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The Tax Incidence of Three Texas Lottery Games: Regressivity, Race, and Education

Abstract *- Zip code aggregated data were used to measure the regressivity of three Texas lottery games using both Suits Indices of Progressivity and regression analysis. Per capita purchases of the individual games were regressed against variables measuring income, black and Hispanic populations, education levels, gender, age, and the purchases of other lottery products. The results reveal that each of the games is highly regressive and that one, the instant game, should be classified as an inferior good. Furthermore, differences among the games indicate the more regressive games are purchased more than proportionately by black and Hispanic minorities, by people with lower education levels, and by older people. Finally, the results reveal that the various lottery products are complementary goods.*

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INTRODUCTION

The government of the state of Texas, like the governments of many other states, has recently turned to lottery games as a means of supplementing existing revenue sources. Declines in traditionally important revenue sources such as oil and gas severance taxes combined with a political atmosphere where new taxes or tax increases face strong opposition have caused the state to seek other sources of revenue. One consequence of this is the state's interest in gaming products.

Texas, which has no state income tax, once relied heavily on severance tax payments from the oil and gas industries to finance state-supported services. During the nine-year period between 1986 and 1994, Oil Production and Regulation Tax collections fell six times. This tax, which as recently as 1986 accounted for 4.3 percent of the state's revenues, provided only 1.0 percent of the revenues in 1994. The Natural Gas Production Tax, over the same period, fell six times. The tax had accounted for 4.4 percent of state revenues but reached a low of 1.5 percent by 1994.[1]

The decline in traditional revenue sources and the strong antitax sympathies of many Texans made lottery games an attractive alternative revenue source. Lottery games were introduced to the state in 1992. As a source of state revenues they have grown rapidly and comprised 4.0 percent of gross

[1] Data were obtained from the *Texas Revenue History by Source* compiled by the Comptroller of Public Accounts, state of Texas.

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state revenue in 1994. Critics of lottery games, however, have argued that revenues are being raised primarily from those who can least afford to pay. Accordingly, lotteries are a regressive form of taxation. According to the Texas Lottery Commission, 50 percent of the proceeds from each Texas lottery game is returned to players in the form of winnings, 5 percent is paid to lottery ticket sellers, and 7 percent is used to cover administrative costs. The remaining 38 percent is retained by the state as an unrestricted source of general revenue. The portion retained by the state can be considered an excise tax on the purchase of state lottery products. Studies of lotteries in other states have concluded almost unanimously that lottery games impose regressive excise taxes on purchasers. Early studies by Spiro (1974), Brinner and Clotfelter (1975), and Suits (1977b) reveal the same finding of regressivity, which later studies by Clotfelter and Cook (1987), Borg, Mason, and Shapiro (1993), and Hansen (1995) also find. The one notable exception to these findings is Mikesell's (1989) study of Illinois' lottery products. His study found purchases of lottery products to be roughly proportional to income.

Lottery critics have consistently argued that lottery products are purchased in disproportionately large amounts by the poor, minority populations, and the poorly educated. A number of studies have examined purchasing habits of the Black community. Studies that find that blacks spend greater amounts on some lottery products include Clotfelter and Cook (1987), Mikesell (1989), Clotfelter and Cook (1990), Cook and Clotfelter (1993), Hansen (1995),and Stranahan and Borg (1998b). Less numerous are studies that examine the purchasing habits of the Hispanic community. Clotfelter and Cook (1990), Hansen (1995), and Stranahan and Borg (1998b) all report findings that show a tendency for Hispanics to spend more on some lottery products.

Previous findings regarding education levels have produced mixed results. Clotfelter and Cook (1987) found that purchases fall with the level of formal education. However, Heavy (1978) found that the education variable was not significant and Hansen (1995) actually found a positive association between education levels and the purchase of instant games. Both Scott and Garen (1994) and Stranahan and Borg (1998a, 1998b) found that education affects both the decision to participate in a lottery game and a participant's decision on how much to wager. Scott and Garen's examination of the instant game in Kentucky found that levels of education had a negative impact on participation but no impact on amounts spent. Stranahan and Borg (1998a), however, found that levels of education did not significantly affect lottery game participation but did affect the amount a participant chose to spend. Participants with less than a high school education were found to spend significantly greater amounts than more educated participants.

