred and twenty to one hundred and thirty sample counties, each representing a major agricultural farming area, were selected in 41 states. The Bureau of Agricultural Economics used these data as a check on estimates from crop reporters.

Prior to 1941 not many of the state agricultural experiment stations published farm real estate data based on sample counties. Exceptions were Missouri, Nebraska, Minnesota, South Carolina, Kansas, and Vermont. But after the Bureau of Agricultural Economics began collecting data from sample counties, many states followed the same procedure. The result has been the publication of a bulk of reports since then.

In some of the states deed records have been the only source of information about volume of sales and sale price, but in most cases supplementary information was obtained by interviews, questionnaires, or schedules.

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[45] E. H. Wiecking, Research in Farm Real Estate Values, Scope and Methods, Social Science Research Council, Bulletin No. 19, June, 1933, p. 10.

Two studies have been made in Idaho, testing the reliability of estimating the cash consideration from amount of federal revenue stamps stated on the deed. A study was also made of the reliability of questionnaire forms in the farm real estate market.

Chapter III

SOURCE OF DATA

The information on individual transfers of farm real estate for the years, 1941-1949, used in this study was obtained from the deed records in the court houses of Payne and Grady counties. The selected counties represent two of the eight counties upon which the Oklahoma land market study was based.[1,2]

The location of Grady and Payne counties is respectively in the west south-central portion and the east north-central portion of Oklahoma. The soils in Grady county "range from the productive type in the bottom lands of the Washita River to the less productive upland soils of the Cross Timbers. During the past four years, there has been some oil activity in Grady county which has had an influence on the land market".[3] Payne county "contains some prairie land and some blackjack oak land of the Cross Timbers".[4] Oil developments have taken place through the years of study. For collecting data from deed records a special summary card was used (Figure 4). Information obtained included: Name of seller, name of buyer, legal description of the land, date of sale, date recorded, amount of federal revenue stamps (hereafter termed revenue stamps), total consideration, kind of deed, percent of mineral rights owned and reserved, mortgage balance and volume and page of the instrument in county record books.

Only sales of "genuine" agricultural units have been taken into consideration in this study. Transfers of ten acre tracts or less were excluded because in many cases suburban land or improved homesites which may or usually have a

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[1] Randall T. Klemme and E. C. Ford, Op. cit., p. 5

[2] Randall T. Klemme, L. A. Parcher, and E. C. Ford, Op. cit., p. 4.

[3] Randall T. Klemme and E. C. Ford, Op. cit., p. 18.

[4] Ibid., p. 21.

OKLAHOMA FARM LAND MARKET SURVEY

Volume_____ Page_____ Sale Number_____
Kind of Deed_____ Date of Sale_____ Date Recorded_____ County_____
Buyer_____ Address_____
Seller_____ Address_____

Description	Sec	Twp.	Rg.	Acres
Total Acres	XX	XX	XX	

Consideration Amt. of fed. Stamps$_____
Total $_____
Cash paid $_____
Mortgage Balance $_____ Int. Rate_____
Date final payment is due_____
Seller as mortgagee Other new Mrtg.
Mortgage assumed Combination

Percent of mineral rights owned by seller at time of sale
Mineral rights reserved by seller:
None_____
All_____ Number of Years_____
Fractional part____ Number of Years_____
of whole mineral
estate (show amount $\frac{1}{4}$ etc.)

Names of mortgagees or lien holders: Amount
_____; $_____
_____; $_____
_____; $_____
_____; $_____

Remarks:_____

Figure 4. Summary Card on Which Data Were Recorded for Each Individual Transfer of Farm Real Estate

higher price per acre than land used for agricultural purposes would tend to distort the estimated values. Other transfers eliminated from this study were sheriff's sales, foreclosures, settlements of estates and some transfers between relatives.

The elimination of some of the transfers, especially transfers between relatives, was based upon personal judgment. The basic criterion for making these decisions was, "that the parties involved in a transaction must include a willing buyer and a willing seller, both making their decisions voluntarily and free from any outside forces or influences".[5]

If the total consideration was not recorded, it was estimated from the amount of revenue stamps attached to the deed. This is possible because a revenue stamp value of $0.55 has to be attached for each beginning $500, except when the total consideration is less than $100. The estimation can be made without error except for the last $0.55 revenue stamp value. Here it was assumed that the midpoint of the $500 range would tend to balance the discrepancies. But as will be shown later, this has not quite been the case. The midpoint of the $500 range is too low because the total consideration tends to be rounded to multiples of $500 and $1000, but until better techniques are available, it is the best method to use.

Table 1 shows examples of amount of revenue stamps and the corresponding range of consideration and midpoint values.

If only $0.55 revenue stamps had been attached to the deed the midpoint value would be $300 because the first $100 is exempted. Were the amount of revenue stamps stated on the deed, for example, $2.75, the estimated total consideration would be $2250, $500 for each $0.55 stamp value, except the last one for which the estimation was $250.

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[5] C. C. Cable, Op. cit., p. 10.

Table 1. Amount of Federal Revenue Stamps and Some Hypothetical Estimation Values

Amount of Revenue Stamps (Dollars)	Range of Consideration (Dollars)	Midpoint Value of Range (Dollars)
0.55	100 - 500	300
1.10	501 - 1000	750
1.65	1001 - 1500	1250
2.20	1501 - 2000	1750
2.75	2001 - 2500	2250

More complicated estimations had to be made where a buyer assumed a mortgage on the farm as a part of the total consideration. In such cases, the mortgage balance was added to the consideration estimated from the amount of revenue stamps.

As mentioned previously, both the day of sale and day of recording were obtained. The day of recording has been used in separating the transfers in different time periods in preference to the day of sale. The reason for this is the greater ease in keeping the results up to date. If the date of sale were used as a basis of separation, the value per acre and the number of transfers would be changing constantly as late recordings became available.

Late recordings of a large number of sales would result in too low an average price in periods with an increasing price level and too high an average price per acre in periods with a decreasing price level. However, in most cases, the sales are recorded the same day or only a few days later than the day the transaction took place, making the difference in using sales day or recording day very small.

Chapter IV

LAND MARKET

Before discussing sampling methods a general description of distribution and price characteristics of the land market will be made.

First, values and transfers during the month are investigated to check the assumption of a random distribution. Second, an analysis of the presence of seasonality in the land market is made in order to determine the best division of the calendar year in respect to seasonal movements. Third, the reliability of the commonly used method of estimating cash considerations from the amount of revenue stamps attached to the deed is investigated because a recent study in Idaho[1] reveals that there may be some discrepancies in such a procedure. Fourth, yearly data of values per acre are computed in order to have a basis for comparing county data with the yearly state data.

Daily Variation

This analysis of the distribution of land market data during the month is made for Payne county in order to have a check on the randomness of the information obtained in the courthouses.

The first step in this investigation is an enumeration of the acres transferred, total value, and number of transfers daily for the nine year period, 1941 to 1949, for Payne county. This distribution of transfers is very scattered because on the average only 202 transfers took place each year or 17 transfers each month.

The next step is an enumeration of acres transferred, total value, and number of transfers by day of the month for each of the 108 months in the nine

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[1] A. N. Nybroten, Op. cit., pp. 558-561.

year period. For instance, the data for the first of January, the first of February, the first of March, etc., is summarized for all 108 months from 1941 to 1949, making a total of acres transferred, values, and number of transfers for the first day of these 108 months. The same is done for the second in each month, the third, etc., resulting in 31 sums by days in the months. Each of these 31 sums represent sales for 108 days except the last three dates: the twenty-ninth, the thirtieth, and the thirty-first, which represent fewer days by virtue of different lengths of the months.

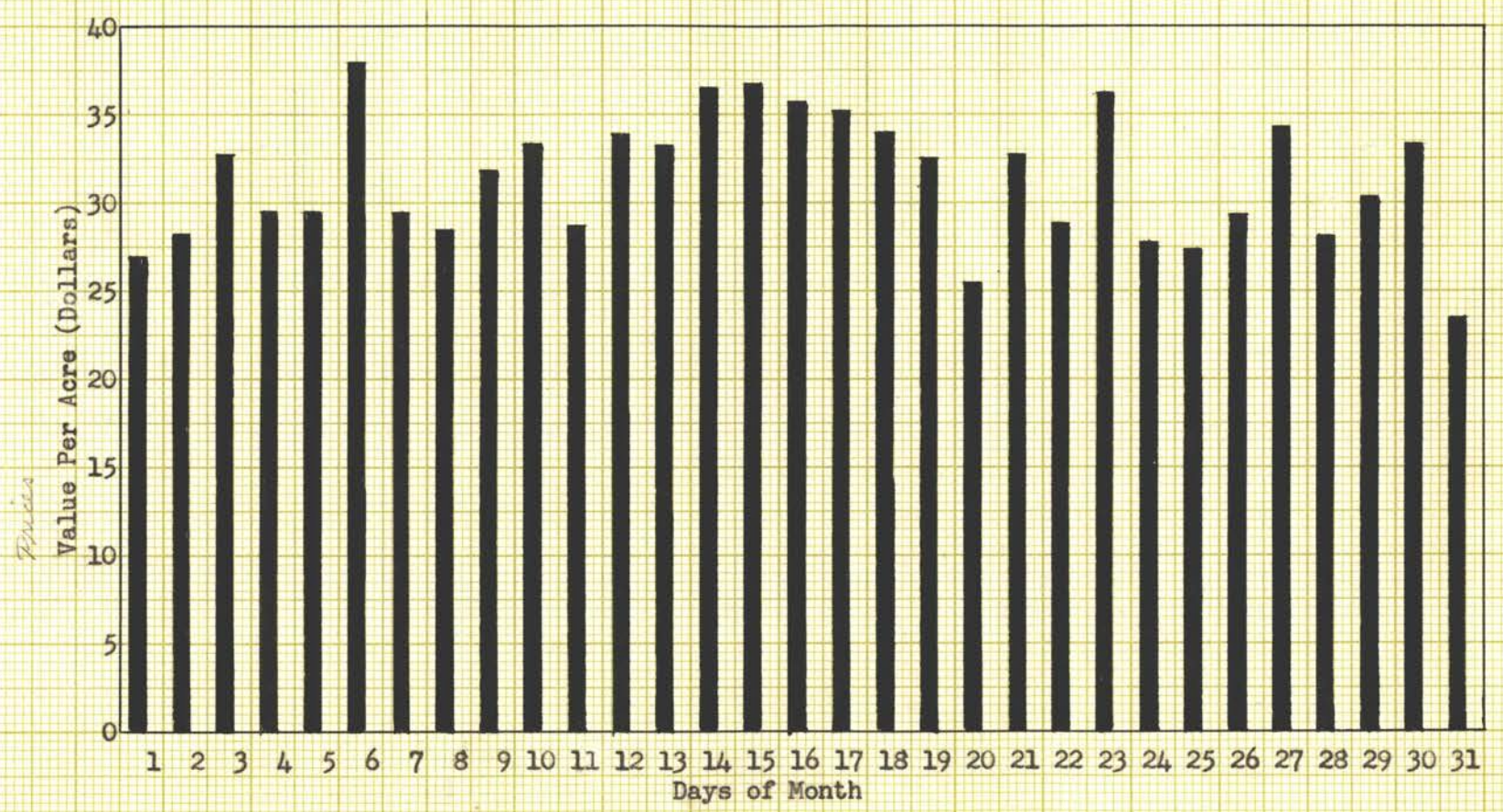
The values per acre are computed for each day in order to get comparable data. The values per acre are shown in Figure 5 by days of the month for the nine year period, 1941 to 1949. The figure reveals that the values are quite different from day to day. The highest value per acre, $37.91, is obtained on the sixth day, the lowest value per acre, $23.40, on the thirty-first day.

The number of transfers by day of the month for the nine year period is shown in Figure 6. The highest number of transfers, 82, took place on the twenty-first and the lowest number, 39, on the twenty-second. This along with the other transfers indicates that great fluctuations occur during the monthly time period; however, neither the values per acre or the number of transfers indicates any consistently higher activity in the land market on certain selected days, such as the first, the tenth, or the fifteenth. The average of consecutive days tends to follow the average value per acre and the average number of transfers for all data. It is evident that the information obtained in the courthouses is randomly distributed.

Seasonal Variations

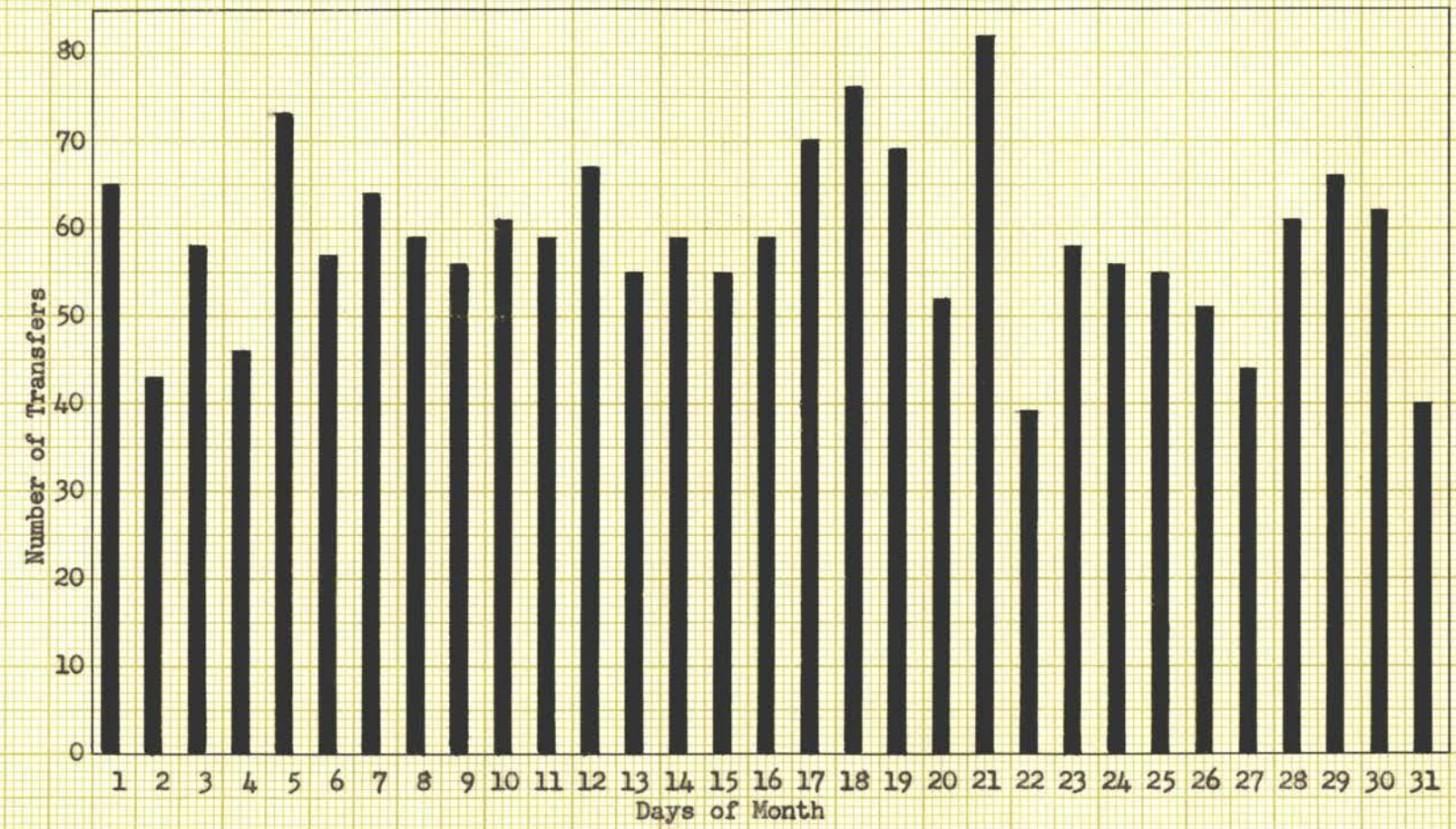
Having in mind to base the analysis of the land market sample study on semi-annual values per acre and number of transfers, the question arises as to how to divide the year into six-month periods.

Figure 5. Average Value Per Acre of Farm Real Estate for Each Day in the Month, Payne County, Oklahoma, 1941-1949



Source: See Appendix Table 22.

Figure 6. Distribution of Total Number of Transfers for Each Day in the Month, Payne County, Oklahoma, 1941-1949



Source: See Appendix Table 22.

An important thing to know before dividing the year into semi-annual parts is whether the data studied have any type of periodic fluctuations within the duration of one year. If such is the case the six-month periods of the year should be made as much alike as possible in order to minimize or eliminate the seasonal effect. If large fluctuations in the data can be detected, explained and compensated for, it will be easier and more reliable to pick a sample not deviating significantly from the original data.

