AN ANALYSIS OF SELECTED DETERMINANTS OF TEXAS LOTTERY REVENUE

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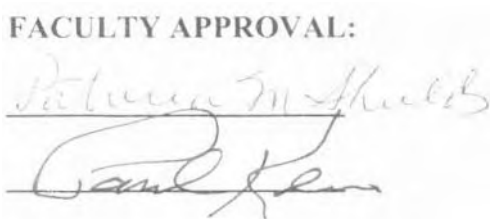

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ABSTRACT

State lotteries have been implemented in a majority of the United States. The anti-tax sentiment throughout the country has contributed to the approval and growth ot'this alternative method of revenue generation. In Texas. over $21 billion in sales has been produced since the lottery hcgan operating in 1992. Generally. this source of revenue has not been a stable or predictable one. Through the examination of certain intlucnces on lottery revenues. officials can gain insight on ways to increase sales and maximize revenue if they so desire. In this study. multiple regression analysis is employed to evaluate the impact of four selected determinants on Texas lottery revenues. The four dctenninants analyzed in this study are the lottery payout rate. advertising expenditures. numhcr ofjackpots of $25 million or more and the state unemployment rate. Of these four. the unemployment rate was found to have a significant impact on lottery revenues. Since the unemployment rate is a factor outside the control of lottery officials, the remaining three were also analyzed. Of the remaining three dctenninants. advertising expenditures were found to have a significant impact on lottery revenues.

CHAPTER ONE
INTRODUCTION

The Texas Lottery began generating revenue for the State of Texas in 1992. Originally estimated to generate $61 million in revenue during its first year and $400 million the following year, the lottery surpassed all expectations. During the lottery's first biennium, revenue generated from sales totaled more than $900 million. For several years Texas lottery sales have enjoyed tremendous success. By the end of 1997, yearly sales for the Texas Lottery totaled $3.745 billion and revenue to the state had reached $1.182 billion (Lottery Commission 1998).

These figures are enormous when compared to other segments of the entertainment industry in Texas. Table 1.1 represents gross sales of lottery tickets and economic activity generated from the other segments of the entertainment industry compiled from sales tax records.

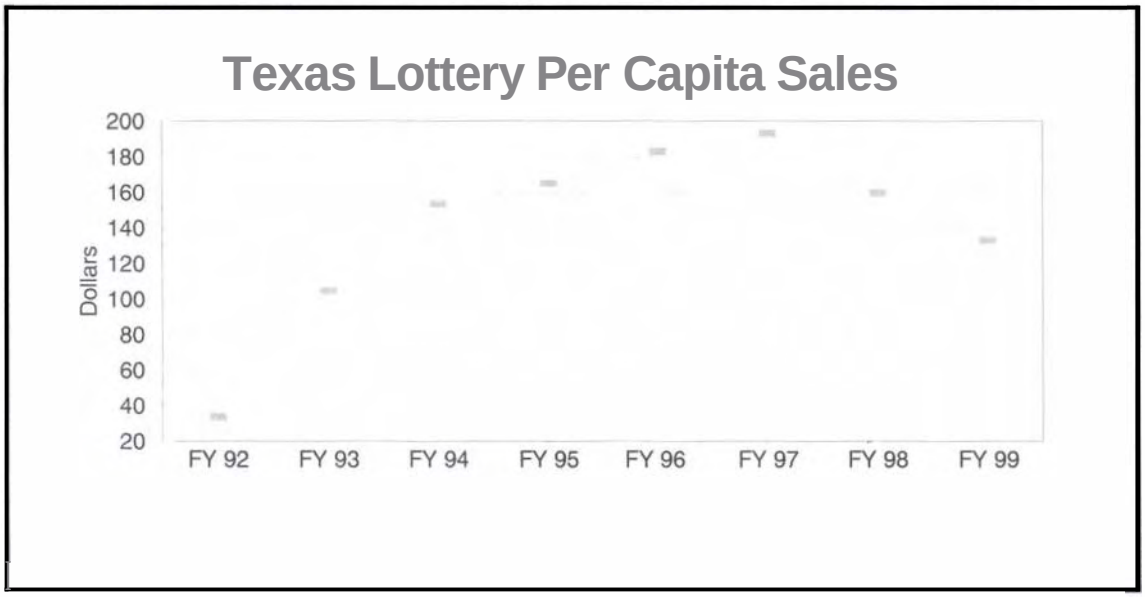
Table 1.1 Gross Sales of the Texas Entertainment Industry

	Fiscal 1996	Fiscal 1997
Amusement and recreation	$ 737,376,334	$ 895,799,023
Motion picture theaters	$ 464,896,560	$ 515,537,285
Motion picture and video production	$ 416,840,622	$ 480,027,681
Record and pre-recorded tape stores	$ 332,689,366	$ 325,956,207
Video tape rental	$ 505,192,344	$ 298,213,741
Amusement parks	$ 258,285,536	$ 292,156,865
Texas Lottery	$3,432,309,408	$3,745,469,123

(Source: Lottery Commission)

As the 1998 fiscal year began, Texas lottery sales began to decline. Figure 1.1 shows this decline. Several factors have been mentioned as possible contributors to this decline. In order to better understand the revenue potential of the Texas lottery, it would be helpful to acknowledge factors that can influence lottery revenues.

Figure 1.1 Texas Lottery Per Capita Sales Fiscal Year 92 - 99



(Source: Texas Lottery Commission)

Research Purpose

The purpose of this research is to identify and examine the major factors that influence lottery revenues in Texas. The relationship between these influences on lottery revenue will be included in the research. Specifically, this research focuses on the impact the lottery payout rate, advertising expenditures, number of lottery jackpots of $25 million or more, and the state employment level has on lottery revenue.

Organization of Research

A comprehensive review of the literature related to state lotteries is presented in Chapter Two. The history of lottery, the advantages and disadvantages, why people play, who plays, and the factors influencing lottery revenue will be discussed. In addition, this chapter presents the conceptual framework utilized for this study and summarizes the research hypotheses. Chapter Three identifies the methodology used in this study - multiple regression analysis. The strengths and weaknesses of multiple regression are explained. Also, there is discussion of the dependent and independent variables, and how the variables are operationalized. The findings of this research are examined in Chapter Four. Results are presented in both narrative and tabular form. The relationship between the dependent variables and the independent variable is analyzed and discussed. Finally, Chapter Five presents conclusions drawn from the analyses, as well as recommendations for future research.

CHAPTER TWO
LITERATURE REVIEW

This chapter examines and reviews the available literature on lottery operations in the United States. It begins with a brief description of the history of the lottery, arguments used for and against the adoption of lotteries, and a description of typical lottery players. The main purpose of the paper is the explanation of factors that influence lottery revenues. A description of each factor and its relationship to lottery revenue is discussed in relation to the appropriate research literature. Finally, this chapter presents the formal hypothesis which serves as the conceptual framework for the empirical portion of this study.

The Commission on the Review of National Policy Toward Gambling defined lottery as a form of gambling where chances to win a prize are sold.[1] The majority of prizes are cash and winners are picked through random selection procedures. Contrary to some players belief, there are no skills involved in playing (Mikesell and Zorn 1986).

In 1994 the District of Columbia and thirty-eight states engaged in lottery operations that contributed over $11.5 billion in revenue to government treasuries (McGowan 1994). U.S. Lottery sales totaled over $36 billion in 1999.[2] "Lottery sales exceed those of all other products sold directly by state governments to the public and are larger than all but three major activities of state government: education, public welfare and highways" (Clotfelter and Cook 1990, p. 105).