Many earlier studies have examined a single measure of lottery: either spending on one type of game or spending on all lottery products. Only a few studies have examined separate games for differences in regressivity. Suits (1977b) found that illegal numbers games were significantly more regressive than legal lottery games. Clotfelter (1979) found daily numbers games to be significantly more regressive than weekly numbers games. Clotfelter and Cook (1987) found both Maryland's three-digit and four-digit numbers games were more regressive than the state's lotto game. Mikesell (1989) found expenditures on instant, numbers, and lotto games to be roughly proportional to income. In addition, he found that Black population percentages were positively associated with purchases of the instant game. No such association was found with the other games. The most recent evidence in this area is Stranahan and Borg's (1998b) find-

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ing that the instant games in Florida, Virginia, and Colorado are more regressive than the lotto games in those states.

This study examines three separate Texas lottery games: lotto, Pick3, and instant. Lotto is commonly called a 6/50 game. To win the grand prize, a participant must correctly pick six numbers from among numbers 1 through 50. If no winning ticket is sold, the jackpot is increased for the next drawing. Pick3 is a three-digit numbers game where the player must correctly select a three-digit number to win a fixed prize. The instant game is a simple scratch-off game where the player scratches an opaque film from cells on a card to reveal if a fixed amount prize has been won.

The regressivity of each of the games is measured using both the Suits Index of Tax Progressivity (1977a) and regression analysis. The regression analysis also estimates the relationships among per capita expenditures on each lottery game and explanatory variables measuring Black population, Hispanic population, income, education levels, age, gender, and purchases of related lottery products.

The second section of the paper provides a Suits Index analysis of the regressivity of each of the games. The third section describes a regression model that relates purchases of each of the lottery products to variables measuring key characteristics of purchasers. The fourth section analyzes the regression results, and the fifth section is brief summary of the conclusions.

SUITS INDEX ANALYSIS

Data and Methodology

The Suits Index (Suits, 1977a) is a common measure of tax progressivity that shows the cumulative proportion of taxes paid as a function of the cumulative proportion of income. The index is similar to the Gini coefficient used to measure the relative concentration of income distribution for Lorenz Curves. Specifically, it measures the difference between the cumulative tax function and a proportional tax line. The index varies from +1 to –1, such that positive values represent progressive taxes, a zero value indicates a proportional tax, and negative values represent regressive taxes. The degree of progressivity or regressivity in a tax increases as the absolute value of the index approaches one.

Suits Indexes were calculated for each of the games using 1994 sales data from 1,351 Texas zip codes. In 1994, Texas had 1,505 zip codes that contained lottery sales outlets. A total of 154 zip codes were eliminated from the analysis because they were either commercial, nonresidential areas or shared a border with another state or Mexico. Commercial, nonresidential zip codes were eliminated because purchases in those areas were primarily from nonresidents and because income and demographic data were not available for the few residents of such areas. Border zip codes were eliminated because such areas are likely to experience a high incidence of out-of-area purchasers. The elimination of border zip codes was the method used to reduce the effects of cross-border purchases in the only other study that used aggregate purchases of lottery products at the zip code level (Clotfelter, 1979). Similarly, a study that used county level aggregates (Mikesell, 1989) chose to eliminate border counties. Zip codes without lottery sales outlets were eliminated for lack of sales data. In our analysis, we identified 161 residential zip codes without lottery sales outlets. Hansen's Colorado study (1995) used this criterion to eliminate one county.

The data used for the calculations were total disposable income of each zip code and total expenditures on each game in each zip code.[2] Three estimates of the Suits Indexes were made for each game. The

[2] Lottery sales data were obtained from the Texas Lottery Commission (1995). Data from all individual outlets in each zip code area were aggregated to obtain zip code sales figures.

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Suits Indexes were calculated using a bottom to top ordering based upon three separate measures: (1) per capita disposable income, (2) average family income, and (3) median household income. The estimates differ only in the order ranking of income. The same data were used for the calculations in every case.

Suits Index Results

Our Suits Index estimates are shown in Table 1. The results reveal a clear pattern of regressivity in all lottery games. Regardless of which income measure was used to order the zip codes, all of the statistics are negative. The lotto game is clearly the least regressive of the three games, and the instant game is consistently the most regressive of the three.