It may be that the division of the calendar year into the first and the last six months, which has been and still is being used in most studies, is not the best solution. Perhaps, for instance, periods from November to April and May to October might give more reliable results. Even a different six-month period possibly should be used for the study of values per acre than for the study of the number of transfers.

One reason for trying to measure the seasonal variations in this study is to answer the question about division of the year semi-annually in order to minimize or eliminate the effect of seasonal variations, if any, in the data. Another reason is to inform people in the real estate business about any general and workable knowledge, of possible seasonal movements in values of farm real estate.

Monthly values per acre are used in this investigation of seasonality in the land market without any adjustment for changes in the price level. The effect of this could be that the seasonal movements, if any, increased in size from 1941 to 1949 because this period was one having an almost constant increase in farm real estate values.

In the attempt to measure the seasonal variations in average values per acre and number of transfers for Payne and Grady counties, the first step was the estimation of the combined trend and cyclical movements by computing the

twelve months moving totals and the twelve months moving agerages of values per acre and number of transfers. These twelve months moving averages were centered between the months. In order to get a moving average which centered on the month, two consecutive twelve months moving averages were added and then divided by two.

The twelve months moving averages of values per acre for the two counties are presented in Figures 7 and 8. Since great fluctuations in the values per acre occurred from month to month a smooth line is not obtained; however, the combined trend and cyclical movement is clearly indicated. Deciding whether there is any consistent cyclical fluctuation is difficult for so short a time period. If a straight line is able to describe the trend there would be some cyclical movements in land values.[2] Further investigation for a longer time period is suggested in order to determine the length and the consistency of the cyclical movements.

An advantage of using the length of twelve months in computing the moving averages is that movements of seasonality are eliminated. But the twelve months moving averages also eliminates the irregular movements besides some of the cyclical movements caused by the inability of the twelve months moving averages to reach into the peaks and troughs of the cycles.

The deviations of monthly data from the centered twelve month moving averages are used in the analysis of seasonal variations in this study, assuming that indications of any important seasonality would be discovered. An adjustment should have been made for irregular and cyclical movements but not knowing

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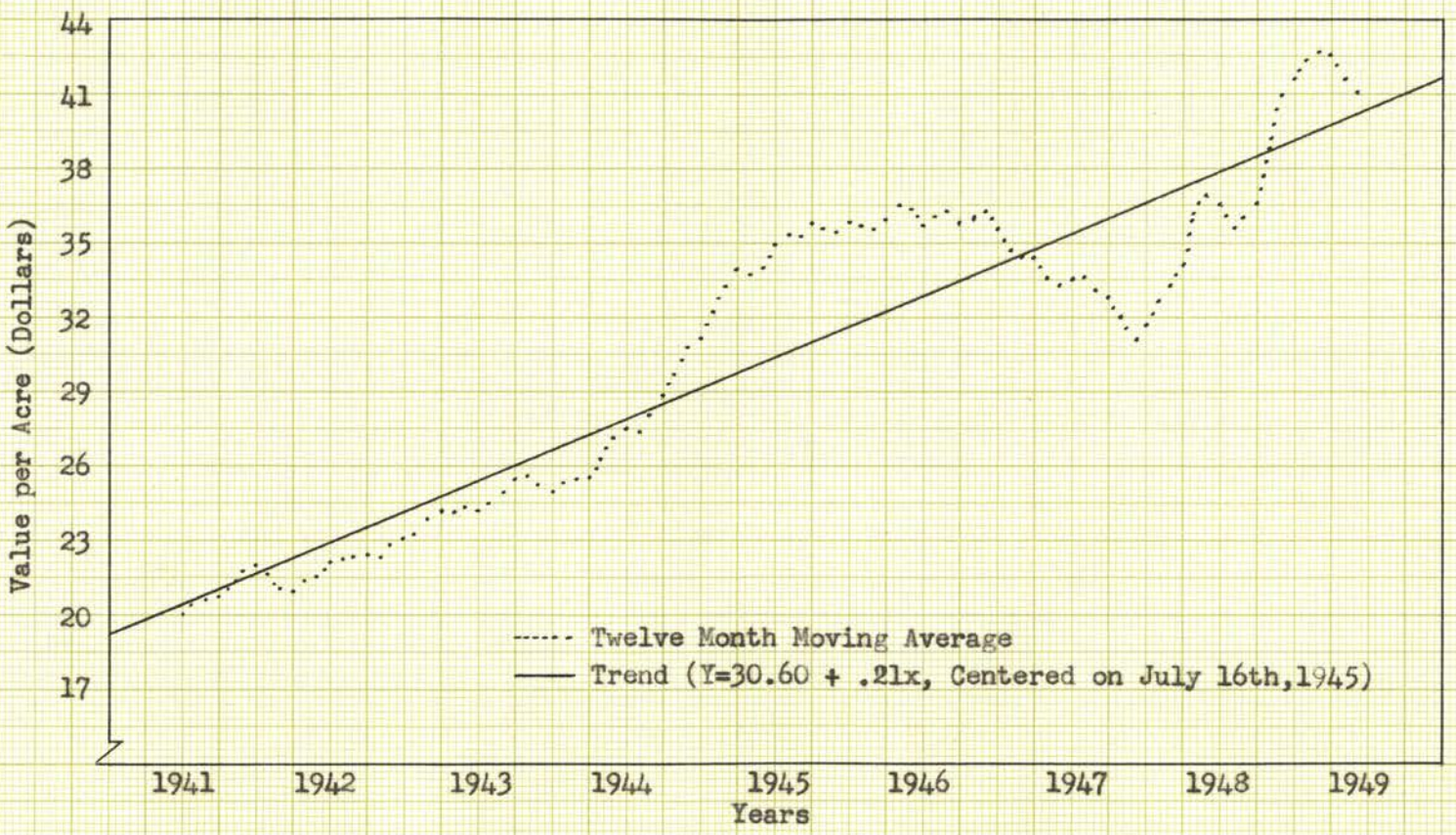
[2] For the number of transfers it would be necessary to fit two trend lines for the nine year period, one covering the period 1941 to 1946, another the period 1946 to 1949.

A second degree curve of the form $Y = a + bx + cx^2$ would also describe the trend of transfers fairly well.

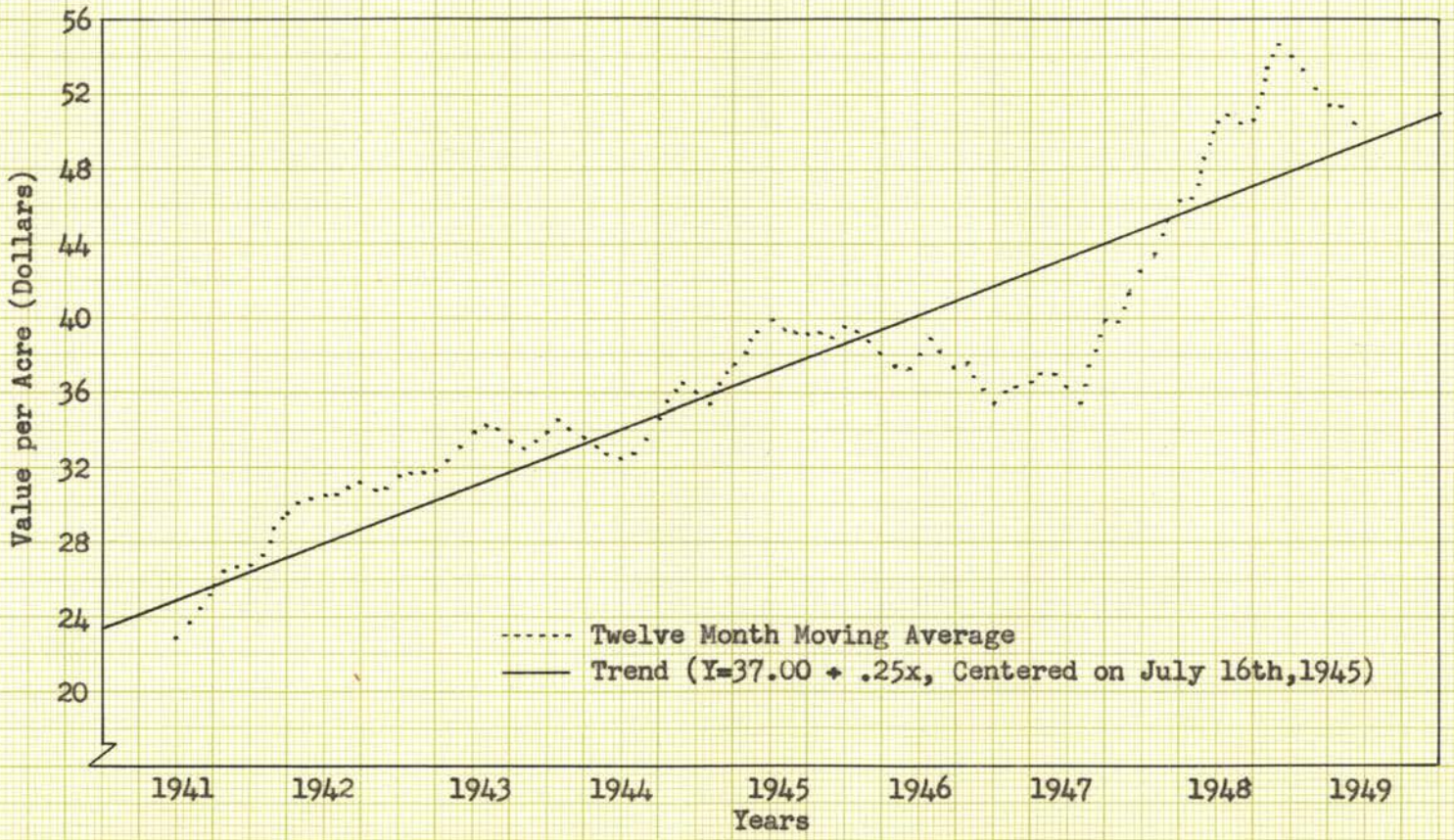
For an example of computing trend lines, see Appendix Table 35.

Figure 7. Twelve Month Moving Average and Trend of Monthly Values Per Acre, Payne County, Oklahoma, 1941-1949



Source: See Appendix Table 23.

Figure 8. Twelve Month Moving Average and Trend of Monthly Values Per Acre, Grady County, Oklahoma, 1941-1949



Source: See Appendix Table 24

whether there is any consistent cyclical pattern it is dangerous to use the artificial or freehand methods available for such an adjustment.

Tables 2 and 3 show the deviations for Payne and Grady counties, arranged by months and years for the values per acre. The deviations from the twelve month moving average (zero) are distributed about fifty-fifty for each month. Exceptions are 6 minus deviations in April and 6 plus deviations in November for Payne county. This could lead one to believe that values of farm real estate are lower per acre in April and higher in November each year, in other words, some seasonal pattern; but if the deviations for these two months for Payne county are compared with the deviations for the same two months for Grady county it must be denied. The deviations from the trend-cycle in April for Grady county are distributed equally between plus and minus deviations. For November the result is just opposite that for Payne county wherein six of the deviations are negative.

The conclusion made is that there is no seasonal pattern in the average values per acre for the two farming areas represented by Payne and Grady counties. The isolated deviations from the trend-cycle are caused by undeterminable factors. Perhaps different locations of the farm real estate, different productivity of the land, different values of buildings, and fluctuations in the value of the growing crops could be causal factors.

The deviations of the monthly number of transfers from the twelve months moving averages of transfers for the two counties are shown in Figures 9 and 10.[3] Each point in these figures stands for a deviation of the monthly number of transfers from the twelve month moving average. The heavy line represents

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[3] For detailed information about individual years, see Appendix Tables 27 and 28.

Table 2. Differences Between Monthly Land Values Per Acre* and Twelve Month Moving Averages of Land Values Per Acre Payne County, Oklahoma, 1941-1949.

Year	Months											
	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Dollars											
1941							9.88	- .16	3.00	- 3.04	1.93	- .86
1942	- 5.02	5.88	- 9.01	4.28	.13	4.84	1.45	- 4.51	- 6.83	.93	4.36	.57
1943	7.80	- 4.54	- 3.44	- 6.55	1.43	9.15	- 2.12	- .69	.23	- 4.02	2.17	.54
1944	.29	4.58	- 1.02	- 2.32	- 2.57	.78	- 5.32	2.55	- 6.28	- 1.33	10.43	4.41
1945	- 8.13	- 1.71	4.77	- 5.93	8.80	- 4.66	1.10	3.06	2.69	- 6.48	- 2.37	10.16
1946	1.10	- 8.00	5.17	1.21	- 8.83	2.42	- 2.06	3.58	- 2.19	6.38	3.97	- 3.99
1947	- 3.60	5.71	2.87	-10.34	11.25	- 5.37	- 3.73	-10.04	10.56	.82	- 1.22	- .88
1948	9.90	- 1.55	- .53	-10.96	-10.73	-10.60	-18.09	[illegible].04	7.35	24.76	[illegible].40	- 7.81
1949	-16.94	-15.12	.87	-12.71	30.04	- 8.69						

* Sale value of land and buildings.

Table 3. Differences Between Monthly Land Values Per Acre* and Twelve Month Moving Averages of Land Values Per Acre Grady County, Oklahoma, 1941-1949.

Year	Months											
	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Dollars											
1941							10.90	- 5.49	- 3.92	- 2.82	- 7.12	.63
1942	3.38	3.39	- 4.68	11.17	- .91	- 7.62	4.89	3.47	6.15	- 2.88	- 6.90	- 3.64
1943	- .97	.47	3.57	5.54	- 8.97	- 2.72	7.80	.05	2.26	- 3.61	.35	4.05
1944	4.41	1.18	- 6.56	- 7.06	- 6.87	3.61	14.62	9.44	-14.50	3.53	-12.35	-11.20
1945	7.03	1.59	12.84	- 5.89	4.10	3.13	- 8.13	5.64	- 1.90	4.06	- 6.26	6.46
1946	- 3.34	- 1.39	3.85	- 1.68	- 2.17	8.96	- .23	- 3.09	- 6.76	- 3.99	- 8.19	8.87
1947	15.55	10.38	-18.38	9.31	-11.40	-15.58	12.07	3.21	- 5.55	- .96	- 5.01	- 4.22
1948	1.05	- 5.30	32.22	- 6.65	-14.86	1.16	- .52	5.69	6.60	-13.59	8.25	22.91
1949	- 6.49	- 6.25	5.74	10.11	22.67	- 8.74						

* Sale value of land and buildings.

the average monthly deviation for eight years.[4] It can be used, not as a seasonal index because of a lack of any typical central tendency of the deviations around the average monthly deviation, but it can be used as an indicator of the variations within the year.

As the figures show, the distribution of the average deviation for the two counties indicates about the same variations within the year. The average deviations tend to be positive during the first and the last quarter of the year and negative for the second and third quarter, but large variations are found. For instance, for January where five of the deviations for Payne county are positive, three have large negative values, resulting in an average of minus 0.2 transfers for the eight years. Seven of the deviations for January for Grady county are positive, five of these are above plus nineteen transfers, and only one has a negative value.

The month of April for Payne county shows the largest concentration of deviations around its average, running from minus 3.3 to plus 3.7 transfers, the average being minus 1.1 transfers. August is the month with the largest concentration of deviations for Grady around the average, the deviations running from minus 8.2 to plus 1.2 transfers, with an average of minus 4.1.