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[1] The Commission conducted the National Study on Gambling, a national survey conducted in 1975 involving 1,735 respondents. The Commission issued the report, *Gambling in America,* in 1976.

[2] Unaudited sales reported by LaFleur's Lottery World website [www.lafluers.com].

Table 2.1 State Lotteries' Fiscal Year 1999 Sales (in $millions)

Arizona	268.3	Minnesota	390.0
California	2,525.1	Missouri	513.3
Colorado	368.4	Montana	30.0
Connecticut	871.0	Nebraska	72.4
Delaware	527.4	New Hampshire	199.0
District of Columbia	205.0	New Jersey	1,658.2
Florida	2,176.6	New Mexico	89.2
Georgia	2,034.3	New York	3,697.6
Idaho	90.5	Ohio	2,144.9
Illinois	1,524.4	Oregon	728.5
Indiana	681.4	Pennsylvania	1,668.7
Iowa	184.1	Rhode Island	741.4
Kansas	202.8	South Dakota	554.6
Kentucky	575.7	Texas	2,580.0
Louisiana	296.2	Vermont	70.4
Maine	144.5	Virginia	934.5
Maryland	1,084.1	Washington	473.4
Massachusetts	3,381.6	West Virginia	392.6
Michigan	1,774.5	Wisconsin	428.2

(Source: LaFleurs Lottery World)

History of Lottery

Lotteries began to take root in colonial times. The colonies were severely restricted in their ability to raise funds independent of Mother England. The colonial government began to sponsor lotteries as a way to fund worthwhile causes. This became a popular revenue generator because of the general anti-tax sentiment of the colonists (Blakey 1979).

In the early 1700's, lotteries funded two main purposes that today are traditionally government-funded responsibilities. The first program was educational institutions. The educational lotteries were held to provide revenues to build the infrastructure for the fledgling higher education system and to establish and provide basic education to the residents of the early frontier area (McGowan 1994).

The second main program of colonial lotteries was public interests, this program included public infrastructure such as roads, canals, bridges, and fire houses (Clotfelter and Cook 1990). Many public infrastructure projects during colonial times would not have been built because the government's authority to collect taxes for such purposes was repeatedly opposed (McGowan 1994).

Lotteries were also approved during this time to benefit individuals if the profit was to be used to pay off debts from bankruptcy. Thomas Jefferson had even applied to the State of Virginia in 1826 to conduct a lottery to pay off his debts. He expected to use his home and land holdings as the lottery prize but passed away before the lottery was carried out (McGowan 1994).

Upon the declaration of independence from Great Britain, the government needed a way to fund the war effort. A national lottery funded the armed forces of the revolutionary government. After the national lottery was established many colonies quickly began their own lottery operations to support the revolutionary war (McGowan 1994).

After the war, the new states remained desperate for funds. The need for public services increased with the population. Until dependable revenue sources were developed, lotteries would continued to enjoy success. In 1832, eight eastern states used lotteries to raise a total of $66.4 million annually (Blakey 1979).

Before the civil war, lottery popularity waned. Lottery operators developed corrupt games and often disappeared with the proceeds without distributing prizes. Organized opposition began to emerge from reform groups. States outlawed lottery operations because of citizen complaints. By 1842 ten states and the federal government had imposed bans on lotteries.

For sixteen years, a Louisiana company ran the only state licensed lottery. Ninety three percent of the company's revenues came from outside the state. The federal government received numerous complaints from other states regarding use of the mail system to deliver lottery tickets. The Supreme Court quickly upheld a Congressional ban on the postal service from delivering lottery tickets. Since the majority of Louisiana lottery players were from outside the state, the lottery died from lack of participation. By the turn of the century, lotteries were banned in every state. (Clotfelter and Cook 1990).

A new era of lottery operations began in the 1960's. States were searching for additional ways to increase revenues with least resistance from its citizens. New Hampshire became the first state to engage in this system of revenue generation. In 1963, New Hampshire adopted a lottery, the first of the modem era (DeBoer 1986a).

Lottery activities did not become successful until New Jersey established its lottery in 1971. New Hampshire and New York, which approved a lottery in 1967, failed to reach revenue expectations. New Hampshire had instituted a high price of three dollars per lottery ticket and New York devoted only thirty percent of lottery revenue toward prizes. These two practices, although later changed, did contribute to the disappointing record (Aronson, Weintraub and Walsh 1972).

New Jersey was the first state to generate significant revenue from its lottery. New Jersey designed its lottery format taking into account citizen preference. Innovations such as a lower priced ticket, more drawings with better odds and additional sales outlets are credited for its success. New Jersey was also the first state to use numbered tickets instead of requiring players to furnish names and addresses upon purchase. This innovation proved to become widely popular as players did not like writing their names and addresses for each ticket. New Jersey also began the practice of heavily promoting its lottery operations, another reason for its sudden popularity (Mikesell and Zorn 1986).

Increasing pressure on state budgets began a new wave of lottery adoptions across the country during the 1980s. Lottery adoptions were approved in three states in 1980, including the first western states to approve a lottery, Arizona and Colorado. At the end of the decade, over 66 percent of the United States population would reside in lottery states (Clotfelter and Cook 1989).

Table 2.2 United States Lotteries' Start-up History

Lottery	Method of Authorization	Approval Rate	Date Begun
Arizona	Initiative	51%	July 1,1981
California	Initiative	58%	October 3, 1985
Colorado	Initiative	60%	January 24, 1983
Connecticut	Legislation	NA	February 15,1972
Delaware	Legislation	NA	October 30,1975
District of Columbia	Initiative	66%	August 25,1982
Florida	Referendum	64%	January 12,1988
Georgia	Referendum	52%	June 29, 1993
Idaho	Referendum	51%	July19,1989

Lottery	Method of Authorization	Approval Rate	Date Begun
Illinois	Legislation	NA	July 30, 1974
Indiana	Referendum	62%	October 13,1989
Iowa	Legislation	NA	August 22,1985
Kansas	Referendum	64%	November 12, 1987
Kentucky	Referendum	60%	April 4, 1989
Louisiana	Referendum	65%	September 6,1991
Maine	Referendum	61%	June 27, 1974
Maryland	Referendum	80%	May 15,1973
Massachusetts	Legislation	NA	March 22, 1972
Michigan	Referendum	67%	November 13,1972
Minnesota	Referendum	57%	April18, 1990
Missouri	Referendum	70%	January 20, 1986
Montana	Referendum	70%	June 27,1987
Nebraska	Referendum	63%	September 11,1993
New Hampshire	Legislation	NA	March 12, 1964
New Jersey	Referendum	82%	December 16,1970
New Mexico	Legislation	NA	April 27, 1996
New York	Referendum	61%	June 1, 1967
Ohio	Legislation	NA	August 22, 1974
Oregon	Initiative	66%	April 25, 1985
Pennsylvania	Legislation	NA	March 6, 1972
Rhode Island	Referendum	NA	May 30,1974
South Dakota	Referendum	60%	September 30,1987
Texas	Referendum	65%	May 29, 1992
Vermont	Referendum	66%	February 14,1978
Virginia	Referendum	57%	September 20, 1988
Washington	Legislation	NA	November 11, 1982
West Virginia	Referendum	67%	January 9,1986
Wisconsin	Referendum	65%	September 14,1988

(Source: La Fleur's Lottery World)

Modem advances brought more popularity and success to lottery operations across the country. New computerized versions of lottery tickets and games were developed and instituted. New technology brought innovative advancements to the lottery. The instant game ticket was developed. This form of game allowed lottery players to discover immediately if they had won a prize and allowed instant verification, and sometimes instant payoff, at retailer outlets. A daily computerized version of a numbers game was developed to appeal to the lottery's main competitor, the illegal numbers game, which proliferates in urban settings? The lotto game was also developed (Clotfelter and Cook 1990).