Table 2 shows the ranges of previous Suits Index estimates for other taxes and for the lottery games of other states along with the ranges of our estimates of the lottery games in Texas. Individual estimates, from which the ranges are derived, can be found in the Appendix. Our findings show each of the Texas lottery games to be more regressive than any of the taxes shown in the table. It is noteworthy that the most often criticized regresssive tax, the sales tax, has been estimated to have a Suits Index value of –0.16. Each of the Texas lottery games is shown to be substantially more regressive than any previously published measure of sales tax regressivity.

TABLE 1
SUITS INDEX OF TAX PROGRESSIVITY FOR TEXAS LOTTERY GAMES

Measure of Taxpayer Income	Lottery Game		
	Lotto	Pick 3	Instant
Per capita income	–0.21	–0.34	–0.37
Median household income	–0.20	–0.32	–0.36
Average family disposable	–0.21	–0.33	–0.38

TABLE 2
SUITS INDEX OF TAX PROGRESSIVITY FOR VARIOUS TAXES

Type of Tax	Observed Suits Index Range
Individual income tax	0.06 to 0.28
Corporate income tax	0.32 to 0.36
General sales and excise	–0.07 to –0.16
Payroll taxes	–0.13 to –0.17
Personal property taxes	–0.09 to –0.12
Real property tax	–0.12 to 0.23
Lotto games	–0.18 to –0.36
Texas lotto games	–0.20 to –0.21
Daily lottery games	–0.42 to –0.48
Texas three-digit numbers game	–0.32 to –0.34
Instant lottery games	–0.32 to –0.42
Texas instant lottery games	–0.36 to –0.38

REGRESSION MODEL

For each of the lottery games, a regression model was estimated using per capita disposable income as the income measure.[3] In every case, per capita expenditures on individual lottery games were used as dependent variables. Explanatory variables included per capita disposable income; per capita expenditures on other lottery games; and demographic measures of education levels, minority populations, gender, and age. The equations are given below:

$$[1]\quad LOTPC = f(PCY, AGE, BLACK, HISP, MF, NOLOT, HS, BACH)$$

$$[2]\quad NUMBER = f(PCY, AGE, BLACK, HISP, MF, NOPICK, HS, BACH)$$

$$[3]\quad INSTPC = f(PCY, AGE, BLACK, HISP, MF, NOINST, HS, BACH)$$

where

LOTPC = per capita expenditure on lotto;

NUMBER = per capita expenditure on three-digit numbers game;

[3] Regression equations using average family disposable income and median household income as alternative income measures were also estimated. All equations produced similar results to those presented herein. The per capita disposable income measure was selected because it is the measure that is closest to the level of the individual purchaser.

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INSTPC = per capita expenditure on all instant games;

PCY = per capita disposable income;

AGE = the median age of the population;

BLACK = the percentage of the population that is Black;

HISP = the percentage of the population that is Hispanic;

MF = the ratio of males to females in the population;

HS = the percentage of the population, 25 years or older, that has completed high school;

BACH = the percentage of the population, 25 years or older, that has completed 4 years of college;

NOLOT = per capita expenditures on lottery games other than lotto;

NOPICK = per capita expenditures on lottery games other than the three-digit numbers game; and

NOINST = per capita expenditures on lottery games other than instant games.

All variables are expressed in logarithms.

Because the sales and income variables are measured in logarithms, the estimated regression coefficients are income elasticity coefficients or ratios of the percentage change in lottery expenditures to the percentage change in the income measure. Income elasticity coefficients can be used as a measure of tax regressivity because tax revenue from lottery sales is a constant proportion of the lottery ticket price. Therefore, state tax revenue will change by the same percentage as lottery expenditures.[4] A coefficient value greater than one identifies a progressive tax, and any value less than one, including negative values, identifies a regressive tax. Proportional taxes should have coefficients equal to one.

In an attempt to ascertain the influence of demographic characteristics on lottery product purchases, we obtained zip code aggregates of several key variables that had been identified in the literature.

Texas provides the opportunity to study the lottery purchase habits of two large and widespread minority populations: Blacks and Hispanics. Although Black purchasing habits have been widely studied, the study of Hispanics as a separate group is limited to only a few studies (Clotfelter and Cook, 1990; Hansen, 1995; Stranahan and Borg, 1998a, 1998b). The percentages of the total population represented by each of the minority groups were included to determine if their lottery purchase habits were substantially different from the white Anglo population.