As a result of the great dispersion of the monthly deviations of transfers from the twelve month moving average, as evidenced in Figures 9 and 10, a seasonal index has not been computed, though there is some seasonality in the transfers. In order to obtain information about the importance of the deviations of monthly data from the twelve month moving average, the average monthly deviations have been computed as a percentage of the average monthly

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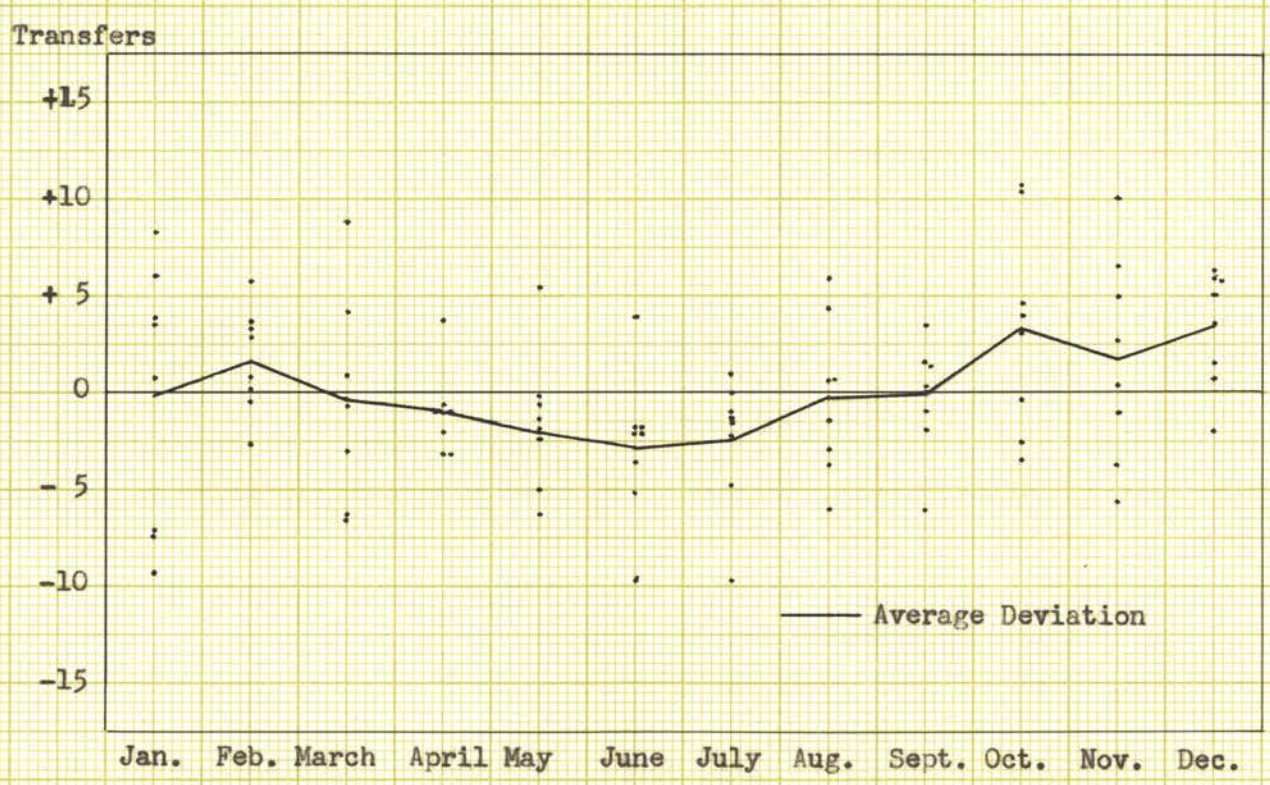
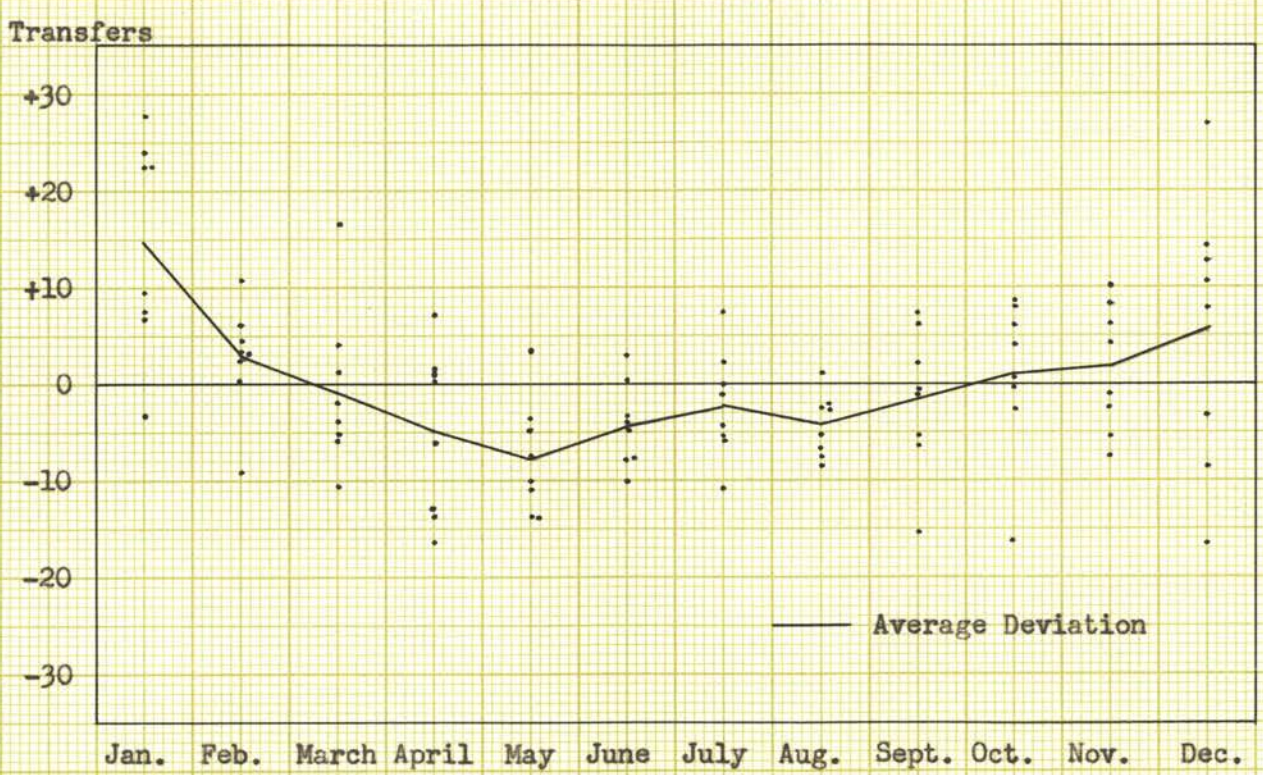
[4] Computation of the twelve month moving average eliminates the first six months of 1941 and the last six months of 1949.

Figure 9. Array and Average Deviations of Number of Transfers From the Twelve Month Moving Average, Payne County, Oklahoma, By Month, 1941-1949



Source: See Appendix Table 27.

Figure 10. Array and Average Deviations of Number of Transfers From the Twelve Month Moving Average, Grady County, Oklahoma, By Month, 1941-1949



Source: See Appendix Table 27.

number of transfers for the years 1941 to 1949 for Payne and Grady counties. For example, the average deviation from the twelve month moving average for the month of January, 1941 to 1949, minus 0.2 transfers was divided by the average number of transfers, 16.2, for January from 1941 to 1949, resulting in 1.2 percent (Table 4).

The percentages indicate very important periodic fluctuations with duration of one year. For Payne county, June is 18.9 percent below and December 16.5 percent above the twelve months moving average (Table 4). Grady county shows much greater fluctuations than Payne county; the lowest percent is 47.2 for May and the highest 41.1 percent for January.

The question as to how to divide the year semi-annually can now be answered. The average values per acre for the two counties did not show any seasonality so it is immaterial as to which months are taken together. For transfers, however, the case is different. The average deviation shows a downward trend for the first six months for Payne county and the first five months for Grady county. The upward trend for the two counties covers six and seven months respectively.

Taking into consideration the fact that the six-month periods for the two counties should be the same and the average deviations of the month number of transfers from the trend-cycle should be eliminated if possible, the only solution is to take the time periods December-May and June-November or January-June and July-December. The first division would be best for Payne county, the second division would come closer for Grady county. The last division has been used in the sampling study, because the division of the year in the first and the last six months is more convenient for summary presentation inasmuch as other studies are presented on this basis.

Having made the decision as to how to divide the year into six-month

Table 4. Average Number of Transfers*, Average Deviation of Transfers from Twelve Month Moving Average** And Deviations in Percent of Average Number of Transfers 1941-1949, Payne and Grady Counties, Oklahoma, By Months

Month	Payne County, 1941-1949			Grady County, 1941-1949		
	Average Number of Transfers	Average Deviation from Twelve Month Moving Average	Average Deviation of Average Number of Transfers	Average Number of Transfers	Average Deviation from Twelve Month Moving Average	Average Deviation of Average Number of Transfers
	Number	Number	Percent	Number	Number	Percent
January	16.2	- .2	- 1.2	36.0	14.8	41.1
February	18.1	1.6	8.8	24.9	2.7	10.8
March	16.2	- .4	- 2.5	21.5	- .5	- 2.3
April	16.0	-1.1	- 6.9	17.7	- 4.7	-26.6
May	14.8	-2.1	-14.2	15.9	- 7.5	-47.2
June	14.8	-2.8	-18.9	17.6	- 4.1	-23.4
July	14.3	-2.5	-17.5	19.7	- 2.2	-11.2
August	16.9	- .4	- 2.4	18.4	- 4.1	-22.3
September	16.3	- .3	- 1.8	21.7	- 1.5	- 6.9
October	21.1	3.3	15.6	24.1	1.1	4.6
November	18.0	1.7	9.4	24.7	1.8	7.3
December	19.9	3.3	16.5	29.1	5.6	19.2

* Summarized from Appendix Tables 25 and 26.
** Summarized from Appendix Tables 27 and 28.

periods, the semi-annual values per acre and the number of transfers semi-annually were computed as the standards for measuring the reliability of sampling on the land market (Table 5).

The data reveal that the values per acre and number of transfers are a little higher for Grady county than for Payne county. A comparison of the first half year period of the nine years studied gives the impression that the average value per acre and number of transfers tend to be higher for the second half-year. But taking into consideration that the time period covers an upward trend in the values, there is no significant difference. (Regression coefficients: Payne county b = 1.289; Grady county b = 1.402 measured semi-annually and in dollars.) This seems to indicate a little higher average price per acre for the first half-year period for Grady county.

The number of transfers indicates large variations between the first six-month period and the last six-month period but an adjustment for trends would also tend to equalize them.

Values Based on Federal Revenue Stamps

The amount of revenue stamps attached to the deeds have been used in many studies in measuring the cash consideration in real estate transfers. It can only be done on the assumption that the buyer and seller record the cash consideration and buy the amount of revenue stamps required for such an amount. The soundness of this assumption depends in no small degree on the middlemen in the land market as well as on the county recorder.

In previous studies based on estimated cash considerations it has been assumed that buyers pay $0.55 revenue for each beginning $500 cash consideration. In addition to that it has been assumed that the mid-point of the last $500 reflects the consideration for the last $0.55 revenue stamps attached to the

Table 5. Values Per Acre and Number of Transfers Semi-Annually for Payne and Grady Counties, Oklahoma, 1941-1949

County	Year	Half Year			
		First		Second	
		Average Value per Acre (Dollars)	Total Transfers (Number)	Average Value per Acre (Dollars)	Total Transfers (Number)
Payne:					
	1941	17.56	48	22.32	58
	1942	21.96	67	22.42	65
	1943	23.40	90	24.17	132
	1944	25.67	84	29.74	102
	1945	31.10	117	37.63	127
	1946	34.82	153	36.87	180
	1947	34.62	116	32.28	135
	1948	30.92	110	44.09	74
	1949	36.51	73	42.64	86
Grady:					
	1941	21.02	75	24.46	142
	1942	27.73	106	30.05	139
	1943*	31.12	116	35.54	155
	1944	34.49	121	31.15	92
	1945	40.59	196	38.59	154
	1946	39.31	204	35.78	185
	1947	40.29	118	38.70	117
	1948	44.38	126	54.56	152
	1949	51.57	85	44.28	103

* For the first half year of 1943 for Grady county a number of cards (59) had only the month recorded but not the day in the month given. Being reliable transfers the cards were used in the analysis of seasonal movements, where monthly data were used, but had to be excluded in the sample study where the day in the month was necessary in order to pick the samples. This means that the analysis of seasonality in land market data was based on 116 transfers with both month and day in the month recorded plus 59 transfers with only the month in which the transactions took place recorded.

deed. But is that the case? If not, how much do the estimated values deviate from the real considerations?

About 74 percent of the considerations for Payne county and 69 percent for Grady county for the years 1941 to 1949 have been estimated from the amount of revenue stamps. Only 26 and 31 percent of the considerations respectively were given in the deeds for Payne and Grady counties.

An analysis of records in which both the cash consideration and amount of revenue stamps were stated has been made for Payne and Grady counties for the years 1941 to 1949. The records, 476 for Payne county, 701 for Grady county, were divided into groups according to the amount of revenue stamps shown on the deeds (Tables 6 and 7). These tables show the number of transfers in each group, the percentages of these at the upper limit of the possible values, and the amount of consideration representing the last $0.55 of revenue stamp. In addition to this the percentage that the average amount of cash consideration for the last $0.55 of revenue stamp is of maximum value and the percentage underestimation when the middle value of $250 is used.

The distribution of the number of transfers according to the amount of revenue stamps is about the same for the two counties (Tables 6 and 7). The largest number of transfers is in the groups with the lowest amount of revenue stamps.

The percentage of total number of transfers at the upper limit of possible value, $500, for the last $0.55 of revenue stamps shows to a certain extent a positive correlation with amount of revenue stamps. The reason for this may be that buyers and sellers are more likely to round off the total consideration, as the consideration increases, not only to a hundred dollars but to five hundred and to a thousand dollars. The group with an amount of $11.00 revenue stamps stated on the deed (Table 7) indicates a typical example for Grady county,

Table 6. Revenue Stamps and Cash Consideration in Deed Records, Payne County, Oklahoma, 1941-1949

Amount of Revenue Stamps	Transfers	Percentage of Transfers at Upper Limit of Possible Value	Average Amount of Cash for last $.55 Revenue Stamp	Average Amount of Cash for Last $.55 Revenue Stamp in Percent of Possible Amount ($500 = 100%)	Under Estimation in Percent ($250 = 50%)
Dollars	Number	Percent	Dollars	Percent	Percent
0.55	29	27.6	409	81.8	21.8*
1.10	68	35.3	341	68.2	18.2
1.65	51	39.2	340	68.0	18.0
2.20	58	39.7	328	65.6	15.6
2.75	37	59.5	403	80.6	30.6
3.30	45	55.6	390	78.0	28.0
3.85	31	54.8	376	75.2	25.2
4.40	36	52.8	368	73.6	23.6
4.95	22	68.2	445	89.0	39.0
5.50	16	68.8	406	81.2	31.2
6.05	8	75.0	422	84.4	34.4
6.60	13	92.3	469	93.8	43.8
7.15	9	88.9	467	93.4	43.4
7.70	11	81.8	457	91.4	41.4
8.25	7	85.7	464	92.8	42.8
8.80	11	90.9	477	95.4	45.4
9.35	3	33.3	344	68.8	18.8
9.90	1	100.0	500	100.0	50.0
10.45	1	100.0	500	100.0	50.0
11.00	5	60.0	380	76.0	26.0
11.55 and more	14	92.9	486	97.2	47.2

* Since the first $100 is exempt, the midpoint of this class is $300 compared with $250 for the other classes.

Table 7. Revenue Stamps and Cash Consideration in Deed Records, Grady County, Oklahoma, 1941-1949

Amount of Revenue Stamps	Transfers	Percentage of Transfers at Upper Limit of Possible Value	Average Amount of Cash for Last $.55 Revenue Stamp	Average Amount of Cash for Last $.55 Revenue Stamp in Percent of Possible Amount ($500 = 100%)	Under Estimation in Percent ($250 = 50%)
Dollars	Number	Percent	Dollars	Percent	Percent
0.55	50	30.0	378	75.6	15.6*
1.10	77	35.1	346	69.2	19.2
1.65	78	39.7	373	74.6	24.6
2.20	70	51.4	366	73.2	23.2
2.75	51	52.9	392	78.4	28.4
3.30	51	66.7	418	83.6	33.6
3.85	33	51.5	398	79.6	29.6
4.40	47	55.3	372	74.4	24.5
4.95	28	57.1	383	76.6	26.6
5.50	34	64.7	438	87.6	37.6
6.05	20	45.0	375	75.0	25.0
6.60	24	62.5	390	78.0	28.0
7.15	16	56.3	410	82.0	32.0
7.70	13	38.5	358	71.6	21.6
8.25	14	64.3	417	83.4	33.4
8.80	10	80.0	430	86.0	36.0
9.35	8	87.5	469	93.8	43.8
9.90	7	71.4	429	85.8	35.8
10.45	3	100.0	500	100.0	50.0
11.00	17	94.1	476	95.2	45.2
11.55	4	75.0	475	95.0	45.0
12.10	3	100.0	500	100.0	50.0
12.65	1	-	400	80.0	30.0
13.20	10	100.0	500	100.0	50.0
13.75	4	100.0	500	100.0	50.0
14.30	4	75.0	400	80.0	30.0
14.85 and more	24	91.7	481	96.2	46.2

* Since the first $100 is exempt, the midpoint of this class is $300 compared with $250 for the other classes.

where 16 of 17 transfers or 94.1 percent are at the upper limit which in this case is ten thousand dollars.