Lotto's have begun to dominate the portfolio of most lottery operations as the main revenue generator. This form is a computerized game with a low probability of winning. Players are allowed to pick a selection of numbers, usually six, from a limited field, usually 50. A random set of numbers is selected at a preset time, usually weekly. Anyone holding a ticket with the selected numbers is declared the winner and awarded the jackpot or a share thereof. If no one comes forward with a winning ticket, the jackpot is added to the next drawing. A concept known as a "rollover" and is a key reason for the popularity of the game (Clotfelter and Cook 1990).

There are now five types, or categories, of modem lottery games that are recognized and included in most U.S. lottery programs. A state may or may not include all of the types, depending on a particular state's lottery commission or its players interests (Clotfelter and Cook 1990).

The first category is passive games. These games are described as a sweepstakes type of

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[3]New York officials and law enforcement credit the development of the daily numbers with shutting down a majority of the illegal lottery trade. The illegal game is now known only to exist in certain parts of the city of New York.

game. Winners are picked at random from a pool of contest entries and the winner is awarded a prize (Mikesell and Zorn 1987).

Instant games are another type of lottery game. Instant games are commonly referred to as "scratch offs" by players. An instant ticket contains a removable coating that reveals whether the ticket is a winner and, if it is, the size of the prize. A common feature in some states is for players to enter a second-chance drawing. Players are allowed a single entry for each non-winning ticket they have purchased. Prizes are often large, such as vacations, cars, or boats (Mikesell and Zorn 1987).

Numbers is another type of game and is primarily played daily. Players select a three or four digit number and compare their selection to the randomly selected winning number. Prizes are generally the same daily amount (Mikesell and Zorn 1987).

Lotto is the next category of lottery game. As stated earlier, a player chooses a predetermined amount of numbers from a limited field and winning numbers are identified at random. The jackpot is usually a percentage corresponding to the tickets sold in the particular drawing and can be shared by multiple winners. If the winning ticket is not sold, the jackpot is rolled into the prize pool for the next drawing (Mikesell and Zorn 1987).

The final type is keno games. Keno is modeled after the casino version of the game. The player selects a group of numbers from a pre-established field of numbers. The lottery then selects another group of numbers from the field. Random selection then determines the winning numbers. The percent of winning numbers on the player's ticket determines the size of the payoff. The odds of winning and the prize amount depend on the number of selections made by the player (Mikesell and Zorn 1987).

The Advantages and Disadvantages of Lottery

The debate over state sponsored lottery has been vociferous. Each side of the argument contains opinions that resemble a moralistic tome. This paper addresses some of the basic arguments for and against the adoption and implementation of lottery activities.

The most common argument for lottery adoption is its potential as a new public revenue source. Proponents tout the lottery as an ideal form of public finance because unlike taxes no one is coerced to contribute (Mikesell and Zorn 1986).

One belief used to support lottery activities is that human beings have an inclination for risk-taking and gambling by nature. If people are predisposed to engage in this type of activity, then states should participate and fairly regulate gambling. In doing so, the state enjoys a revenue stream similar to the taxes on alcohol and cigarettes and citizens are provided a legitimate outlet for gambling tendencies (Clotfelter and Cook 1989).

The legitimacy of state sanctioned gambling emerged long before modem day lottery proposals. For example, states previously debated the use of bingo games for public and charitable purposes. In many earlier instances, bingo games were conducted in open defiance of state and civil prohibitions against them. Many respectable civic and public organizations were running games for charity. State and local law enforcement officials were reluctant to shut down the popular operations. Bingo games became an acceptable form of gambling in the eyes of the public. By 1973, thirty-eight states had approved bingo as a legalized form of gambling (Clotfelter and Cook 1989).

Many states had also approved gambling in the form of pari-mutual betting on horse and dog racing. By 1986, thirty-six states had approved this form of gambling. Proponents of the

lottery argued states had already legitimized gambling as a government sponsored activity and lotteries should be legal as well (Karcher 1989).

At the same time, public opinion favoring adoption of lotteries began to rise across the country. Every lottery poll taken after 1938 had more supporters than opponents. In 1964, the public approval rating was around 50 percent. In 1975 it had jumped to 61 percent and by the end of 1982 it had risen to over 70 percent (Clotfelter and Cook 1989).

Public opinion and support for lottery activities rose to one of the strongest arguments for lotteries adoption. The public was especially fond of the lottery's ability to generate revenue without increasing or imposing new taxes. During and after the recession of the 1980s, states were more than willing to embrace popular alternative revenue sources. Lotteries were adopted in a number of states. Adoptions increased the pressure for approval in the remaining holdout states.

If a neighboring state instituted a lottery, adjoining states would generally follow suit. A state's fear of lost revenue from players crossing state lines to play was a major factor in adoption of the lottery in states like New York and New Jersey. (Mikesell and Zorn 1986).

Arguments against lottery are equally zealous. Opponents state the lottery is a tax that places undue burden on the lowest income segment of society. Many scholars[4] have questioned the equity of the lottery tax because of this belief. Studies have found the lottery tax makes a state tax system more regressive (Mikesell and Zorn 1988). Survey data proved regressivity in Pennsylvania, Connecticut, California, and Illinois (Price and Novak 2000).

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[4]See Clotfelter and Cook (1987), (1989); Borg, Mason and Shapiro (1981), Scott and Garen (1994) and Stranahan and Borg (1998).

Other opponents are equally displeased with the lottery for eroding the state's ethical values. Lottery play tends to lead to an ethical teaching of easy money over the value of hard work and savings (Clotfelter and Cook, 1989).

Legislators speaking in opposition have often criticized lottery as an unstable and unreliable source of revenue. As this paper will explain later, lottery revenue is influenced by a number of factors. These factors include changing consumer preferences, introduction of new games, competition from other lottery states, marketing efforts, as well as economic factors outside the control of the states (Mikesell and Zorn 1986).

Today, lottery revenue is being relied upon more and more by governments for the provision of goods and services. States have begun to aggressively market the lottery to increase revenues. Opponents insist an ethical dilemma has been created as the state has been placed in the business of exploiting citizens (Mikesell and Zorn 1986).

When demand for lottery tickets decreases, states often attempt to increase the demand. The easiest way to stimulate demand is by increasing advertising. Advertising plays a critical role in reminding, promising, and reinforcing the reasons why a player buys a lottery ticket (Karcher 1989).

Lottery advertising is criticized for the way in which ads are structured. Two distinct approaches are used to increase sales. The first, "front loading", calls for heavy advertising when a game is introduced. Second, timing advertising, schedules advertisements to coincide with paydays and the typically high levels of consumer spending accompanying them. Both approaches have their critics (Clotfelter and Cook 1989).

The lottery as a state revenue source is a high cost operation. Some of the factors that lead to high costs include marketing and promotional activities. As stated earlier, the lottery has

to be aggressively marketed and promoted to maintain or increase revenue levels. In 1998, advertising costs alone for state lotteries amounted to over $374 million (La Fleur 1999).