The high school and college graduation percentages were used to measure education levels. The median age variable was included to measure any differences in purchasing habits by age group. The male-female ratio is used to measure differences in purchases by gender.[5] Variables describing per capita expenditures on other lottery games are used to represent alternative product purchases. Because the variable relates the amounts of each game sold, a significantly positive sign should indicate a complementary relationship and a significantly negative sign should indicate a substitute relationship.

Lottery sales data used in the regression analysis are from the same 1,351

[4] A discussion of this point can be found in Brinner and Clotfelter (1975). The pay-out rate for each of the Texas games is a constant 50 percent.

[5] The male-female ratio was used rather than the more common male proportion of the population because the data were available, by zip code, in that form from a published data source, *The Sourcebook of Zip Code Demographics*.

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residential Texas zip codes used to measure the Suits Index for each lottery game.[6]

REGRESSION RESULTS

The regression estimates of equations 1–3 appear in Table 3. A number of clear patterns are discernible from the results.

Regressivity

The regression results show the same pattern among the games that were found in the Suits Index analysis and generally confirm the findings of most other studies that show that lottery expenditures are regressive taxes. The coefficients associated with the income variables represent tax elasticities. Therefore, values less than one indicate that a tax is regressive. Table 4 provides supplementary *t*-test values, which test the coefficients for significant differences from the value, one. The tax elasticity coefficients are significantly less than one for all equations. The coefficient measuring tax elasticity is largest for the lotto game, smaller for the Pick3 game, and smaller still for the instant game. This is the same pattern found in the Suits Index analysis shown in Table 1 and indicates that the instant game is the most regressive of the three and that the lotto game is the least regressive. These results are consistent with a Maryland study (Clotfelter and Cook, 1987) that found the lotto game to be significantly less regressive than the numbers games. Our results are also consistent with a recent study of lottery games in Florida, Virginia, and Colorado (Stranahan and Borg, 1998b) that found the lotto game to be less regressive than the instant game. Although our finding of regressivity for all games is inconsistent with the Mikesell (1989) study of the Illinois lottery, that study did show the instant game products to have lower income elasticities than either lotto or numbers games.

TABLE 3
REGRESSION RESULTS FOR THREE TEXAS LOTTERY GAMES

Equation	Lotto	Pick 3	Instant
Per capita income	0.498 (0.067)**	0.028 (0.082)	–0.450 (0.065)**
Black	–0.031 (0.007)**	0.111 (0.009)**	0.024 (0.007)**
Hispanic	–0.011 (0.014)	0.028 (0.017)	0.046 (0.013)**
High school	0.287 (0.100)**	0.285 (0.122)*	–0.328 (0.096)**
Bachelors degree	0.092 (0.034)**	–0.062 (0.041)	–0.124 (0.032)**
Median age	–0.477 (0.113)**	–0.655 (0.137)**	0.957 (0.107)**
Male-Female ratio	0.209 (0.092)*	–0.489 (0.112)**	–0.016 (0.088)
Purchase of other lottery products	0.911 (0.015)**	1.032 (0.019)**	0.815 (0.014)**
Intercept	–2.314 (0.300)**	–0.168 (0.366)	1.503 (0.289)**
Adjusted R^2	0.751	0.726	0.782
F-statistic	463.246	408.078	552.625
Number of cases	1,351	1,351	1,351

Note: Figures in parentheses are standard errors.
*Indicates significance at the 0.05 level.
**Indicate significance at the 0.01 level.

TABLE 4
T-TESTS FOR REGRESSIVITY

Lottery Game	Income Coefficient
Lotto	0.498 (–7.492)**
Pick 3	0.028 (–11.854)**
Instant	–0.45 (–22.308)**

Note: The numbers in parentheses are *t*-values showing the number of standard errors by which each coefficient is less than the proportional tax value, one.
**Indicate significance at the 0.01 level.

[6] All data other than lottery sales data were obtained from *The Sourcebook of Zip Code Demographics, 9th edition*. Sales data were the same data used in the Suits Index calculations divided by the population of zip code.