The average amount of cash for the last $0.55 revenue stamps is in all cases above the middle value, $250, which in many studies has been used for estimating individual considerations. For Payne county the lowest underestimation is 15.6 percent for an amount of revenue stamps of $2.20. For Grady county the lowest underestimation is also 15.6 percent but at an amount of revenue stamps of $0.55. It is interesting to note the increasing underestimation for the last $0.55 of revenue as the amount of revenue stamps increases. The positive correlation, mentioned above, between percent of transfers at the upper limit and amount of revenue stamps is reflected in the percentage underestimation.

An important thing to remember about the percentage underestimations given in Tables 6 and 7 is that they are computed from the average amount of cash for the last $0.55 revenue stamps. If the total consideration were used the correlation would be negative which means that the error is larger for the groups with the lowest amount of revenue stated on the deed. An example for Payne county will show this effect. If the amount of revenue stamps was $1.10, the total consideration would be $841.00, but the estimated consideration would be only $750.00, a difference of 10.8 percent. Were the amount of revenue stamps instead $8.80 the total consideration would be $7,977.00 and the estimated $7,750.00, a difference of only 2.8 percent.

These differences indicate clearly that estimation of cash consideration from the amount of revenue stamps cannot be used with much confidence if a study is made of considerations for smaller tracts of land with values below $1000 - $2000. If, on the other hand, all the sales over a period of time are used the larger mistakes made for the lower priced estates tend, to a certain

extent, to balance the smaller error for the higher prices estates, but it will never be possible to reach the true consideration because all estimations are too low.

For obtaining information about how much the total consideration for all sales and years deviate from the estimated considerations for the same period, both the cash considerations stated on the deeds and estimated from revenue stamps were summarized. For Payne county the total consideration stated on the deeds was 4.1 percent higher than the estimated consideration; for Grady county the difference was 3.4 percent.

These deviations do not seem very important, especially not when the great fluctuations in farm real estate prices are taken into consideration. Further, the deviations are actually smaller than these percentages indicate because they only applied when all considerations were estimated. Twenty-six percent of the considerations for Payne county and 31 percent for Grady county are given in the deeds so the underestimation is only 3.0 percent and 2.4 percent for the two counties respectively. Where the great error comes in is, as mentioned previously, when a study is made of farm real estate separated according to farm size. In such a case it is possible to make an underestimation from 10 to 15 percent for the smaller farms, compared with one to three percent for the larger farms, depending on the limits of acres in each group. If such a study had to be undertaken without limiting it to records with a given cash consideration on the deed, some corrections of the previous used middle values of the $500 range should be worked out so that the error made when estimating the consideration for the last $0.55 of revenue stated on the deed could be minimized.

Assuming that the number of records studied, 1,177, is a sufficient number on which to base a rough conclusion, it would be possible from the average

amount of cash for the last $0.55 revenue stamps for Payne and Grady counties to set some artificial limits for the estimation value, which could be used instead of the middle value, $250. For example, $350 could be used for the first five groups (see Tables 6 and 7), $400 for the next ten and $450 for the rest. These values would not estimate the exact consideration because of fluctuations in the average amount of cash from group to group, but on the average they would be better than the middle values, and more important they would tend to equalize the estimations for different farm sizes.

Compared with the results obtained by Nybroten in a similar study made in Idaho,[5] in which he found the same trends, the previously stated new values are ten to fifteen dollars too high, but the limits could be used. It suggests that further studies should be made for more years in the same counties or for the same years in other counties before the previously stated new values are used.

Yearly

A summary of farm real estate data on a yearly basis is made in order to compare relative changes from county to county and check them against relative changes for the state.

Table 8 shows the average value per acre, number of transfers, and an index based on the value per acre for 1941 (100 percent) for each of the two counties. The index for Oklahoma has been converted to the 1941 base from an index of the United States Department of Agriculture.[6]

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[5] N. Nybroten, Op. cit., pp. 558-561.

[6] Current Developments in the Farm Real Estate Market, Bureau of Agricultural Economics, United States Department of Agriculture, December, 1950.
A. R. Johnson, The Farm Real Estate Situation, 1946-1947, United States Department of Agriculture, Circular 780, March, 1948.

Table 8. Value Per Acre, Number of Transfers, and Index Numbers of Value Per Acre of Farm Real Estate, Payne County, Grady County and Oklahoma, 1941-1949

Year	Payne County			Grady County			Oklahoma
	Value Per Acre	Index of Value Per Acre*	Transfers	Value Per Acre	Index of Value Per Acre*	Transfers	Index of Farm Real Estate
	Dollars	1941 = 100	Number	Dollars	1941 = 100	Number	1941 = 100
1941	20.06	100	106	23.32	100	217	100
1942	22.18	111	132	29.06	125	245	105
1943	23.84	119	222	33.74	145	330	116
1944	27.98	139	186	33.15	142	213	125
1945	34.59	172	244	39.77	171	350	136
1946	35.96	179	333	37.66	161	385	163
1947	33.37	166	251	39.52	169	235	176
1948	36.55	182	184	50.19	215	278	193
1949	39.98	199	159	47.73	205	188	220

* The index numbers for Payne and Grady counties were computed from farm sales recorded in the county court houses, using 1941 as the base year.

** The State index numbers were converted from an index published by the United States Department of Agriculture: Current Developments in the Farm Real Estate Market, Bureau of Agricultural Economics, United States Department of Agriculture, December, 1950; and A. R. Johnson, The Farm Real Estate Situation, 1946-1947, United States Department of Agriculture, Circular 780, March, 1948.

These indices should not be used as absolute indicators of changes of the farm real estate market, for each of them is based only on about one hundred transfers, but rather as indicators of relative changes. Yearly average values per acre, on which the indices for Payne and Grady counties are based, cover large fluctuations from transfer to transfer, and fail to indicate whether the value of land is actually increasing or the number of sales of higher quality land have increased more than sales of lower quality land.

The state index has been going up constantly in the nine year period from 100 in 1941 to 220 in 1949, an increase of 120 percent. Payne county from 1941 to 1949 increased 99 percent, but a drop occurred in the index for 1947 in comparison with the previous year. The index for Grady county has fluctuated more than the indices for the state and for Payne county. The index rose 45 percent the first two years compared with 16 and 19 percent for the State and Payne county. Three times, 1944, 1946, and 1949, the index decreased in comparison with previous years.

Knowing the limitations of the indices, they serve nevertheless as indicators of the magnitude of the yearly changes in land values for the State and for the two counties.

Chapter V

SAMPLING THE LAND MARKET

How many days of each month, summarized semi-annually are needed to describe the "true" semi-annual values per acre and number of transfers based upon all transactions without significant deviation? A summary of how much a sample can vary from the actual data without being statistically significant is also made.

Before any samples were picked holidays and Sundays were eliminated. The reason for this is that they do not have the same effect on a small and a large sample. If, for example, the first five days of January were picked the highest number of business days would be three or sixty percent because no recordings have taken place the first and the second. If on the other hand the first fifteen days of January were sampled the lowest number of business days would be eleven or 73 percent. No adjustment has been made for Saturdays because exact information as to what year the court houses started the practice of closing Saturday afternoons was not available.

After elimination of holidays, the business days were numbered from one to twenty-four or twenty-five depending on the length of the month and the number of holidays.

Samples and Sample Periods

A random sampling method easy to understand and follow was desirable as most of the data are collected by clerks in the areas studied. Information obtained from the county court houses reveals that sales are recorded at random in the records. This idea was checked and found to hold by investigating the distribution of land market data during the month. No particular day nor a period of days such as the first or the fifteenth indicated any greater land

market activity than any other days.

This means that a random sample can be obtained not only by picking a certain number of single days throughout the month, but that groups of days can be selected. For example, five or ten consecutive days in a month can be picked. The only thing to remember is that when first a method has been selected it must be used for all samples.

The basic time period for selecting different samples was the number of business days in a month. The monthly number of business days were first divided into five consecutive five-day time periods.[1] Then similar time periods were combined for the nine years studied, resulting in five different five-day sampling periods. There were eighteen samples in each sample period, because the data were examined semi-annually and over a nine year period. The five-day samples of values per acre and number of transfers are shown in Tables 9 and 10, together with the semi-annual values per acre and number of transfers.

Ten-day time periods were obtained by dividing the business days in the month in three consecutive ten-day groups. Data from the first ten business days of each of the nine years studied constitute the first ten-day sample period. The number of samples in a sample period were the same as for the five-day sample periods, eighteen. The ten-day samples of values per acre and number of transfers are given in Tables 11 and 12.

The largest time period selected was fifteen days. Only the first fifteen business days in the month were selected because two time periods, the first

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[1] The last time period for both the five-day and the ten-day samples in each month were picked from the last business days in the month, and then five and ten days backwards, respectively.

Table 9. Farm Land Values* by Five-Day Samples and Semi-Annually, Payne County, Oklahoma, 1941-1949

Year	Half-Year	Five-Day Sample					Semi-Annual
		First	Second	Third	Fourth	Fifth	
		Dollars					
1941	1st	18.59	19.38	10.11	18.09	22.18	17.56
	2nd	21.99	22.38	14.58	33.49	21.64	22.32
1942	1st	24.37	19.65	24.53	28.89	13.99	21.96
	2nd	19.62	21.05	32.20	24.66	16.96	22.42
1943	1st	24.28	21.23	24.14	32.21	20.34	23.40
	2nd	25.31	19.41	26.05	25.60	25.47	24.17
1944	1st	24.72	27.32	25.54	25.69	25.23	25.67
	2nd	27.70	22.94	28.36	36.79	30.48	29.74
1945	1st	27.10	23.12	40.64	30.53	34.44	31.10
	2nd	31.32	39.67	41.21	32.48	40.26	37.63
1946	1st	45.21	34.80	32.79	30.32	32.38	34.82
	2nd	34.55	40.02	42.36	33.72	31.51	36.87
1947	1st	32.55	28.73	51.60	37.13	23.54	34.62
	2nd	21.36	48.96	34.93	33.39	31.69	32.28
1948	1st	29.04	48.93	32.44	22.38	29.90	30.92
	2nd	56.40	45.80	47.31	40.58	39.53	44.09
1949	1st	38.09	39.42	44.81	36.84	24.34	36.51
	2nd	42.24	36.28	47.72	35.75	52.97	42.64

* Sale value per acre of farm land and buildings.

Table 10. Number of Transfers by Five-Day Samples and Semi-Annually, Payne County, Oklahoma, 1941-1949

Year	Half-Year	Five-Day Sample					Semi-Annual*
		First	Second	Third	Fourth	Fifth	
		Number					
1941	1st	6	10	7	10	13	9.5
	2nd	7	12	9	16	18	11.4
1942	1st	10	21	13	12	12	13.2
	2nd	12	13	13	12	13	12.7
1943	1st	27	15	16	11	18	17.8
	2nd	28.	24	27	27	25	25.7
1944	1st	21	17	18	16	12	16.5
	2nd	21	23	14	20	21	20.1
1945	1st	22	25	22	21	26	23.1
	2nd	22	19	24	24	37	24.9
1946	1st	29	29	30	30	31	30.4
	2nd	40	35	41	38	24	35.3
1947	1st	22	32	28	19	15	23.0
	2nd	20	16	33	35	28	26.5
1948	1st	23	16	26	20	25	21.4
	2nd	8	15	13	18	16	14.4
1949	1st	12	12	16	19	14	14.4
	2nd	20	22	21	12	10	16.8

* For making the semi-annual number of transfers comparable with the number of transfers taking place semi-annually in five business days of each month (30 business days), an adjustment has to be made. For an example see Table 30.

Table 11. Farm Land Values* by Ten-Day Samples and Semi-Annually, Payne County, Oklahoma, 1941-1949

Year	Half-Year	Ten-Day Sample			Semi-Annual
		First	Second	Third	
		Dollars			
1941	1st	19.06	15.54	17.89	17.56
	2nd	22.21	24.54	24.29	22.32
1942	1st	21.28	26.53	21.32	21.96
	2nd	20.15	28.41	20.52	22.42
1943	1st	23.32	26.78	20.86	23.40
	2nd	22.17	25.80	24.13	24.17
1944	1st	25.88	25.60	24.27	25.67
	2nd	25.16	33.38	33.29	29.74
1945	1st	24.67	35.85	31.69	31.10
	2nd	35.34	36.91	36.88	37.63
1946	1st	39.83	31.52	31.44	34.82
	2nd	37.26	38.12	32.02	36.87
1947	1st	30.00	45.95	29.92	34.62
	2nd	31.55	34.24	31.25	32.28
1948	1st	36.71	27.68	25.89	30.92
	2nd	50.07	43.15	39.88	44.09
1949	1st	38.72	40.35	28.61	36.51
	2nd	39.08	43.75	47.65	42.64

* Sale value per acre of farm land and buildings.

Table 12. Number of Transfers by Ten-Day Samples and Semi-Annually, Payne County, Oklahoma, 1941-1949

Year	Half-Year	Ten-Day Sample			Semi-Annual*
		First	Second	Third	
		Number			
1941	1st	16	17	26	19
	2nd	19	25	28	23
1942	1st	31	25	22	26
	2nd	25	25	25	25
1943	1st	42	27	29	36
	2nd	52	54	49	51
1944	1st	38	34	25	33
	2nd	44	34	40	40
1945	1st	47	43	44	46
	2nd	41	48	60	50
1946	1st	58	60	66	61
	2nd	75	79	59	71
1947	1st	54	47	37	46
	2nd	36	68	59	53
1948	1st	39	46	44	43
	2nd	23	31	37	29
1949	1st	24	35	31	29
	2nd	42	33	19	34

* For making the semi-annual number of transfers comparable with the number of transfers taking place semi-annually in ten business days of each month, (60 business days), an adjustment had to be made. For an example see Table 30.

fifteen business days and the last fifteen business days in the month, would overlap each other very much. The fifteen-day samples are shown in Table 13.

The total possible number of five-day, ten-day, and fifteen-day samples were 90, 54, and 18 respectively, obtained by multiplying the number of samples in each sample period by the number of sample periods.

Tests of Significance, Payne County

The following hypothesis was set up about the sample periods: A five-day, a ten-day, or a fifteen-day sample period of values and transfers for Payne county from 1941 to 1949 do not deviate significantly from the semi-annual data of farm real estate for the same time period.

In order to test this hypothesis two measurements were needed: One to measure the deviations of the sample values from the semi-annual values per acre and number of transfers, and the other to decide whether or not these deviations can be commonly expected in sampling or whether it is so great as to throw doubt upon the hypothesis.

Two different tests have been applied to the data. The first of these was the chi-square test, the second a test based on the regression coefficients of the semi-annual data and the samples. Both of these statistics were able to measure the deviations of the samples from the semi-annual data, and the decision about significant deviation could be based on probability tables.[2] Both of these tests should give the same results. If not, the test rejecting the hypothesis was relied upon.

Before the chi-square test could be applied to the data an adjustment had to be made because the sum of the semi-annual data and the sum of the data for

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[2] George W. Snedecor, Statistical Methods, pp. 65 and 190.

Table 13. Farm Land Values* and Number of Transfers by Fifteen-Day Samples and Semi-Annually, Payne County, Oklahoma, 1941-1949

Year	Half-Year	Fifteen-Day Sample: Value Per Acre	Fifteen-Day Sample: Transfers	Semi-Annual: Value Per Acre	Semi-Annual: Adjusted Semi-Annual Transfers
		Dollars	Number	Dollars	Number
1941	1st	16.31	23	17.56	29
	2nd	19.28	28	22.32	34
1942	1st	22.11	44	21.96	40
	2nd	23.63	38	22.42	38
1943	1st	23.57	58	23.40	53
	2nd	23.35	79	24.17	77
1944	1st	25.76	56	25.67	49
	2nd	25.92	58	29.74	60
1945	1st	29.89	69	31.10	69
	2nd	37.14	65	37.63	75
1946	1st	37.58	88	34.82	91
	2nd	39.02	116	36.87	106
1947	1st	36.71	82	34.62	69
	2nd	33.26	69	32.28	79
1948	1st	34.82	65	30.92	64
	2nd	49.01	36	44.09	43
1949	1st	41.22	40	36.51	43
	2nd	41.70	63	42.64	50

* Sale value per acre of farm land and buildings.