In order to maintain integrity, players require guarantees the lottery is not fixed. States' maintain costly security precautions and operations (Mikesell and Zorn 1988). Because of high operating costs, opponents argue the lottery would not even be considered as a revenue source if it was not promoted as a voluntary tax. An enormous amount of money is spent promoting the lottery in efforts to induce citizens to participate. These promotional efforts give opponents additional arguments that lottery as a voluntary tax is a misnomer (Mikesell and Zom 1988).

Critics have also assailed the extensive marketing practices used to promote the lottery. Present day marketing and promotional practices used by states give a misleading impression to the lottery player. Lottery marketing avoids disclosing details such as the minute probability of winning the lottery and the present value of prizes, which are usually distributed over several years. These criticisms add to the argument that the state is engaged in business practices it normally does not approve (Karcher 1989).

Opposition to the lottery centers around the burden it places on the poor. A study of the income redistribution effects of Texas lottery games found the games to be highly regressive (Price and Novak 2000). Findings such as these raise concerns about principles of good government. A number of political leaders have taken a stand against lottery adoption because of the belief that gambling is immoral and should not be sanctioned in any form. In light of increasing public opinion in favor of the lottery, arguments about regressive taxation and the appropriateness of the state encouraging people to gamble seem to fall on deaf ears (Clotfelter and Cook 1989).

Why People Play Lottery

Lotteries have become an integral and sometimes increasing part of states' revenue packages. In 1992, state lotteries contributed $11.5 billion to government treasuries (McGowan 1995). Many lottery states have tried to increase lottery participation rates. In order to accomplish this, an understanding of why people play lottery games is required.

In a 1986 Los *Angeles* Times poll, California lottery players were asked whether they played the lottery for amusement or cash. Responses were about evenly divided. Lower income respondents were more likely to cite money as a reason and higher income respondents were more likely to cite entertainment (Clotfelter and Cook 1990).

Lottery officials research game attributes favored by players in attempts to enhance overall participation. Attributes include a high percentage of sales returned as prizes, low ticket prices, frequent prize drawings, a large grand prize, and increased odds for winning at least a small prize. Lotteries attempt to address preferences through the mix of games offered, such as lotto and instant games (DeBoer 1986a).

One reason for playing the lottery may be characterized as an illusion. Langer's (1975) research on the "illusion of control" is dependent on the tendency of the lottery player to deny the operation of chance in the technique employed by the lottery operator to select winning numbers.[5] The player believes choosing winning numbers is partly a matter of skill (Clotfelter and Cook, 1990). A 1951 survey of British gambling behavior produced a similar results. An increase in gambling participation was noted when the gambler believed he was exercising skill (DeBoer 1986a).

[5]Langer found the introduction of choice or other active involvement in chance situations increased people's willingness to take risks.

Marketing is an important reason why many people play the lottery. States have begun expansive marketing campaigns that sometimes target a specific segment of the population. One tool used in advertising is the concept of availability, defined as the ease at which players visualize the prospect of winning the grand prize. Lottery advertising concentrates on winners and the wonderful possibility of winning. As noted earlier, the slim chances of actually winning are never mentioned (Clotfelter and Cook 1990).

Who Plays Lottery

Lottery officials are interested in who plays the lottery. This information is helpful for marketing purposes since lottery advertising is geared toward increasing participation among the pool of existing players.[6] Clotfelter and Cook (1990) estimated that sixty percent of residents living in lottery states have played at least once. Ten percent of lottery players account for roughly half of lottery sales. Twenty percent of lottery players account for roughly 65 percent of sales (Clotfelter and Cook 1990).[7]

In a Pennsylvania Lottery study, income, age, and formal education where shown to have an impact on the sale of lottery tickets (Heavey 1978). This supports later evidence of social class as a good indicator of lottery participation because sales tend to fall in response to formal education (Clotfelter and Cook, 1990). In the Pennsylvania study, race was not shown to have a statistically significant impact on lottery sales (Heavey 1978).

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[6]The Public *Gaming* Research Institute reports lotteries reach eighty-five percent of the U.S. population. The Institute estimates that more than two-thirds of all adults play the lonely.

[7]Typical of the marketing concept known as "Pareto's law of the heavy half'. The top 20 percent of consumers of any good account for about 80 percent of total purchases.

Factors Influencing Lottery Revenue

"The success of a lottery depends, of course, on the willingness of people to gamble" (Aronson, Weintraub, and Walsh 1972: 3). Vroom (1976) found New York players were bored with the same lottery game and sales begin to fall. Theil (1991) found similar results with declining participation and revenue in the Washington state lottery. Mikesell and Zom (1987) theorized that new and innovative games are critical to increasing lottery sales. In developing new methods to increase sales, such as advertising, publicity and increased frequecy of drawings, officials began to investigate the factors that influenced lottery revenue (Clotfelter and Cook 1990). The following factors,

- competition among states,
- probability of winning,
- few large jackpots,
- prize payout and tax rate,
- price of ticket,
- age of a lottery,
- economic conditions,
- specificity of purpose,
- advertising, and
- minority population,

are viewed as the most common influences on lottery revenue. In some cases, manipulation of these factors have been shown to increase or decrease lottery revenues.

Competition Among States

Competition from other lottery states is a factor over which states exercise little control. A 1987 study on the effect of maturity and competition on state lottery markets found significant impact to a state's lottery sales if the state is bordered by states who do not have a lottery (Mikesell and Zorn 1988).

New Hampshire instituted the first lottery but soon competition would end the monopoly and cut into revenues. When New York began its lottery, New Hampshire's annual revenues decreased by $2.5 million (Blakey 1979). In a study on lottery sales from eighteen states that operated a lottery in 1984, states without competition from neighboring states had higher per capita lottery sales (Mikesell 1987).

Scholars realize the lottery can be an excellent short term revenue generator. They also doubt its usefulness as a long term policy because it seldom maintains the level of revenue enjoyed soon after introduction. Although many factors contribute to this phenomenon, interstate competition is one of the biggest. (Aronson, Weintraub, and Walsh 1972).

A possible way in which competition could be negated is by instituting a high tax on a player's winnings from lotteries outside the player's home state. This reduces the attractiveness of playing an out of state lottery. The next solution involves the institution of a federal lottery that disperses a state's revenue on a percentage of the state's citizens share of the bets. This solution reduces the effect of competition because all states are involved in the same lottery. One criticism, the federal government now looks for an administrative cut of the revenue the individual state now enjoy only for themselves (Aronson, Weintraub, and Walsh 1972).

Probability of Winning

Increases in lotto sales are known to result in better probability of a player winning, which has the effect of more people winning. As more people win there are fewer jackpot rollovers, therefore fewer larger jackpots to attract more players. Deboer's research found the odds should be increased as ticket sales increase in order to keep the likelihood of large sales and the lure of big jackpots (DeBoer 1990).

The opposite effect was found to apply in Aronson, Weintraub, and Walsh's earlier study conducted on lottery ticket revenue. A three state analysis of the lottery in New Jersey, New York, and New Hampshire concluded there is a positive relationship between the probability of winning and lottery ticket revenue (Aronson, Weintraub, and Walsh 1972). An opposite finding appeared in Vrooman's later study of only the New York Lottery, results showed that increasing the probability of winning did not increase ticket sales (Vrooman 1976).