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In our study, the regressivity of the instant games is so severe that the income elasticity coefficient is significantly negative. This indicates that increases in income lead to declines in the absolute amount purchased. The instant game, therefore, was shown to be an inferior good. This agrees with Hansen's (1995) study in Colorado where instant games were also shown to be inferior goods.

Minority Groups

The equations provide evidence that both Black and Hispanic populations spend greater amounts on the more regressive games than the nonminority population. The pattern is clearest among Blacks but can also be identified among Hispanics.

Positive coefficients relating the percentage of the population that is Black to the purchase of both instant and three-digit numbers games show that larger Black population percentages are associated with increased purchases of these games. The evidence presented in Tables 1 and 3 makes it clear that these games are much more regressive than the lotto game. Furthermore, the negative coefficients in the lotto equations show that lotto purchases increase when the percentage of the Black population declines.

A similar but less pronounced pattern is found in the Hispanic population. There is a positive relationship between the Hispanic portion of the population and the sale of the most regressive game, instant. However, no relationship was found between the size of the Hispanic population and either of the other two lottery products.

The patterns in our results are consistent with most previous findings regarding specific games. Mikesell (1989) found that the percentage of the Black population and purchases of Illinois instant tickets were positively related but found no relationship to purchases of lotto and numbers games. Cook and Clotfelter (1993) found that there was a significantly positive relationship between the size of the Black population and expenditures on numbers games but could identify no similar relationship to purchases of lotto tickets. Hansen's (1995) study of instant games in Colorado found some evidence of greater spending among the Black population and a direct relationship between the size of the Hispanic population and expenditures on the instant games. Scott and Garen (1994) found that nonwhite participants in Kentucky's instant game tend to spend larger amounts. Stranahan and Borg's (1998b) research shows that Hispanic participants tend to spend more on instant games and that Black participants tend to spend more on lotto. Our findings show both groups purchasing larger amounts of the most regressive game, instant. The clearest difference between our results and those of other studies is our findings regarding Black population expenditures on the lotto game. Where others found either a positive relationship or no relationship between race and expenditures on lotto games, we show a significantly negative one.

Education

An examination of the education variable coefficients shows that the relationship between educational attainment and lottery purchases is not the same in all equations. Both education variables are inversely related to expenditures on the most regressive product, instant. This result is what is normally anticipated for lottery expenditures, in general, and is consistent with the findings of Clotfelter and Cook (1987, 1990). Our results are also consistent with Stranahan and Borg's (1998a) finding that poorly educated individuals who participate in lottery games spend greater amounts than more educated lottery participants. It is, however,

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inconsistent with Hansen (1995), who found positive relationships between education levels and instant games in Colorado.

When the coefficients of high school and bachelors degree variables are examined in each equation, it appears that education levels affect the type of lottery product that people purchase. In the case of the lotto game, sales are positively associated with increases in both levels of education. In the case of instant lottery games, increases in both education levels have a negative impact on sales. Thus, more education reduces sales of the most regressive product, instant, while increasing sales of the least regressive product, lotto. With respect to both instant games and lotto, the proportion of high school graduates has a substantially greater effect on lottery play than does the proportion of bachelors degrees. In the case of the numbers game, the effect of education on lottery purchases is less conclusive. The proportion of bachelors degrees is negatively associated with purchases, but not at a reliable level of statistical significance, while the proportion of high school graduates is positively associated with purchases.

Alternative Products

Our results clearly indicate that the various lottery games are complementary products. Significant positive relationships between per capita purchases of each lottery game and per capita purchases of the other games appear in all equations. Although it may be considered surprising that various lottery products are not substitutes for one another, our results support the findings in one previous study. A complementary relationship was also found by Clotfelter and Cook (1990), who noted that sales of existing lottery products increased with the introduction of a new product in 9 of 13 states studied.

Male-Female Ratio

In a Maryland study (Clotfelter and Cook, 1987), which related gender to spending on all lottery products, males were shown to spend significantly more than females. Our results confirm this with respect to the lotto game but contradict it with respect to the three-digit numbers game and the instant game. We show numbers game expenditures decreasing with increases in the size of the male-female ratio and no relationship to gender for the instant game.