** For making the semi-annual number of transfers comparable with the number of transfers taking place semi-annually in 15 business days of each month (90 business days in all), an adjustment had to be made. For an example, see Table 30.

each sample period had to be the same for the nine years studied. A correction coefficient was computed by dividing the sum of the semi-annual data into the sum of the data for the sample period. The semi-annual data were then multiplied with the correction coefficient in order to obtain the same sum as for the sample periods.[3]

For the number of transfers another adjustment was necessary before both the chi-square test and the test of regression coefficients could be applied. The number of transfers is not an average figure as are values per acre. In order to be able to compare the semi-annual transfers with the transfers in different samples the semi-annual transfers were adjusted to the same number of business days as the samples. For example, a five-day sample studies only 30 business days in each six month period; there are a total of about 150 business days in the period. To make the transfers comparable the semi-annual data had to be adjusted to a thirty business day level.[4]

The formula used to measure the deviations of the different samples from the semi-annual data in the chi-square test was:

$$\text{Chi-Square} = \frac{(\text{Observed} - \text{Expected})^2}{\text{Expected}}$$

where the expected data were the semi-annual and the observed the sample data of values per acre and number of transfers.

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[3] For an example of computation of correction coefficient and adjustment, see Appendix Table 29.

[4] Adjusted semi-annual transfers to different sized samples have been computed in Appendix Table 30.

The computed chi-squares for each sample were added for sample periods, and then compared with the tabular chi-square,[5] to see what the probability of a larger value was. Using the customary 5 percent probability level and 18 degrees of freedom as the limit between no evidence and evidence of significant deviation, this table indicates that if sampling is repeated chi-square values greater than 28.869 on the average should not occur more than five times out of one hundred or once out of twenty in order to be able to assume the deviations not significant.

Table 14 shows the computed chi-square values for all the sample periods of values per acre and number of transfers. None of these chi-square values furnishes evidence that the different sample periods deviate significantly. But it should be pointed out that all the five-day sample periods of values per acre have relatively large chi-squares. The chi-square value for the second five-day sample period is 26.46 wherein there is only an 8 percent chance of getting a higher value.

The test of regression coefficients was based on the assumption that the samples should be able to describe the same regression line as the semi-annual data.

As mentioned earlier the price per acre does on the average increase throughout the nine year period studied, making it possible to describe the trend with a single regression line. It will be noted, however, that the number of transfers on the other hand indicates a slight increase from 1941 to 1946, but a very rapid decrease from 1946 to 1949, making it necessary to compute two regression lines (Figure 14). The values of the different regression coefficients are shown in Table 15, together with the standard errors of

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[5] George W. Snedecor, Op. cit., p. 190.

Table 14. Chi-Square of Different Samples of Land Values and Transfers,* Payne County, Oklahoma, 1941-1949**

Sample Period	Chi-Square*** of Values Per Acre	Chi-Square of Transfers
1st Five Days	13.41	16.95
2nd Five Days	26.46	18.31
3rd Five Days	19.30	8.52
4th Five Days	17.70	12.26
5th Five Days	17.25	22.72
1st Ten Days	6.21	17.61
2nd Ten Days	7.03	10.14
3rd Ten Days	5.27	23.76
1st Fifteen Days	3.01	14.94

* Sale value per acre of farm land and buildings and number of transfers.

** The chi-square values have been computed from data in Tables 9, 10, 11, 12, and 13.

*** Using the customary 5 percent probability level and 18 degrees of freedom as the limit between no evidence and evidence of significant deviation chi-square values greater than 28.869 should not occur, if sampling is repeated, more than once out of twenty in order to be able to assume the deviations not significant.

Table 15. Statistical Measures of Farm Land Values and Transfers*, Semi-Annually and by Sample Periods, Payne County, Oklahoma, 1941-1949

Item	Regression Coefficients			Standard Error of Regression Coefficient			Computed t Values**		
	Value Per Acre 1941-49	Transfers 1941-46	Transfers 1946-49	Value Per Acre 1941-49	Transfers 1941-46	Transfers 1946-49	Value Per Acre 1941-49	Transfers 1941-46	Transfers 1946-49
1st Five Days	1.335	2.374	-2.964	.347	.473	1.333	.133	.685	-.164
2nd Five Days	1.672	1.717	-2.559	.276	.358	1.020	1.388	-.930	.182
3rd Five Days	1.822	2.343	-2.857	.290	.431	.986	1.838	.680	-.113
4th Five Days	.610	2.024	-2.845	.229	.413	1.011	-2.965***	-.063	-.099
5th Five Days	1.207	1.657	-2.345	.090	.474	.824	- .910	-.829	.485
Semi-Annual	1.289	2.050	-2.745	.153	.274	.599	---	---	---
1st Ten Days	1.429	4.098	-5.440	.205	.692	1.942	.683	-.046	.019
2nd Ten Days	1.229	4.367	-5.702	.218	.795	1.779	- .261	.298	-.127
3rd Ten Days	1.077	3.806	-5.762	.230	.707	1.309	- .922	-.458	-.218
Semi-Annual	1.289	4.130	-5.476	.153	.552	1.212	---	---	---
1st Fifteen Days	1.571	6.441	-8.298	.160	1.062	2.691	1.763	.294	-.009
Semi-Annual	1.289	6.129	-8.274	.153	.890	1.792	---	---	---

* Sale value per acre of farm land and buildings, and number of sales.

** The decision of whether the regression coefficients of the sample periods deviate significantly from the regression coefficient for the semi-annual data was based on the t test. The t values of the different sample periods were computed by substitution in the formula $t = \frac{b - \beta}{s_b}$ where b is equal to the regression coefficient of the sample period, β the regression coefficient of the semi-annual data, and s_b the standard error of the sample period. For example, the t value, .133, for the values per acre for the first five-day sample was computed by subtracting 1.289 from 1.335 and dividing the difference by .347.

*** This t value deviated highly significant.

the regression coefficients. It was necessary to compute the standard error because it was one of the measures needed in the test of significance.

The test of significance was based on the following formula:

$$t = \frac{\text{Regression Coeff. of Sample Period} - \text{Regression Coeff. of Semi-Annual Data}}{\text{Standard Error of Sample Period}}$$

A t value was computed for each sample period (last three columns in Table 15). These t values were then compared with the tabular values[6] at the 5 percent probability level and the proper number of degrees of freedom. The number of degrees of freedom is the number of samples included in the time period for which the regression coefficient was computed minus two, resulting in 16 degrees of freedom for the values per acre, 1941-1949, 10 degrees of freedom for the transfers from 1941 to 1946 and 6 degrees of freedom for the transfers from 1946 to 1949.

It was found that the fourth five-day sample period had a highly significant t value, -2.965, which means that the chance of getting a larger one was less than one percent. The t value for the third five-day sample period was also very high, 1.838, leaving only about an eight percent chance of a larger value.

That these two sample periods deviate very much can also be seen in Figure 11 where the regression lines for the five five-day sample periods are drawn together with the regression line of the semi-annual data.

Having only five five-day sample periods and one of them deviating highly significantly, the conclusion was that regression coefficients determined from five-day sample periods of values per acre in Payne county deviate significantly

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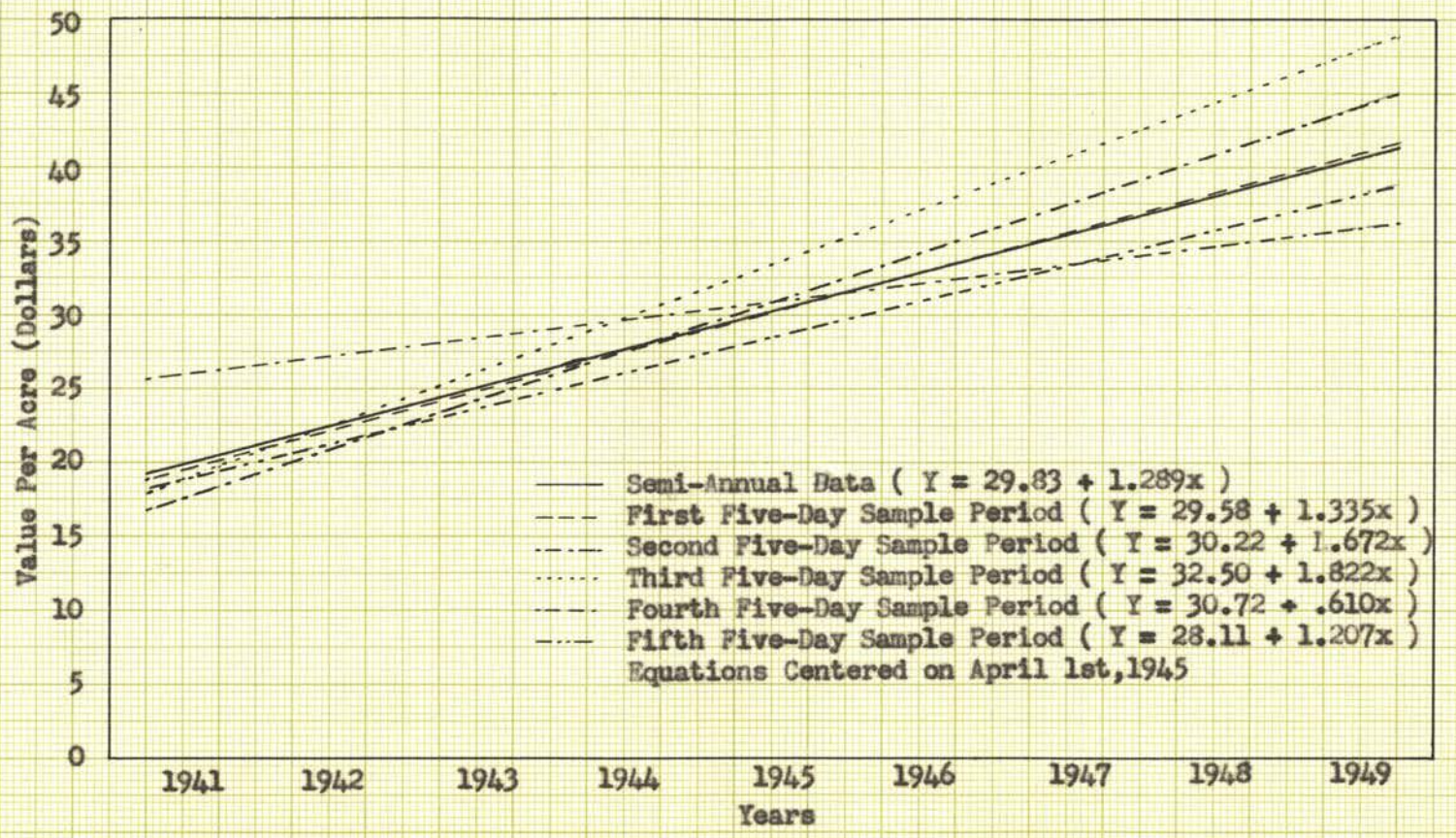
[6] George W. Snedecor, Op. cit., p. 65.

Figure 11. Regression Lines of Values Per Acre, Semi-Annual and by Five-Day Sample Periods, Payne County, Oklahoma, 1941-1949



Source: See Table 9.

from the regression coefficient computed from the semi-annual data. Consequently, the hypothesis stated previously was rejected.

The ten-day and fifteen-day sample periods of values per acre do not deviate significantly from the semi-annual values per acre, and thus make it possible to use these sample periods as indicators of the trend on the land market. In Figure 12, the regression lines of values per acre are drawn for the semi-annual data and the three ten-day sample periods. In Figure 13 are shown the regression lines for values per acre of the fifteen-day sample period and the semi-annual data, together with the semi-annual and sample values.

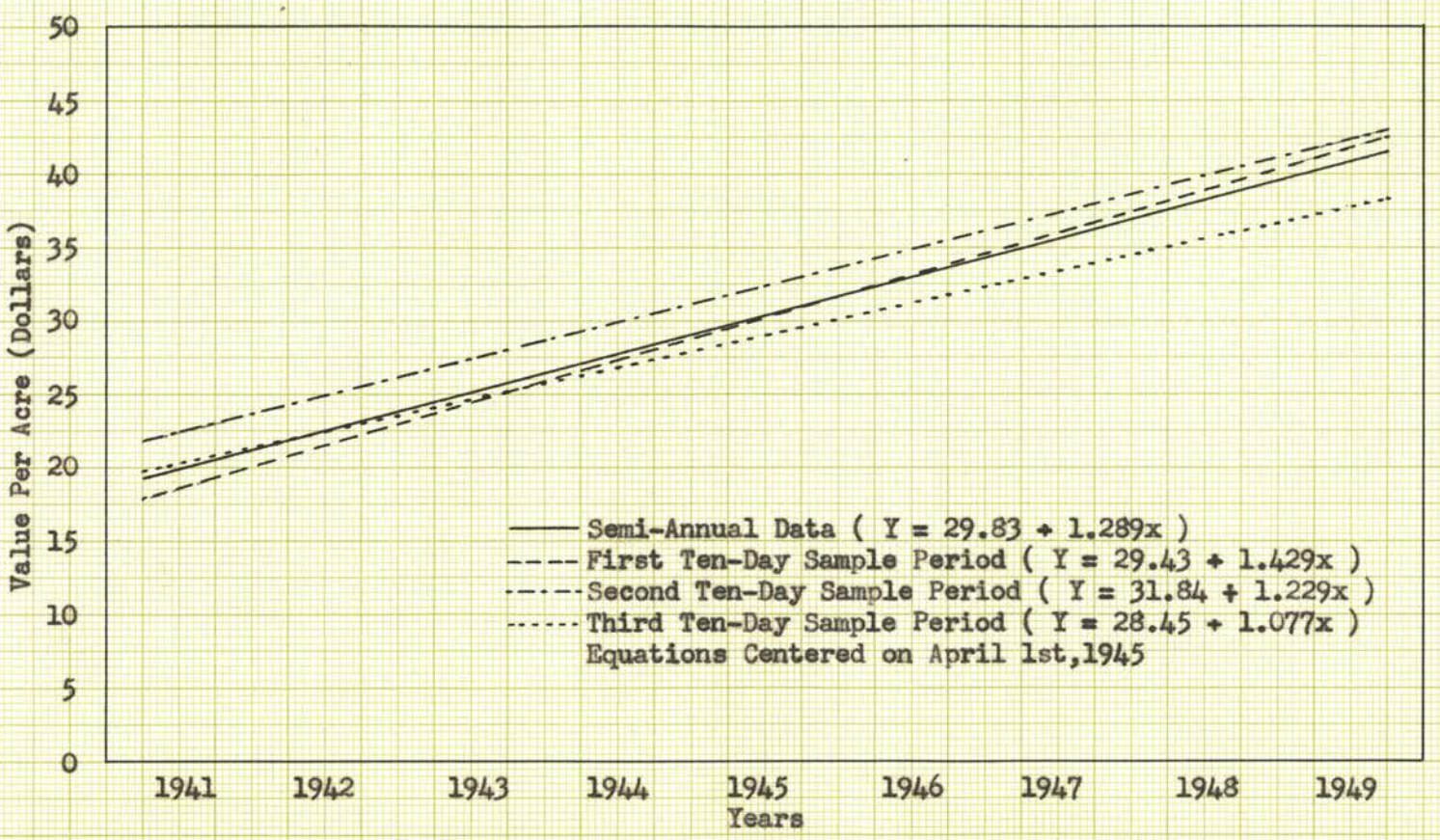
The regression coefficients for the two regression lines of semi-annual number of transfers are given in Table 15 together with the corresponding regression coefficients and t values for the different sample periods. It should be noticed that the t values were surprisingly low, running from plus .685 to minus .930, which means that for all sample periods there is more than 35 percent probability of getting a larger t value. It can be concluded that the t values furnish no evidence for rejecting the previously stated hypothesis.

Figure 14 reveals that the regression lines for the semi-annual data and the fifteen-day sample period of transfers follow each other very closely. The same is the case with the semi-annual transfers and transfers in the fifteen-day samples.