The state of Washington experimented with a reduction in the odds of winning in an effort to generate more interest in its lotto game. The state lottery agency decreased the odds of winning in an effort to increase the number of large jackpots. As stated earlier and discussed in the next section, large jackpots are known to increase interest in lotto and stimulate sales, thus increasing revenue. Results proved the policy adopted was a success in making the game more attractive and is justified within the appropriate context (Thiel 1991).

Few Large Jackpots

> "Few very large jackpots generate excitement. The director of New York's lottery claimed that a $5 million jackpot did not create great interest, and a $10 million jackpot produced only 'a bit of a nudging'. When the jackpot's grew to $17 million, betters were eager to by tickets" (DeBoer 1990: 73).

DeBoer, Mikesell and Zorn found the small size of the lottery jackpot can be an impediment to increased sales. Higher jackpots increase sales (Mikesell and Zorn 1988).

As ticket sales increase, the likelihood of someone winning the grand prize also rises. The probability of jackpot rollover is low. Scoggins developed a model to show that artificially increasing the prize amount with revenue outside of the lotto revenue stream can increase net revenues. Scoggins found that maximum impact on net revenue will occur after three consecutive jackpot rollovers plus the additional revenue (Scoggins 1994).

Prize Payout and Tax Rate

The lottery player's idea of a perfect lottery would be the one they are named the winner. If winning is not possible, they at least hope to participate in a fair lottery. Aronson, Weintraub, and Walsh (1972) define the lottery as most fair when all money received from ticket sales are paid out in prizes, amounting to a 100 percent payout rate and a zero percent tax rate. A structure that would undoubtedly be popular with the players.

Unfortunately, the state has no reason to use a 100 percent payout rate because the purpose of the lottery is revenue generation. Further, states must take into account the cost of lottery administration. Clotfelter and Cook (1990) found that by increasing prize payout to a point, states can increase revenues. One method of increasing prize payout is through a reduction in price of a lottery ticket, which has shown to increase sales. The common lottery practice of players reinvesting smaller prizes in additional tickets is a good reason to assume an increase in payout rates results in increased sales (Clotfelter and Cook 1989).

Research by Vasche (1985) and DeBoer (1986) provides evidence of tax rates influencing

revenues. In Vasche's 1983 study of eighteen state lotteries, lower lottery tax rates did not increase net revenues. One explanation was little variance in state's tax rates, which were between 43 to 56 percent. Common sense indicates an increase in the lottery tax rate decreases sales. DeBoer found declining sales in response to rising tax rates somewhere between the 1983 maximum of 56 percent and 100 percent. Lower tax rates resulted in higher payout rates and larger prizes, which are found to increase participation rates (DeBoer 1986b).

Price of Lottery Ticket

Methodological problems have made it difficult to establish an empirical relationship between the price of a lottery ticket and overall sales. Ticket prices are basically the same in most states. The lack of variation hampers the ability to reveal any empirical relationship. The tendency of states to implement lottery activities by copying the success of other lottery operations has also contributed to the uniformity in lottery ticket prices. For this reason, scholars search for other ways to measure price reduction. For example, lotto jackpot rollovers are a form of price reduction that have been shown to stimulate sales (Clotfelter and Cook 1990).

Age of a Lottery

The age of a lottery is noted as a factor explaining declining sales in many state lottery operations. Few states can maintain the increasing revenue levels enjoyed soon after introduction of a lottery. A study on the effects of age on lottery sales was instituted using data from the Census Bureau's ***State Government Finance in 1984.*** The eighteen state analysis showed a trend that annual sales rose initially and began to decline with age. The maximum point of sales was

reached at about ten years of operation (Mikesell 1987).

Deboer (1990) and Mikesell (1994) believe lotteries may have reached the mature stage of their product life cycle and thus operate typically as any other product. Sales of successful products often grow rapidly in first years after introduction. New customers discover the products and increase their purchases. Once a product's market is fully exploited, sales growth tends to slow (DeBoer 1990). Overall sales are expected to stabilize after the initial period of introduction.

DeBoer's (1986b) study on the factors influencing lottery revenue did not support the maturity effect hypothesis? One criticism of this study may be the use of pooled information as the data set on lottery systems. Another criticism may be the period in which the sales occurred. The early 1980s were a time of phenomenal growth for lotteries in general, many were instituted for the first time after many years of prohibition (DeBoer 1986b).

Economic Conditions

Economic conditions such as unemployment and personal income are also known to influence lottery revenue. Studies found support for both positive and negative influences. When economic conditions are prosperous, unemployment rate is low and incomes are high, people may spend more on lottery tickets (DeBoer 1990). Mikesell and Zorn (1988) found that states with higher incomes have higher lottery sales, as cited in DeBoer (1990). On the other hand, in an earlier study Vrooman found that increases in unemployment rate and decreases in

[8]The maturity effect refers to the decline in sales growth of a lottery and the leveling off of overall ticket sales. The average time period of this phenomena is ten years after lottery introduction.

income increase lottery sales (Vrooman 1976).

Lottery sales are known to be sensitive to changes in the state unemployment rate, with sales increasing as the unemployment rate increases. Low levels of economic activity appear to greatly enhance the attractiveness of the small chance of winning the lottery (Mikesell 1994).

Personal income is another factor that influences lottery revenue. DeBoer (1986) found that higher disposable income increased sales. Mikesell (1994) found the lower the personal income of the player, the more likely the person would play the lottery. The lure of winning and desire to change circumstances are greatest for the lower income players.

In Heavey's (1978) Pennsylvania lottery study, multiple regression analysis was used to test variables of income, age, race, and education of lottery players. Only income was found to have a significant effect on lottery sales. Lottery participation decreases as the income level of the player is raised (Heavey 1978).

Evidence from Clotfelter and Cook (1989) suggests there is little relationship between income and lottery participation. Data showed expenditures appeared to be uniform over a broad range of income levels. As a percentage of income, lottery expenditures decline as income rises. The study found that the lowest income class spent two percent of income on lottery play while those with incomes above $40,000 spent just .05 percent of income on lottery play. Thus, as a percentage of household income, lottery expenditures decline as income rises (Clotfelter and Cook (1989).

Specificity of Purpose

Dedicating lottery revenues to a specific purpose can influence sales. In a 1983 study on

18 state lotteries, Vasche found a more favorable impression of the lottery and an increase in per capita sales if the revenue from lottery sales are dedicated to a specific purpose. Parks, education or care for the elderly are some of the examples of socially popular programs which receive dedicated lottery funds (Vasche 1985).[9]

Advertising

States have become increasingly dependent on lottery revenue to provide services. For this reason states are equally dependent on advertising to maintain a certain level of sales. Lottery marketing can influence revenue. Using conventional advertising strategies, constant exposure of a brand reinforces the experience of satisfaction and invites the consumer to relive the experience again and again. Constant exposure of a lottery ticket and ticket agent locations has an opposite effect. This strategy reminds players they did not win, creating a negative feeling which is reinforced the next time the player contemplates playing."[10] Advertising is used to transfer a feeling of happiness and fun from playing the game (Karcher 1989).

In enacting its lottery legislation, Virginia passed a ban on advertisements inducing people to play. Only passive advertising such as the types of games offered, how to play, and odds of winning, were allowed. The ban was prompted by evidence given during legislative debate showing Illinois had provided a disproportionate amount of advertising in black

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[9]The National Gambling and Impact Study Commission notes ten states earmark lottery money exclusively for education while 15 others use it for tourism, parks and recreation, economic development or construction of public buildings. Colorado directs revenue to environmental protection. Massachusetts redistributes lottery revenue to local governments. In FY 1997, over $500 million was provided to Massachusetts' cities and towns.

[10]Mr. Edward Trahan, advettising consultant for the Maryland Lottery, reiterated this point in his testimony before the Senate Subcommittee on Intergovernmental Relations in 1984. Mr. Trahan was defending advertising strategies designed to lure players with images of fun and excitement.

neighborhoods attempting to boost sales. (Clotfelter and Cook 1989).

Studies have found that passive advertising has a negative effect on sales, leading to reduced revenue. Pennsylvania Governor Rob Case had instructed their lottery commission to only engage in low-keyed advertising that did not glorify the playing of the lottery. As a result of this decision, the Pennsylvania lottery has experienced a pronounced decline in sales (McGowan 1994).

Minority Population

Minority population has not been found to have a significant effect on lottery revenues. A study by Heavy (1978) hypothesized factors affecting lottery participation. The finding discounted race as statistically insignificant (Heavey 1978).

In review of the history of lottery games, the daily numbers game was developed intentionally as a substitute for the "illegal" game. This game has had a history of success in the urban areas where the highest concentration of minorities live.

Studies by Clotfelter and Cook (1987), Mikesell (1989) and Stanahan and Borg (1998) show evidence of a heavier burden on minority populations. A 1986 state lottery study in Maryland found that 43 percent of whites had played the lottery in the previous month, compared to 68 percent of blacks. A New Jersey study shows similar results, blacks and hispanics played the numbers game at twice the rate of the general population and lotto at a rate 30 percent higher than average (Clotfelter and Cook 1989).

Overview

As noted earlier, lotteries have developed and proliferated where existing revenues have fallen short of providing the needs and desires of government and its' citizens. As the modem day anti-tax sentiment has grown across the country, many states have instituted the "painless" lottery tax to supplement existing revenue.

As state lotteries mature, lottery operators quickly realize they must manage operations intensely to keep the interest of their players and maintain a steady stream of revenue. In order to accomplish these goals, operators must be sensitive to the wishes of the players in order to keep the level of play high. In some instances, government officials may become dependent upon lottery revenue and increasing this source may become the only priority for lottery operators.

Conceptual Framework

Throughout the literature researchers identify numerous influences on lottery revenues. Some of these influences are connected to the operation of lottery, such as payout rate and advertising expenditures, and subject to manipulation by lottery operators. Research has also indicated economic indicators such as unemployment level and personal income, influences not under the control of lottery operators. In developing the conceptual framework, the issue of whether or not the lottery operator can control a particular influence was key.

This research uses formal hypotheses as a conceptual framework. The purpose of this research is to identify and explain major influences on lottery revenues in Texas. The formal hypothesis is the preferred conceptual framework because the research purpose is explanatory in nature. Formal hypotheses allow researchers to examine the influence of certain factors on a

particular subject. In allowing lottery revenue to be a dependent variable and the particular factors that influence lottery revenue as independent variables, the conceptual framework becomes an organizing tool to guide the results of the research (Shields 1998). Table 2.3 links the formal hypotheses conceptual framework to lottery revenue related literature. The conceptual framework can also be stated as the following equation:

$$LOTREV = f(POR, ADVER, \#LJP, UER). \quad (+) \quad (+) \quad (+) \quad (+)$$

Where:

LOTREV = Lottery revenue,

POR = Payout rate,

ADVER = Advertising expenditures,

#UP = Number of large jackpots,

UER = Unemployment rate.

The first hypothesis proposes the relationship between increasing the lottery payout rate and lottery revenues. Clotfelter, Cook and DeBoer have demonstrated a positive relationship between these two factors (Clotfelter and Cook 1990, DeBoer 1986b).

A relationship between lottery revenues and advertising expenditures is the second hypothesis. Karcher, Clotfelter, Cook, and McGowan have found this relationship to be positive (Karcher 1989, Clotfelter and Cook 1989, McGowan 1994).

The third hypothesis proposes a positive relationship between the number of large lottery jackpots and lottery revenues. Similar findings were found in studies by DeBoer, Mikesell, Zorn, and Scoggins (DeBoer 1990, Mikesell and Zorn 1988, Scoggins 1994).

The fourth hypothesis suggests a relationship between the percentage of state

unemployment and lottery revenue. Studies by DeBoer, Vrooman, and Mikesell found the relationship to be positive (DeBoer 1990, Vrooman 1976, and Mikesell 1994).

Table 2.3 Formal Hypotheses Linked To Literature

Hypotheses	Source
H1: Lottery revenues increase as a result of increasing the lottery pay out rate.	Clotfelter and Cook (1990) DeBoer (1986b)
H2: Lottery revenues increase as a result of increasing lottery advertising expenditures.	Karcher (1989) Clotfelter and Cook (1989) McGowan (1994)
H3: Lottery revenues increase as lottery jackpots of $25 million or more increase.	DeBoer (1990) Mikesell and Zorn (1988) Scoggins (1994)
H4: Lottery revenues increase as the percentage of state unemployment increases.	DeBoer (1990) Vrooman (1976) Mikesell (1994)

Conclusion

This chapter provides an overview of the literature on lottery operations in the United States, presents the conceptual framework for this study, and states the hypotheses tested. Chapter Three presents the methodology employed to test the hypotheses.

CHAPTER THREE
METHODOLOGY

This chapter examines the methodology used to test the hypotheses stated in Chapter Two. First, the research technique used is explained and its' advantages and disadvantages are discussed. Second, the independent and dependent variables are defined, their operationalization discussed, and the corresponding data source is identified. Finally, the statistical method employed for this analysis is reviewed.

Research Technique

The research technique used to address the research question is aggregated data analysis and time series analysis. Aggregated data analysis is preferred because the variables in this particular research project are expressed and aggregated as numbers (Babbie 1995). There are two advantages to using this technique. First, the data is readily available from government sources and inexpensive. Second, the technique is unobtrusive and has no effect on the relationship being studied (Babbie 1995). The research technique includes time series analysis because the data used is aggregated semi-annually.

Data Source

Studying the influences on lottery revenues is well suited to the advantages of using aggregated data analysis. The variables in this study use data that is systematically collected by government agencies for other purposes. The Texas Lottery Commission provided the necessary data on age, revenues and expenditures. The Texas Workforce Commission provides

unemployment levels for the State of Texas as part of its' Texas Labor Market Information Report located on their website.[11] Table 3.1 lists the data used for the regression analyses in this study.

The disadvantages of using aggregated data analysis relate to questions of validity, reliability, and comparability. Validity questions can arise when the data does not exactly match up with the variables under study. Reliability and comparability can come under question when differing sets of data are used from different sources. The variables may be measured in ways that differ from one source to another (Babbie 1995).