Test of Significance, Grady County

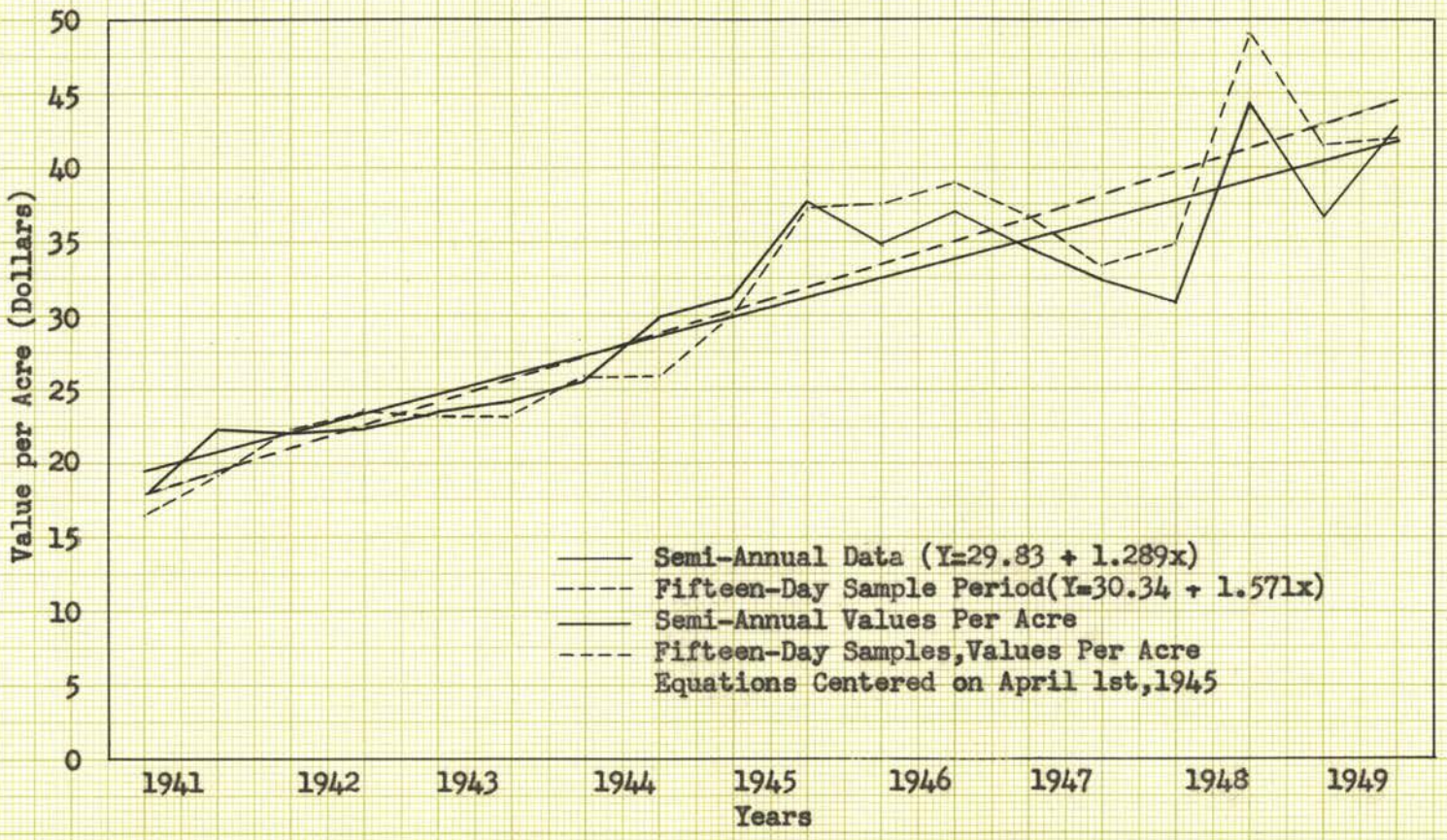
For making a check on the results of sampling on the land market for Payne county, samples were obtained by adding data semi-annually for time periods of the first fifteen business days of the month for Grady county (Table 16). The hypothesis stated and the statistical measures used in testing the hypothesis for Payne county were also applied to the data for Grady county. In order to make the semi-annual number of transfers comparable to the fifteen-day

Figure 12. Regression Lines of Values Per Acre, Semi-Annual and by Ten-Day Sample Periods, Payne County, Oklahoma, 1941-1949



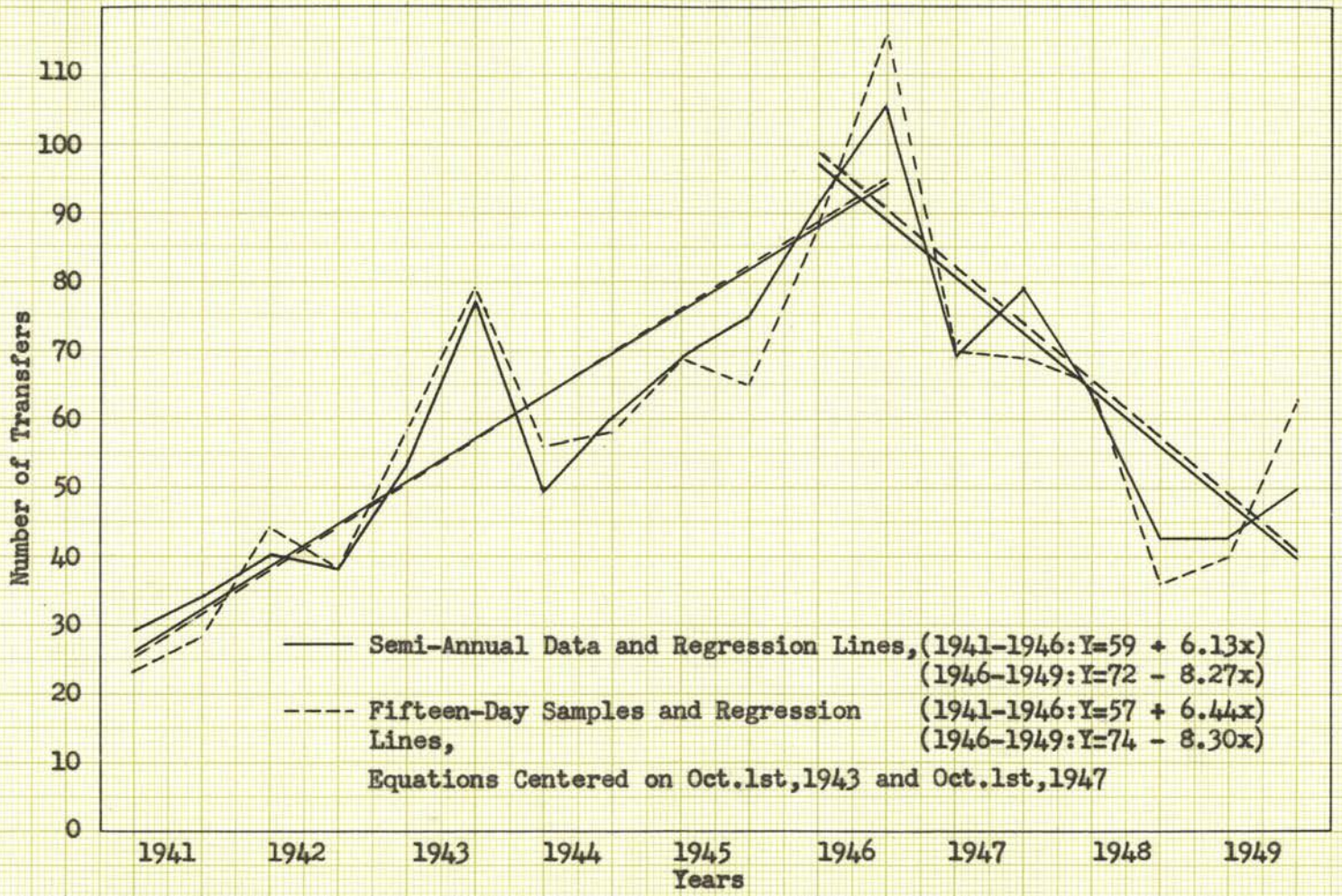
Source: See Table 11.

Figure 13. Semi-Annual Data and Fifteen-Day Samples of Values Per Acre and Corresponding Regression Lines, Payne County, Oklahoma, 1941-1949



Source: See Table 13.

Figure 14. Adjusted Semi-Annual Data and Fifteen-Day Samples of Transfers and Corresponding Regression Lines, Payne County, Oklahoma, 1941-1949



Source: See Table 13.

Table 16. Farm Land Values* and Number of Transfers by Fifteen-Day Samples and Semi-Annually, Grady County, Oklahoma, 1941-1949

Year	Half-Year	Fifteen-Day Sample: Value Per Acre	Fifteen-Day Sample: Transfers	Semi-Annual: Value Per Acre	Semi-Annual: Adjusted Semi-Annual Transfers**
		Dollars	Number	Dollars	Number
1941	1st	20.86	41	21.02	45
	2nd	22.20	63	24.46	84
1942	1st	26.28	68	27.73	63
	2nd	28.64	93	30.05	82
1943	1st	33.03	69	31.12	69
	2nd	40.41	82	35.54	91
1944	1st	34.24	83	34.49	71
	2nd	30.05	55	31.15	54
1945	1st	39.21	121	40.59	116
	2nd	37.82	98	38.59	91
1946	1st	39.23	125	39.31	119
	2nd	37.83	113	35.78	109
1947	1st	38.04	69	40.29	70
	2nd	33.10	75	38.70	69
1948	1st	43.69	89	44.38	74
	2nd	50.05	87	54.56	89
1949	1st	51.46	61	51.57	50
	2nd	45.38	57	44.28	60

* Sale value per acre of farm land and buildings.

** For making the semi-annual number of transfers comparable with the number of transfers taking place semi-annually in 15 business days of each month (90 business days in all), an adjustment had to be made. For an example, see Table 30.

sample, a similar adjustment was made as for Payne county.[7]

Before applying the chi-square test the semi-annual data were adjusted in order to make the sum the same as for the sampling period. The results of the chi-square test were both for the values per acre and number of transfers of the fifteen-day sample period. No significant deviations were found. The chi-square for the values per acre was 2.527, for the number of transfers 16.672, compared to the tabular value 28.869 (5 percent level and 18 degrees of freedom).

The regression coefficients for the semi-annual data and the fifteen-day sample periods for Grady county are shown in Table 17 together with their standard errors and the computed t values. The regression coefficients do not deviate very much from each other. This is reflected in the t values, of which none have significant values.

Figure 15 shows the changes in value per acre of semi-annual data and the fifteen-day samples. The regression lines for the same data have also been drawn, they follow each other closely. The semi-annual number of transfers and the number of transfers in the fifteen-day samples, together with the corresponding regression lines are drawn in Figure 16.

Comparing Individual Samples

Results of the chi-square test show that all five-day, all ten-day, and all fifteen-day sample periods of values per acre and number of transfers did not deviate significantly from the semi-annual data. Testing the regression coefficients for the different sample periods enumerated above against the regression coefficients for the semi-annual data shows that one of the five-day sample periods (the fourth) deviated significantly for values per acre; the

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[7] For an example of an adjustment see Appendix Table 30.

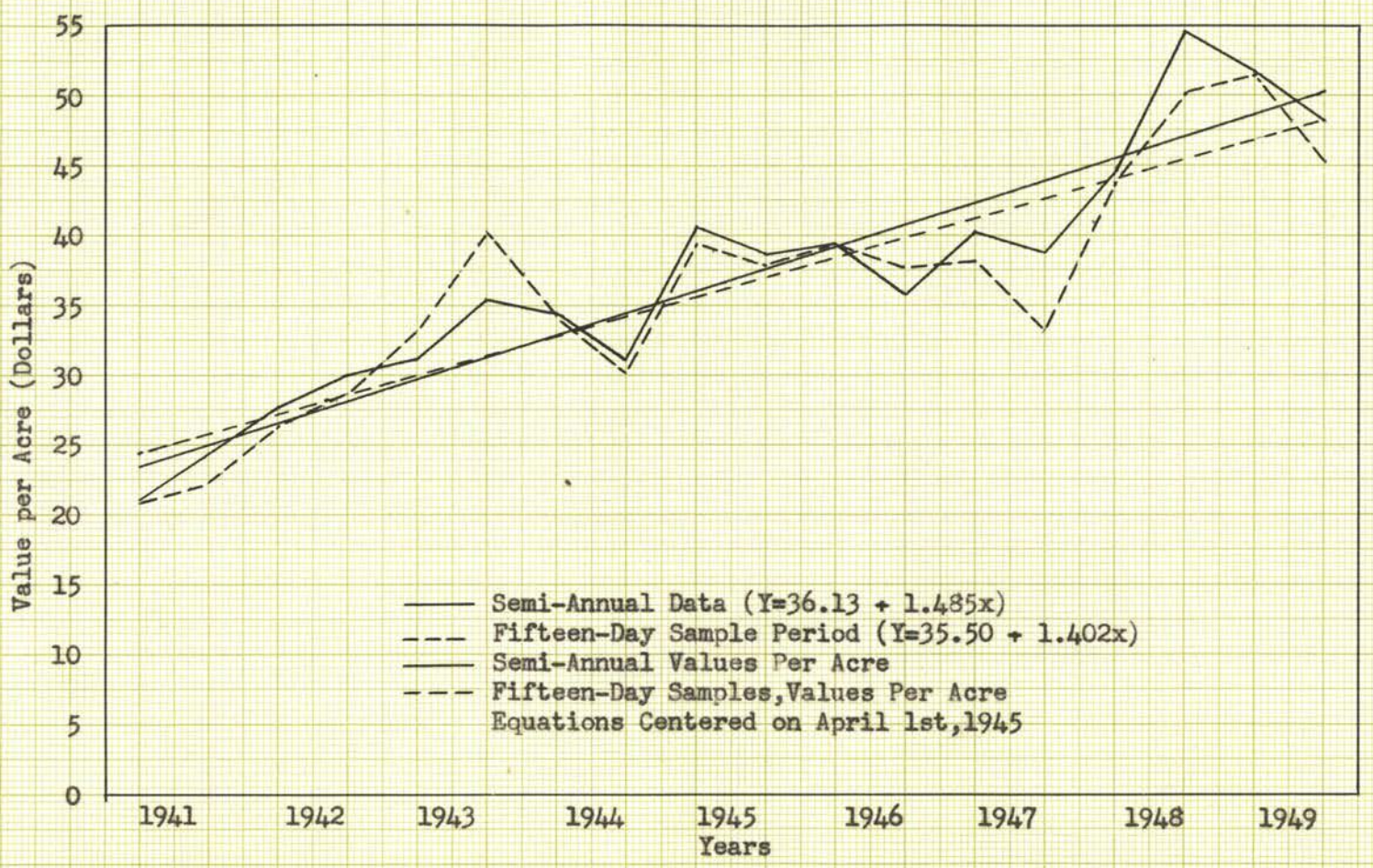
Table 17. Statistical Measures of Farm Land Values and Transfers*, Semi-Annually and by Sample Periods, Grady County, Oklahoma, 1941-1949

Item	Semi-Annual Data		Fifteen-Day Sample Period		
	Regression Coefficient	Standard Error	Regression Coefficient b	Standard Error s_b	Computed t Values**
Values Per Acre	1.485	.168	1.402	.199	- .417
Transfers, 1941-1946	4.615	1.488	5.801	1.442	.822
Transfers, 1946-1949	-7.690	2.453	-7.524	3.001	.055

* Sale value per acre of farm land and buildings and number of sales.

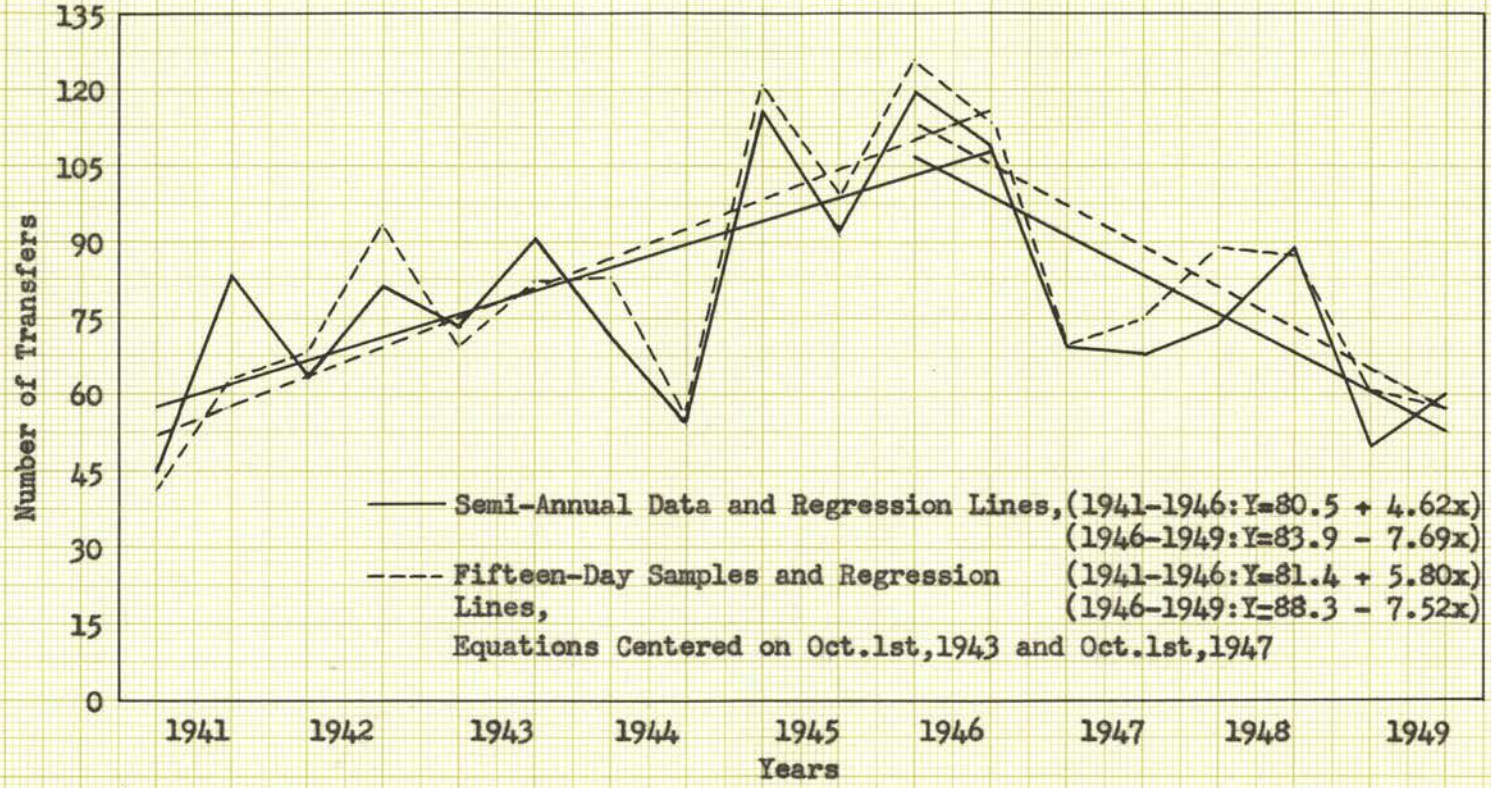
** The decision of whether the regression coefficients of the sample period deviate significantly from the regression coefficients of the semi-annual data was based on the t test. The t values of the different sample periods were computed by substitution in the formula $t = \frac{b - \beta}{s_b}$ where b is equal to the regression coefficient of the sample period, β the regression coefficient of the semi-annual data, and s_b the standard error of the sample period.