Table 3.1 Data Matrix Table

	Lottery Sales (in $'s)	Payout Rate	Advertising Expenditures (in $'s)	No. of JP's $25 mil.+	Unemployment Rate
1992/2	576,326,778	0.47	8,640,662	0	7.3
1993/1	732,470,300	0.51	14,064,074	0	7.6
1993/2	1,095,137,595	0.55	14,436,563	5	6.9
1994/1	1,317,417,874	0.55	17,342,035	6	6.9
1994/2	1,431,748,897	0.56	13,869,000	12	6.1
1995/1	1,411,258,599	0.55	19,676,569	12	6.1
1995/2	1,607,237,637	0.57	13,927,377	13	6
1996/1	1,685,600,907	0.59	23,151,618	5	5.9
199612	1,789,677,434	0.54	19,072,765	5	5.4
199711	1,813,921,959	0.6	18,754,093	9	5.7
199712	1,929,534,243	0.55	20,733,612	7	5.1
1998/1	1,656,103,386	0.54	14,115,235	7	5.3
1998/2	1,432,058,645	0.52	21,112,341	6	4.8
Mean	1,421,422,635	0.55	16,838,150	7	6.1

Dependent Variable

The dependent variable in my research is lottery ticket sales revenue. This variable is measured by using semi-annual figures on the amount of lottery ticket sales in actual dollar

[11] The Texas Workfore Commission website is located at www.twc.state.tx.us.

amounts. The data source is provided by the Lottery Commission. This data includes sales amounts in weekly time periods and was re-aggregated for this study into semi-annual amounts. Table 3.1 lists the mean of the dependent variable, lottery revenues, for the time period of the study as $1,421,422,635.

Independent Variables

The first independent variable is the lottery pay out rate. This rate is expressed as the percentage value that is paid out in prizes from the purchases of lottery tickets. The data source is provided by the Lottery Commission. The time series aggregation for this variable is a semi-annual figure. Table 3.1 lists the mean of this variable for the time period of the study as 55 percent.

Lottery advertising expenditures are the second independent variable. Expenditures are expressed in semi-annual dollar amounts and are also provided by the Lottery Commission. Table 3.1 lists the mean of this variable for the time period of the study as $16,838,150.

The number of large jackpots of $25 million or more is the third independent variable and is measured by the actual number of times a large jackpot has accrued from lottery drawings during the year. The time series aggregation for this variable is a semi-annual figure. This data is available from the Lottery Commission. Table 3.1 lists the mean of this variable for the time period of the study as seven.

The state unemployment level is the last independent variable of the study. The data source for this variable is the Texas Workforce Commission and expressed as its' actual value. The unemployment level is expressed as a percentage of the population. The time series aggregation for this variable is a semi-annual figure. Table 3.1 lists the mean of this variable for the time period of the study as 6.1 percent.

Variable Construction Issues

At the begining of the data collection phase of this study, my intent was to show the variables' time series aggregation as a quarterly figure. By using this aggregation, a multiple regression analysis could be completed using 26 data points for each variable, producing reliable and valid results. After running the first regression, the relationships were not as strong as expected and caused further investigation regarding construction of the variables.

The Lottery Commission normally only tracks advertising expenditures annually. In gathering data for this study, advertising expenditures were requested to be aggregated on a quarterly basis as explained earlier. In reformatting these annual expenditures on a quarterly basis, data analysis issues arose. Lottery officials revealed advertising purchases may not correspond directly to when the advertising may be used in the market. Sometimes a significant amount of time may elapse before the advertising is displayed. The implication of using the quarterly time series aggregation resulted in a less relaible regression analysis. In order to have more reliable variable representing advertising expenditures, the study variables were re-aggregated in a semi-annual time series.

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Operationalization

The lottery ticket sales revenue, payout rate advertising expenditures, number of large jackpots, and state unemployment variables are ratio level variables and the actual figures are used in this analysis. Table 3.1 provides a description of each variable, hypothesized relationships, and how they are operationalized.

Table 3.2 Operationalization of the Conceptual Framework

Variable	Hypothesis	Data Source	Variable Definition	Aggregation Period
Dependent:		Lottery Commission Sales Data	Actual Value	Semi-annually
Lottery Ticket Sales Revenue				
Independent:		Lottery Commission Data	Actual Percentage Value of Pay Out	Semi-annually
Lottery Pay Out Rate	+			
Lottery Advertising Expenditures	+	Lottery Commission Data	Actual Dollar Amount	Semi-annually
Number of Large Jackpots ($25 million or more)	+	Lottery Commission Sales Data	Actual Value	Semi-annually
State Unemployment	+	Texas Workforce Commission	Actual Percentage Value	Semi-annually

Statistical Method

Multiple regression analysis is the inferential statistical technique employed to test the hypotheses in this study. Multiple regression analysis is used to analyze the effect of the independent variables on the dependent variables. Multiple regression analysis is the appropriate method because it provides a means of analyzing situations in which a dependent variable is simultaneously affected by independent variables (Babbie 1995). "The purpose of multiple regression analysis is to measure the relative importance od several predictor [independent] variables on one criterion [dependent] variable (DiLeonardi and Curtis 1988: 108). Multiple regression also allows researchers to measure the strength of each independent variable. In this study, the influence of lottery payout rate, advertising expenditures, the number of lottery

jackpots of $25 million or more, and state unemployment level on state lottery revenues are independent variables.

This statistical method has several strengths. Multiple regression analysis is a good explanatory technique (DiLeonardi and Curtis 1992). Multiple regression analysis allows researchers to measure the influence and strength of several independent variables. Also, this method allows for the evaluation of large amounts of data.

The outputs calculated for this study include the Pearson r, the R^2, the beta coefficient, the F ratio, and the standard error. The Pearson r measures the correlation between the independent and dependent variables. Basically, r reflects how closely you can predict the value of one variable by knowing value of another (Babbie 1995). The R^2 is a measurement of the extent of variance in a variable that can be attributed to another variable. Any R^2 greater than .25 is worth reporting (DiLeonardi and Curtis 1992). The beta coefficients measure the change in dependent variables for every unit of change in an independent variable (DiLeonardi and Curtis 1992). The F ratio indicates whether the R^2 was achieved by chance. The greater the F ratio, the greater the likelihood that the variation of the dependent variable was a result of the regression model and not achieved by chance (DiLeonardi and Curtis 1992). SPSS was the statistical application used to calculate these statistics.

Conclusion

This chapter presented the methodology used in this study. Multiple regression analysis is the statistical technique utilized to test the hypotheses presented in Chapter Two. The results of the two regression analyses are presented in Chapter Four.

CHAPTER FOUR
RESULTS

This chapter reviews the results of the correlation analysis and the two regression analyses performed for this study. Results are presented in tabular and narrative form. Table 4.1 displays the results of the correlation analysis. Table 4.2 reveals the results of the regression for each of the theoretical models.

Correlations

As Table 4.1 indicates, the independent variables in this study are significantly correlated to the dependent variable, lottery sales. Payout rate has the highest Pearson coefficient at over .73. The next highest coefficient is attributed to advertising expenditures at over .68. Both of these variables are significant at the less than .01 level. The next highest coefficient, unemployment, is over .62. The coefficient for unemployment is expressed as a negative, suggesting an inverse relationship with the dependent variable. The last variable, jackpots of $25 million or more, has a coefficient of over .61. The unemployment and jackpots of $25 million or more variables are significant at the less than .05 level.

Table 4.1 Correlation Table

	Lottery Sales	Payout Rate	Ad Expenditures	Jackpots $25 m. +	Unemployment
Lottery Sales	1.00	.731**	.681**	.613*	-.624*
Payout Rate		1.00	.523*	.132	-.159
Ad Expenditures			1.00	.226	-.515*
Jackpots $25 m. +				1.00	-.234
Unemployment					1.00

* Significant at $\alpha < .05$
** Significant at $\alpha < .01$

Model I

Table 4.2 contains the results of the regressions performed for the models associated with this study. The first model tested includes all independent variables hypothesized in the conceptual framework. Unemployment is found to have a statistically significant impact on lottery revenues. This is consistent with the predicted relationship although the inverse relationship was surprising. The beta coefficient is 41 percent and is statistically significant at the less than .05 level. The coefficient is expressed as a negative, suggesting the inverse relationship with lottery revenues, as the unemployment level in Texas decreases, lottery revenue will rise. The unstandardized beta coefficient indicates that for every one percent drop in the unemployment rate, lottery revenue rises by **$163,203,068.**

This inverse relationship is a significant finding regarding lottery revenues in Texas. As stated earlier in chapter two, some of the literature points to the fact that higher unemployment leads to higher lottery ticket sales. This theory does not hold true for the Texas Lottery. One

explanation for this phenomenon may be the period in which the Texas Lottery was instituted. The economic conditions of the 1990s have been profoundly better than those experienced in the late 1970s and early 1980s when the bulk of the research on lottery revenues was performed.