Figure 15. Semi-Annual Data and Fifteen-Day Samples of Values Per Acre and Corresponding Regression Lines, Grady County, Oklahoma, 1941-1949



Source: See Table 16.

Figure 16. Adjusted Semi-Annual Data and Fifteen-Day Samples of Transfers and Corresponding Regression Lines, Grady County, Oklahoma, 1941-1949



Source: See Table 16.

deviations of number of transfers was not significant. The hypothesis was rejected for the five-day samples as a result.

One of the remaining questions is if there is any difference between the ten-day and the fifteen-day sample periods and individual samples. In order to answer this question the different samples of values and transfers were compared individually and with the semi-annual data to see if any difference between the two sample sizes could be discovered.

The number of times sample values in a sample period followed changes in the semi-annual data were enumerated. The results are shown in Tables 18 and 19. The percentages are computed by dividing the possible number of changes, 17, into the frequencies of changes in the same direction for each sample period. The percentages indicate a slightly lower ability of the ten-day sample periods to follow the changes than the fifteen-day sample periods. The first ten-day sample period of values has been able to follow the same direction as the semi-annual data only 53 percent of the time. The fifteen-day sample period of values per acre for Payne county and the fifteen-day sample period of transfers for Grady county have both been able to follow the changes 71 percent of the time or 12 times out of 17. The values per acre in the fifteen-day sample period for Grady county followed the same direction as the semi-annual values per acre 16 times out of 17 or 94 percent.

A comparison of the range of percentages of the ten-day sample periods and the fifteen-day sample periods indicates that fifteen-day samples having a percentage range of 71 to 94 are better able in following the semi-annual changes than the ten-day samples with percentages ranging from 53 to 82 percent.

Another way to get information about the differences between the ten-day and the fifteen-day sample periods is a comparison of the ability of samples

Table 18. Ability of Ten-Day Samples to Follow the Semi-Annual Changes on the Land Market, Payne County, Oklahoma, 1941-1949*

Item	Ten-Day Samples			Semi-Annual Data**
	First	Second	Third	
	Frequency			
Values Per Acre	9	12	14	17
Transfers	13	12	12	17
	Percentage Distribution			
Values Per Acre	53	71	82	100
Transfers	76	71	71	100

* Summarized from Tables 11 and 12.

** There are 18 semi-annual samples in each of the ten-day sample periods, making 17 changes possible. The percentages have been computed by dividing 17 into the frequencies. For example, for the values per acre for Payne county, divide 9 by 17 and obtain 53 percent.

Table 19. Ability of Fifteen-Day Samples to Follow the Semi-Annual Changes on the Land Market, Payne and Grady Counties, Oklahoma, 1941-1949*

Item	Fifteen-Day Samples		Semi-Annual Data**
	Payne County	Grady County	
	Frequency		
Values Per Acre	12	16	17
Transfers	14	12	17
	Percentage Distribution		
Values Per Acre	71	94	100
Transfers	82	71	100

* Summarized from Tables 13 and 16.

** There are 18 semi-annual samples in each of the fifteen-day sample periods, making 17 changes possible. The percentages have been computed by dividing 17 into the frequencies. For example for the values per acre for Payne county, divide 12 by 17 and obtain 71 percent.

to estimate the semi-annual values within a certain range. If the semi-annual values per acre and the number of transfers were equal to 100 percent, how many of the samples would deviate less than plus or minus 10 percent? The results are given in Tables 20 and 21.

A surprisingly low number of transfers in the first and the third ten-day sampling period were within the limits of the range, only 6 out of 18 or approximately 33 percent. The ten-day samples of values per acre have been within the limits of the range more often but reached only as high as 12 out of 18 or 67 percent.

Both of the fifteen-day sample periods of values per acre had more values within the 90 to 110 percent range than the ten-day sample periods. Payne county included 13 out of 18 or 72 percent; Grady county had 16 out of 18 or 89 percent within the limits.

In order to check how much the most extreme case might be off in any ten-day or fifteen-day sample in the nine year period, the percentage range around the semi-annual data (equal to one hundred percent) was determined. All values per acre of the ten-day samples were within the range of 22 percent below to 33 percent above the semi-annual values per acre. For the ten-day samples of transfers the range was from 44 percent below to 28 percent above the semi-annual transfers. The values per acre of the fifteen day samples for Payne and Grady counties ranged from 14 percent below to 14 percent above the semi-annual values per acre. The fifteen-day samples of transfers had a wider range than the values, running from 25 percent below to 26 percent above the semi-annual number of transfers.

These different comparisons indicate clearly that the fifteen-day sample periods and individual samples of both values per acre and transfers were better in describing the semi-annual data than the ten-day sample periods and

Table 20. Frequency of Values Per Acre and Transfers of the Ten-Day Samples in A 90 to 110 Percent Range of the Semi-Annual Markets, Payne County, Oklahoma, 1941-1949*

Item	Ten-Day Samples			Semi-Annual
	First	Second	Third	
	Frequency			
Values Per Acre	12	10	11	18
Transfers	6	12	6	18
	Percentage Distribution**			
Values Per Acre	67	56	61	100
Transfers	33	67	33	100

* Summarized from Appendix Tables 31 and 32.

** There are 18 semi-annual samples in each of the various sample periods. The percentage distribution of the samples was computed by dividing 18 into the frequency. For example, in the first ten-day sample period, divide 12 by 18 and 6 by 18 to obtain a distribution of 67 percent for the values per acre and 33 percent for the transfers.

Table 21. Frequency of Values Per Acre and Transfers of the Fifteen-Day Samples In A 90 to 110 Percent Range of the Semi-Annual Markets, Payne and Grady Counties, Oklahoma, 1941-1949*

Item	Fifteen-Day Samples		Semi-Annual
	Payne County	Grady County	
	Frequency		
Values Per Acre	13	16	18
Transfers	10	13	18
	Percentage Distribution**		
Values Per Acre	72	89	100
Transfers	56	72	100

* Summarized from Appendix Tables 33 and 34.

** There are 18 semi-annual samples in each of the various sample periods. The percentage distribution of the samples was computed by dividing 18 into the frequencies. For example, in the sample period for Payne county, divide 13 by 18, and 10 by 18, to obtain a distribution of 72 percent for the values per acre, and 56 percent for the transfers.

individual samples of values per acre and number of transfers. But the above given percentages show that great variations from the semi-annual data have to be tolerated if the sampling method is used for obtaining information about the changes in the activity of the land market in six-months periods.

Recommendation for Sampling

The results of the sample study show that both the ten-day and the fifteen-day sample periods were able to describe the semi-annual data without significant deviation over the nine year period included in this study. They are recommended for future studies of similar time periods.

When it comes to the ability of the individual samples to indicate the semi-annual values per acre and number of transfers, the fifteen-day samples are the better of the two different sample sizes because they have been within a smaller percentage range of the semi-annual data than the ten-day samples. A range of 14 percent below the semi-annual data to 14 percent above included all fifteen-day samples of values per acre for Payne and Grady counties, whereas a percentage range of 22 percent below to 33 percent above was necessary in order to include all ten-day samples of values per acre. For the number of transfers the percentage range for the fifteen-day samples was from 25 percent below to 26 percent above for Payne and Grady counties, for the ten-day samples the range was from 44 percent below to 28 percent above the semi-annual number of transfers.

Only the fifteen-day samples of values per acre and number of transfers for Payne and Grady counties come sufficiently close to the semi-annual data to be recommended for future studies. The fifteen-day samples of transfers and the ten-day samples of values per acre and transfers deviate too much.

Chapter VI

SUMMARY AND CONCLUSIONS

The reliability of random samples as indicators of farm real estate activity in Payne and Grady counties was determined by testing semi-annual sample periods against the actual semi-annual values per acre and number of transfers for 1941 to 1949.

The hypothesis set up was: Five-day, ten-day, or fifteen-day sample periods of values per acre and number of transfers for Payne and Grady counties do not deviate significantly from the semi-annual data of farm real estate for the same time period.

Before the sample study was made a general description of characteristics of the land market was made. First, the distribution of values per acre and number of transfers during the month was checked for randomness for Payne county. It was found that no days throughout the month indicated any consistently higher activity on the land market than others. The data were randomly distributed.

Land market data were examined for seasonality in order to determine the best division of a year into six month periods. No seasonal movements were found in the values. The transfers indicated some seasonality but large fluctuations occurred, making it impossible to compute any seasonal index. Division of the year semi-annually into the first and the last six months of the year, January-June and July-December, was found best to eliminate the seasonality in the transfers.

The reliability of estimating considerations from amount of revenue stamps attached to the deeds was also made. An amount of $0.55 revenue stamps should and is assumed to be paid for each beginning $500 sales value, making

it possible to estimate considerations without error from the amount of revenue stamps except for the last $0.55 attached to the deed. When estimating the considerations for the last $0.55 revenue stamps the midpoint value, $250, of the $500 range has been the commonly used value. In order to test the ability of this value to describe the actual consideration for the last $0.55 revenue stamps, records with both cash consideration and amount of stamps given were selected and arranged in groups according to amount of stamps. All records with an amount of $0.55 revenue stamps went to make up the first group; all records with $1.10 revenue stamps made up the second group, etc. The actual considerations for the last $0.55 revenue stamps were then compared with the estimated considerations.

This comparison revealed that the midpoint value, $250, of the $500 range has not in any case been able to represent the actual considerations for the last $0.55 revenue stamps. If the actual considerations were expressed as a percentage of the possible consideration, $500, the smallest actual consideration for both counties would be 65.6 percent, increasing to 90 to 100 percent with increasing amounts of revenue stamps, whereas the midpoint value, $250, would be only 50 percent. This means that the midpoint value, $250, not only is too low but that different values should be used for different sized considerations.

A comparison of the total estimated consideration in each group with the total actual consideration in preference to the comparison of the considerations for the last $0.55 revenue stamps was made. The discrepancies were greatest for the groups with the smallest amount of revenue stamps attached to the deed. For instance, for Payne county the estimated value for the group with an amount of $1.10 revenue stamps, $750, would be approximately 12 percent below the actual value, whereas the estimated value for an amount of $9.90 revenue stamps,

$9,250, would be only 2.6 percent below the actual value.

Comparing the sum of considerations stated in the records for the period studied, 1941 to 1949, with the sum of estimated considerations for the same time period, underestimations of 4.1 percent for Payne county and 3.4 percent for Grady county were found.

A yearly summary of land market data was made for the two counties in order to compare the yearly changes on a county basis with the yearly state changes. It was found that the indices for Payne and Grady counties were able to describe the trend of the State index but fluctuations occurred from year to year. For instance, the indices for both counties indicated a faster increase in sale values during the war years, 1941-1945, than the State index, resulting in indices for 1945 of 172, 171, and 136 for Payne county, Grady county and the state respectively. Since 1945 the State index indicated a more rapid increase than the county indices. In 1949 the indices were 199, 205, and 220 for Payne county, Grady county, and the State respectively.

Before the sampling study was made national holidays and Sundays were eliminated in order only to include business days in the samples. The business days were given consecutive numbers in each month, from one to twenty-four or twenty-five, depending on the number of days excluded. Then three different basic time periods of the month were selected in order to test the above stated hypothesis: five-day, ten-day, and fifteen-day time periods. Five five-day time periods and three ten-day time periods were obtained for Payne county by dividing the numbered business days in the month consecutively into five-day and ten-day time periods. One fifteen-day time period was obtained for both Payne and Grady counties by selecting the first fifteen business days of the month. Samples were obtained by adding the time periods semi-annually.

In measuring the reliability of sampling the land market, two different measurements were used: Chi-square and regression coefficients. Both of these statistics measured the deviations of the sample periods from the semi-annual data.

The chi-square test showed that none of the different sized sample periods of values and transfers deviated significantly from the semi-annual data. The test based on regression coefficients indicated that one of the five-day sample periods of values per acre deviated significantly. The hypothesis, therefore, that five-day sample periods of values per acre and number of transfers do not deviate significantly from the semi-annual data was rejected.

The ten-day and the fifteen-day sample periods of values per acre and transfers did not deviate significantly from the actual data. These sample periods are recommended for future studies of similar time periods.

A summary of how much a sample can vary from the actual data without being statistically significant was made by expressing the sample data as percentage of the semi-annual data. It was found that wide ranges were necessary in order to include all samples. For the ten-day samples of values per acre a range of 22 percent below to 33 percent above the semi-annual data was necessary in order to include all samples; for the ten-day samples of transfers the range was 44 percent below to 28 percent above.

The fifteen-day samples of values per acre and transfers for Payne and Grady counties required a smaller range than the ten-day samples in order to include all sample data. Most of the sample values were within the actual data plus or minus 10 percent. However, a range around the actual data of plus or minus 14 percent was necessary to include all the samples of values per acre. For the samples of transfers the range was from 25 percent below to 26 percent above the actual number of transfers. Even though rather wide ranges are needed

in order to include all the samples, it is believed that the fifteen-day samples of land market data can be used in obtaining reliable information about semi-annual changes on the land market.

A P P E N D I X

Appendix Table 22. Number of Acres Transferred, Total Sale Value, Value Per Acre*, and Number of Transfers, By Day of the Month, Payne County, Oklahoma, 1941-1949

Date	Transferred Acres	Total Sales Value	Value Per Acre	Transfers
	Number	Dollars	Dollars	Number
1	6,778	181,870	26.83	65
2	5,189	146,325	28.20	43
3	6,441	210,305	32.65	58
4	4,807	141,375	29.41	46
5	7,282	214,188	29.41	73
6	5,138	194,783	37.91	57
7	6,813	199,800	29.33	64
8	5,702	162,335	28.47	59
9	6,031	191,600	31.77	56
10	6,454	214.550	33.24	61
11	6,516	186,829	28.67	59
12	6,735	228,250	33.89	67
13	5,853	194,044	33.15	55
14	5,268	192,196	36.48	59
15	5,996	220,184	36.72	55
16	5,666	202,275	35.70	59
17	7,317	256,725	35.09	70
18	6,920	234,988	33.96	76
19	7,330	238,480	32.53	69
20	5,855	148,700	25.40	52
21	8,449	276,486	32.72	82
22	3,667	105,350	28.73	39
23	6,146	221,775	36.08	58
24	5,886	163,941	27.85	56
25	6,229	170,022	27.30	55
26	5,702	167,340	29.35	51
27	4,778	171,900	35.98	44
28	7,831	212,345	27.12	61
29	6,728	203,775	30.29	66
30	6,661	221,456	33.25	62
31	3,822	89,450	23.40	40
Total	189,990	5,963,642	31.39	1,817

* Total sale value and value per acre of [illegible]

Appendix Table 23. Values Per Acre of Farm Real Estate*, by Month and Year, Payne County, Oklahoma, 1941-1949

Year	Months												Monthly Average
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	Dollars												
1941	13.75	18.30	18.97	15.90	18.18	18.27	29.95	20.41	23.66	17.72	23.22	20.91	20.06
1942	16.83	27.37	12.05	25.25	21.48	26.45	23.75	18.01	15.68	23.47	26.76	23.43	22.18
1943	30.88	18.70	20.44	17.64	25.58	33.44	22.04	23.71	25.27	21.42	27.77	25.83	23.84
1944	25.37	29.93	24.44	23.25	23.77	28.02	22.21	30.01	21.77	27.48	40.22	35.04	27.98
1945	23.12	30.47	37.98	28.04	42.56	29.25	36.02	38.43	38.06	29.38	33.26	45.58	34.59
1946	36.82	27.67	40.73	37.13	27.90	38.86	33.62	39.59	34.20	42.09	39.85	32.14	35.96
1947	31.92	40.41	37.29	24.12	44.98	27.91	29.87	23.58	43.61	33.66	30.78	30.25	33.37
1948	41.58	31.25	32.76	23.47	25.54	26.48	44.59	35.67	43.27	61.41	47.23	33.18	36.55
1949	24.70	27.26	43.81	29.80	71.59	32.30	54.36	43.53	48.92	45.52	39.96	27.03	39.98

* Sale value per acre of farm land and buildings.

Appendix Table 24. Values Per Acre of Farm Real Estate*, by Month and Year, Grady County, Oklahoma, 1941-1949

Year	Months												Monthly Average
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	Dollars												
1941	17.89	20.67	18.98	19.82	25.34	24.17	33.90	18.45	20.66	22.86	19.60	27.46	23.32
1942	30.21	30.92	24.19	40.96	29.29	22.76	35.29	33.95	37.15	28.45	24.03	27.37	29.06
1943	30.63	32.35	35.44	37.44	23.38	30.45	41.72	34.43	36.45	29.80	33.46	37.56	33.74
1944	38.38	35.69	27.56	26.69	26.82	36.37	47.07	42.16	19.20	38.36	23.33	25.39	33.15
1945	43.24	37.31	49.46	31.71	42.32	42.61	31.90	45.41	37.62	43.50	33.09	45.68	39.77
1946	36.28	38.07	42.66	36.47	35.42	46.37	37.77	35.88	31.52	33.65	29.43	45.03	37.66
1947	51.10	46.49	17.88	45.82	25.55	21.27	48.28	38.77	32.14	38.95	34.90	37.13	39.52
1948	43.66	38.14	77.45	39.55	31.70	49.84	50.01	56.76	57.23	37.15	45.18	77.76	50.19
1949	47.58	47.07	58.03	61.61	74.09	41.67	39.41	49.33	40.02	35.31	45.15	53.48	47.73

* Sale value per acre of farm land and buildings.

Appendix Table 25. Number of Transfers*, by Month and Year, Payne County, Oklahoma, 1941-1949

Year	Month												Year
	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	
	Number												
1941	7	9	8	11	7	6	8	10	10	9	10	11	106
1942	11	16	7	8	16	9	6	9	5	16	15	14	132
1943	6	15	24	13	16	16	20	16	18	29	25	24	222
1944	21	14	10	16	11	12	6	13	20	28	12	23	186
1945	25	19	19	23	13	18	19	15	22	20	22	29	244
1946	32	28	30	23	22	18	27	32	27	28	35	31	333
1947	15	24	17	22	22	16	19	26	23	26	17	24	251
1948	24	23	18	16	15	14	13	14	11	9	17	10	184
1949	5	15	13	12	11	17	11	17	11	25	9	13	159
Total	146	163	146	144	133	126	129	152	147	190	162	179	1,817
Average	16.2	18.1	16.2	16.0	14.8	14.0	14.3	16.9	16.3	21.1	18.0	19.9	201.9

* Transfers of farm land and buildings.

Appendix Table 26. Number of Transfers*, by Month and Year, Grady County, Oklahoma, 1941-1949

Year	Month												Year
	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	
	Number												
1941	17	14	10	9	16	9	13	11	19	26	26	47	217
1942	31	13	17	5	16	24	29	18	9	9	35	39	245
1943	54	32	25	29	15	20	23	19	28	33	18	34	330
1944	45	22	17	7	16	14	7	16	14	25	15	15	213
1945	49	29	31	29	32	26	31	22	23	30	35	13	350
1946	37	34	47	38	23	21	26	29	37	29	24	40	385
1947	32	35	18	9	11	13	19	18	27	17	19	17	235
1948	43	24	10	22	8	19	22	22	20	29	31	28	278
1949	16	21	19	11	6	12	7	11	18	19	19	29	188
Total	324	224	194	159	143	158	177	166	195	217	222	262	2,441
Average	36.0	24.9	21.5	17.7	15.9	17.6	19.7	18.4	21.7	24.1	24.7	29.1	271.2

* Transfers of farm land and buildings.

Appendix Table 27. Differences Between Monthly Number of Transfers* and Twelve Month Moving Average of Transfers, Payne County, Oklahoma, Monthly, 1941-1949

Year	Month											
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Number											
1941							- 1.0	.5	- .3	- .5	.2	.7
1942	.7	5.8	-3.0	-2.0	5.5	- 1.9	- 4.8	-1.6	-6.2	3.9	2.7	1.4
1943	-7.5	.5	8.8	-3.3	-1.3	- 2.1	.9	-3.7	-1.1	10.4	6.5	5.8
1944	3.6	-2.7	-6.7	- .7	-5.1	- 3.5	- 9.7	-3.0	3.4	10.7	- 5.7	5.0
1945	6.2	- .4	- .6	3.7	-6.4	- 2.1	- 1.6	-6.3	- .1	- 2.6	- 1.0	5.7
1946	8.3	3.3	4.2	-3.3	-5.0	- 9.7	0	5.8	1.5	3.1	10.2	6.2
1947	-9.3	.2	- 6.3	-1.1	- .3	- 5.2	- 2.3	4.4	1.4	4.6	- 3.9	3.5
1948	3.8	3.6	- .4	-1.2	-1.5	- 1.9	- 1.5	.6	-1.9	- 3.5	4.8	-2.1
1949	-7.2	2.8	.7	-1.0	-2.3	3.9						
Total	-1.4	13.1	- 3.3	-8.9	-16.4	-22.5	-20.0	-3.3	-2.7	26.1	13.8	26.2
Average	- .2	1.6	- .4	-1.1	- 2.1	- 2.8	- 2.5	- .4	- .3	3.3	1.7	3.3

* Transfers of farm land and buildings.

Appendix Table 28. Differences Between Monthly Number of Transfers* and Twelve Month Moving Average of Transfers, Grady County, Oklahoma, Monthly, 1941-1949

Year	Month											
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Number											
1941							- 5.7	- 8.2	- .5	6.4	6.6	27.0
1942	9.7	-9.3	- 5.2	-16.0	- 4.7	3.2	7.6	- 5.1	-15.3	-16.6	8.5	12.7
1943	28.1	6.3	- 1.5	.7	-13.6	- 7.7	- 4.1	- 7.3	2.4	8.7	-5.5	10.7
1944	22.7	.5	- 3.8	-12.9	- 3.5	- 4.5	-10.9	- 2.4	- 5.3	4.2	-7.3	- 8.5
1945	24.0	2.7	4.1	1.5	3.5	- 3.3	2.3	- 6.4	- 6.3	- .3	4.7	-16.7
1946	7.7	4.6	16.7	7.2	- 7.3	-10.0	- 5.9	- 2.7	6.5	.9	-2.4	14.4
1947	7.0	10.8	- 5.3	-13.4	-10.7	- 7.5	- 1.0	- 2.0	7.7	- 2.5	- .9	- 3.0
1948	22.6	3.3	-10.5	1.2	-13.8	.5	0	1.2	- 1.0	8.0	10.5	8.0
1949	-3.1	3.0	1.5	- 6.0	-10.1	- 3.6						
Total	118.7	21.9	- 4.0	-37.7	-60.2	-32.9	-17.7	-32.9	-11.8	8.8	14.2	44.6
Average	14.8	2.7	- .5	- 4.7	- 7.5	- 4.1	- 2.2	- 4.1	- 1.5	1.1	1.8	5.6

* Transfers of farm land and buildings.

Appendix Table 29. Values Per Acre of Semi-Annual Data and the First Five-Day Sample Period and Corresponding Chi-Squares, Payne County, Oklahoma, 1941-1949*

Year	Half-Year	Value Per Acre: Semi-Annual	Five-Day Sample	Adjusted** Semi-Annual	Chi-Square
		Dollars	Dollars	Dollars	
1941	1st	17.56	18.59	17.42	.079
	2nd	22.32	21.99	22.14	.001
1942	1st	21.96	24.37	21.29	.446
	2nd	22.42	19.62	22.25	.311
1943	1st	23.40	24.28	23.22	.048
	2nd	24.17	25.31	23.98	.074
1944	1st	25.67	24.72	25.47	.022
	2nd	29.74	27.70	29.51	.111
1945	1st	31.10	27.10	30.86	.458
	2nd	37.63	31.32	37.34	.971
1946	1st	34.82	45.21	34.55	3.289
	2nd	36.87	34.55	36.58	.113
1947	1st	34.62	32.55	34.35	.094
	2nd	32.28	21.36	32.03	3.554
1948	1st	30.92	29.04	30.68	.088
	2nd	44.09	56.40	43.75	3.658
1949	1st	36.51	38.09	36.22	.097
	2nd	42.64	42.24	42.30	.000
Sum		548.72	544.44	544.44	13.41

* Source: Table 9.

** It was necessary to adjust the sum of the semi-annual data to the sum of the five-day sample period in order to be able to apply the chi-square test. A correction coefficient was computed by dividing 544.44 by 548.72, equal to .99220. Each of the semi-annual values per acre were multiplied with the coefficient, for example 17.56 times .99220 equals ~~18.59~~ 17.42 for the first five-day sample.

Appendix Table 30. Number of Business Days, Total Number of Transfers, and Number of Transfers Comparable to Five-Day, Ten-Day, and Fifteen-Day Samples of Transfers, Payne County, Oklahoma, Semi-Annually, 1941-1949*

Year	Half Year	Business Days	Transfers Semi-Annual Number	Transfers Comparable to Five-Day Sample Number	Transfers Comparable to Ten-Day Sample Number	Transfers Comparable to Fifteen-Day Sample Number
1941	1st	151	48	9.5	19	29
	2nd	153	58	11.4	23	34
1942	1st	152	67	13.2	26	40
	2nd	153	65	12.7	25	38
1943	1st	152	90	17.8	36	53
	2nd	154	132	25.7	51	77
1944	1st	153	84	16.5	33	49
	2nd	152	102	20.1	40	60
1945	1st	152	117	23.1	46	69
	2nd	153	127	24.9	50	75
1946	1st	151	153	30.4	61	91
	2nd	153	180	35.3	71	106
1947	1st	151	116	23.0	46	69
	2nd	153	135	26.5	53	79
1948	1st	154	110	21.4	43	64
	2nd	154	74	14.4	29	43
1949	1st	152	73	14.4	29	43
	2nd	154	86	16.8	34	50

* The semi-annual number of transfers had, in order to be comparable to the different samples, to be adjusted to the same number of business days as the samples contained. A five-day sample included 30 business days semi-annually, a ten-day sample 60, and a fifteen-day sample 90 business days semi-annually. An example will illustrate the adjustment method used: Total number of transfers for the first half year of 1941 was made comparable to the five-day sample by dividing the semi-annual number of business days, 151, into the semi-annual number of transfers, 48, and multiplying the result with the number of business days in the sample, 30, to obtain 9.5 transfers.

Appendix Table 31. Values Per Acre of Ten-Day Samples in Percent of Semi-Annual Values Per Acre, Payne County, Oklahoma, 1941-1949

Year	Half-Year	Ten-Day Samples			Semi-Annual
		First	Second	Third	
1941	1st	109	88	102	100
	2nd	100	110	109	100
1942	1st	97	121	97	100
	2nd	90	127	92	100
1943	1st	100	114	89	100
	2nd	92	107	100	100
1944	1st	101	100	95	100
	2nd	85	112	112	100
1945	1st	79	115	102	100
	2nd	94	98	98	100
1946	1st	114	91	90	100
	2nd	101	103	87	100
1947	1st	87	133	86	100
	2nd	98	106	97	100
1948	1st	119	90	84	100
	2nd	114	98	90	100
1949	1st	106	111	78	100
	2nd	92	103	112	100

Source: The percentages are computed from the semi-annual data and the ten-day samples in Table 11.

Appendix Table 32. Ten-Day Samples of Transfers in Percent of Semi-Annual Number of Transfers, Payne County, Oklahoma, 1941-1949

Year	Half-Year	Ten-Day Samples			Semi-Annual
		First	Second	Third	
1941	1st	84	89	137	100
	2nd	83	109	122	100
1942	1st	119	96	85	100
	2nd	100	100	100	100
1943	1st	117	75	81	100
	2nd	102	106	96	100
1944	1st	115	103	76	100
	2nd	110	85	113	100
1945	1st	102	93	96	100
	2nd	82	96	120	100
1946	1st	95	98	108	100
	2nd	106	111	83	100
1947	1st	117	102	80	100
	2nd	68	128	111	100
1948	1st	91	107	102	100
	2nd	79	107	128	100
1949	1st	83	121	107	100
	2nd	124	97	56	100

Source: The percentages are computed from the semi-annual data and the ten-day samples in Table 12.

Appendix Table 33. Values Per Acre of Fifteen-Day Samples in Percent of Semi-Annual Values Per Acre, Payne and Grady Counties, Oklahoma, 1941-1949

Year	Half-Year	Fifteen-Day Samples: Payne County	Fifteen-Day Samples: Grady County	Semi-Annual
1941	1st	93	99	100
	2nd	86	91	100
1942	1st	101	95	100
	2nd	105	95	100
1943	1st	101	106	100
	2nd	97	114	100
1944	1st	100	99	100
	2nd	87	96	100
1945	1st	96	97	100
	2nd	99	98	100
1946	1st	108	100	100
	2nd	106	106	100
1947	1st	106	94	100
	2nd	103	86	100
1948	1st	113	98	100
	2nd	111	92	100
1949	1st	113	100	100
	2nd	98	102	100

Source: The percentages are computed from the semi-annual data and the fifteen-day samples in Tables 13 and 16.

Appendix Table 34. Fifteen-Day Samples of Transfers in Percent of Semi-Annual Number of Transfers, Payne and Grady Counties, Oklahoma, 1941-1949

Year	Half-Year	Fifteen-Day Samples: Payne County	Fifteen-Day Samples: Grady County	Semi-Annual
1941	1st	79	91	100
	2nd	82	75	100
1942	1st	110	108	100
	2nd	100	113	100
1943	1st	109	100	100
	2nd	103	90	100
1944	1st	114	117	100
	2nd	97	102	100
1945	1st	100	104	100
	2nd	87	108	100
1946	1st	97	105	100
	2nd	109	104	100
1947	1st	119	99	100
	2nd	87	109	100
1948	1st	102	120	100
	2nd	84	98	100
1949	1st	93	122	100
	2nd	126	95	100

Source: The percentages are computed from the semi-annual data and the fifteen-day samples in Tables 13 and 16.

Appendix Table 35. Computation of Trend Equation and Trend of Values Per Acre, Payne County, Oklahoma, 1941-1949

Year	x	Value Per Acre y (Dollars)	xy	x^2	Yearly Trend, 1941-1949* (Dollars)
1941	- 4	20.06	- 80.25	16	20.50
1942	- 3	22.18	- 66.54	9	23.00
1943	- 2	23.84	- 47.68	4	25.50
1944	- 1	27.98	- 27.98	1	28.00
1945	0	34.59	0	0	30.50
1946	+ 1	35.96	+ 35.96	1	33.00
1947	+ 2	33.37	+ 66.74	4	35.50
1948	+ 3	36.55	+ 109.65	9	38.00
1949	+ 4	39.98	+ 159.92	16	40.50
Total	0	274.51	149.83	60	274.50

$a = \frac{274.51}{9} = 30.50$

$b = \frac{+149.83}{60} = 2.50$

Yearly trend, centered on July 1, 1945 : $Y = 30.50 + 2.50x$.

Monthly trend, centered on July 1, 1945 : $Y = 30.50 + .21x$.

* The yearly trend, 1941-1949, was computed by substituting x in the equation: $Y = 30.50 + 2.50x$, with the different values in second column in the table. For example, the trend value for 1941 was obtained by substituting x in the equation with minus 4.

The yearly trend equation was converted to a monthly trend equation by dividing 12 into 2.50 in order to obtain the monthly change, .21.

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