The R^2 for this model is .83, indicating 83 percent of the variation in the lottery revenue variable can be attributed to variations in the payout rate, advertising expenditures, jackpots of $25 million or more, and the unemployment variables. The F statistic is 11.82 and shown to be statistically significant at the less than .01 level. Standard error for this model is $189,401,004.

Unemployment Revisited

Model I found unemployment rates to be a significant determinate of lottery revenues. The suprising finding was the inverse relationship between unemployment rates and revenues. As unemployment rates dropped, lottery revenues increased. This finding led to an examination of the correlation between unemployment rate and lottery revenues. The first correlation analysis used semi-annual data, consisting of thirteen data points, giving a Pearson's r of over .62 significant at less than .05. Because of the higher level of significance, another correlation between these two variables was performed using more refined data. Lottery sales and unemployment rates were reaggregated on a monthly basis for the time period used and another correlation analysis was performed. This correlation analysis consisted of 72 data points, giving a greater sense of validity to the first correlation analysis. The second correlation analysis had a Pearson's r of over .45, significant at less than .01. The coefficient was also expressed as a negative, verifying the inverse relationship mentioned earlier.

Model II

The first model found the state's unemployment rate to have a significant impact on lottery revenues. Since the unemployment rate is factor that is outside the control of the State, it seemed the next logical step in this study would be to take out the unemployment rate as a variable and test another model that only includes factors under the control of the State.

The second model tests variables related to Lottery Commission statistics and deletes the economic indicator of unemployment. This model found advertising expenditures to have a statistically significant impact on lottery revenues. The beta coefficient for this variable is **46** percent and is statistically significant at the less than .05 level. The unstandardized beta coefficient indicates that for every additional dollar spent on advertising, lottery revenue rises by **$47.37.**

The R^2 for this model is .72, indicating 72 percent of the variation in the lottery revenue variable can be attributed to variations in the payout rate, advertising expenditures, and jackpots of $25 million or more. The F statistic is 9.30 and shown to be statistically significant at the less than .01 level. Standard error for this model is **$229,804,479.**

Table 4.2 Two Model Regression Analysis

Dependent Variable Lottery Sales	Model I		Model II	
	Unstandardized Beta	Standardized Beta	Unstandardized Beta	Standardized Beta
Payout Rate	5,204,533,007	.44	3,217,283,990	.27
Ad Expenditures	20.21	.20	47.37*	.46*
Jackpots $25 m. +	17,948,994	.18	32,190,563	.33
Unemployment	-163,203,068*	-.41*	--	--
Constant	-913,422,946		-1,344,255,262	
R^2	.83	.83	.72	.72
F	11.82**	11.82**	9.30**	9.30**
Standard Error	189,401,004	189,401,004	229,804,479	229,804,479
N = 13				

* Significant at $\alpha < .05$
** Significant at $\alpha < .01$

Conclusion

This chapter reviewed the results of the correlation analyses and two regression analyses performed for this study. The results of the regression models suggest significant influence between advertising expenditures and the unemployment level on lottery revenues. Conclusions drawn from this study are discussed in Chapter Five.

CHAPTER FIVE
THE FINAL CHAPTER

This chapter summarizes this study and presents conclusions drawn from the results of the analyses. Also, suggestions for further research on lottery revenues are discussed.

Research Summary

The purpose of this research was to determine the influence of lottery payout rate, advertising expenditures, number of lottery jackpots of $25 million or more, and state unemployment level on lottery revenue. Chapter Two presented a comprehensive review of the literature related to state lotteries. The history of lottery, the advantages and disadvantages, why people play, who plays, and the factors influencing lottery revenue was discussed. The conceptual framework and hypotheses were also presented in Chapter Two. Payout rate, advertising expenditures, number of lottery jackpots of $25 million or more, and state unemployment level were hypothesized to have a positive influence on lottery revenues.

Chapter Three reviewed the research methodology used to test the hypotheses. Multiple regression analysis was the statistical technique employed in this research. The dependent and independent variables, and how the variables were operationalized was discussed. The findings of this research were examined in Chapter Four.

Major Findings and Conclusions

This study measured the influence of lottery payout rate, advertising expenditures, number of lottery jackpots of $25 million or more, and unemployment level on lottery revenues.

Table 5.1 presents a summary of the hypothesized and observed outcomes for the multiple regressions for both of the models analyzed. The first model included all of the hypothesized relationships. This model showed the unemployment level as having a statistically significant impact on lottery revenues. Also, this model showed an inverse relationship between unemployment and lottery revenue, as unemployment in Texas falls, lottery revenues rise. The presence of a strong economy, as indicated by low enemployment, would prevail over the influences of lottery payout rate, advertising expenditures, and number of lottery jackpots of *$25* million or more.

The second model deleted the unemplyment variable, leaving the variables, of lottery payout rate, advertising expenditures, and number of lottery jackpots of $25 million or more. These variables represent factors the State has some control of or ablity to manipulate in an effort to maximize lottery revenues. This model found advertising expenditures to have a statistically significant impact on lottery revenues. A finding that suggests increasing advertising expenditures will result in increased revenues.

Table 5.1 Summary of Influences on Lottery Revenue

	Payout Rate	Observed	Advertising Expenditures	Observed	Jackpots of $25 m. +	Observed	Unemployment Rate	Observed
Model I	+	(+)	+	(+)	+	(+)	+	0
Model 2	+	(+)	+	+	+	(+)	--	--

+: positive significant impact
(+): positive insignificant impact

Recomendations for Further Research

As the State of Texas searches for additional revenue to meet the growing demand for services, lottery operators will be pressed to increase sales as a means of generating additional state dollars. The literature indicates that lottery revenue tends to peak ten years after the introduction of lottery activities. In the future, as the Texas Lottery reaches this age it may be helpful to analyze the effect age has on lottery revenues. Also, this study concentrated only on the economic indicator of unemployment levels, further research on other indicators such as personal income may be helpful to lottery operators. Since this research was conducted during a period of good economic times, in the future, should the economy begin to slow, a replication of this study may be helpful in determing the effect economic prosperity may have had on the results.

Conclusion

In conclusion, this study provides an analysis of the influence of lottery payout rate, advertising expenditures, number of lottery jackpots of $25 million or more, and state unemployment level on lottery revenue. The findings in this research confirmed the literature. Of the four variables, unemployment level was found to be the most significant influence on lottery revenues. Unfortunatly, the unemployment level is a factor that is outside the control of state lottery operators. Of factors within an operator's control in this study, advertising expenditures was found to be the most significant influence on lottery revenues. Future research should include additional study of other economic indicators and their influence on lottery revenue. Lottery revenues have been known to be influenced by the advancing age of a lottery, as the Texas Lottery matures, research in this area may be practical.

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