Age

Earlier studies have used age variables to ascertain the impact of age on spending for lottery products, in general, but have not examined an age-based preference for individual games. Borg, Mason, Shapiro (1993) found that the age of winners in the Illinois lottery was directly associated with expenditures. A recent study (Stranahan and Borg, 1998a) found that older lottery participants spend more than younger participants. Hansen's (1995) study of the Colorado instant games found a significantly positive relationship among those in the 45–64 age group but a negative relationship among those 65 and older. Our findings show significant relationships between the median age variable and purchases of each of the three games, but they indicate that the relationships are not in the same direction for all games. The median age variable was negatively related to purchases of both the lotto and numbers games but was positively related to purchases of the instant game.

SUMMARY AND CONCLUSIONS

The results of the study clearly show all three Texas lottery games to be highly regressive. Using Suits Indexes, the least regressive of the three games, lotto, is more

regressive than any previous estimate of sales tax regressivity. Furthermore, the results of both the Suits analysis and the regression equations show that the lotto is substantially less regressive than either the three-digit numbers or instant lottery games. The calculated Suits Indexes for the numbers game ranged from –0.32 to –0.34, roughly twice those for sales taxes, and the instant game was more regressive still with values ranging from –0.36 to –0.38. The regressive pattern is reinforced by the regression results. Each of the tax elasticities was found to be statistically smaller than one. The regressivity of the instant game was so severe that the results indicate that it is an inferior good.

The incidence of the implicit taxation in the Texas lottery was found to vary by lottery game, but several clear patterns can be identified in our results. The evidence indicates that the more regressive games are more likely to be played by Blacks and Hispanics. This pattern was more pronounced in the Black population but was clearly evident in both minority groups. An examination of the two educational variables shows that both high school and college graduates tend to avoid the most regressive game (instant) and play more of the least regressive game (lotto). It is also clear that the various games are complementary products, suggesting that people who play one game are more likely to play others. There do appear to be some gender differences among the games. Males are more likely to play lotto and less likely to play the numbers game (Pick3) than are females. Our results also provide evidence that older people are more likely to play the most regressive game, instant.

The results of our research seem to confirm the fears of lottery critics. All of the Texas lottery games are found to be regressive. Accordingly, lower income groups spend a larger portion of their income on lottery products than do higher income groups. When the games are examined individually, it becomes apparent that the more regressive the game, the more it is supported by the poor, Blacks, Hispanics, the poorly educated, and the elderly.

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Appendix

SUITS INDEX ESTIMATES FOR VARIOUS TAXES

Type of Tax	Suits Index	Citation
Individual income tax (1984)	0.11	Metcalf (1994)
Individual income tax (1989)	0.06	Metcalf (1994)
Individual income tax (1966)	0.17	Suits (1977a)
Individual income tax (1970)	0.19	Suits (1977a)
Individual income tax (1980)	0.22	Ricketts (1988)
Individual income tax (1984)	0.21	Ricketts (1988)
Individual income tax (1988)	0.28	Ricketts (1988)
Individual income tax (1989)	0.22	Hite and Roberts (1990)
Corporate income tax (1966)	0.36	Suits (1977a)
Corporate income tax (1970)	0.32	Suits (1977a)
Sales tax (1984)	–0.11	Metcalf (1994)
Sales tax (1989)	–0.07	Metcalf (1994)
General sales tax	–0.11	Phares (1980)
Sales and excise tax (1966)	–0.16	Suits (1977a)
Sales and excise tax (1970)	–0.15	Suits (1977a)
Minnesota sales tax	–0.16	Wong and Wilson (1990)
Payroll taxes (1966)	–0.17	Suits (1977a)
Payroll taxes (1970)	–0.13	Suits (1977a)
Personal property tax (1966)	–0.12	Suits (1977a)
Personal property tax (1970)	–0.09	Suits (1977a)
Real property tax (1984)	–0.09	Metcalf (1994)
Real property tax (1989)	–0.11	Metcalf (1994)
Real property tax	0.13	Phares (1980)
Real property tax (1966)	0.23	Suits (1977a)
Real property tax (1970)	0.18	Suits (1977a)
Maryland lotto game	–0.36	Clotfelter and Cook (1987)
Pennsylvania lotto game	–0.20	Suits (1977b)
Canadian lotto games	–0.18	Vailancourt and Grignon (1988)
Maryland four-digit numbers	–0.42	Clotfelter and Cook (1987)
Maryland three-digit numbers	–0.48	Clotfelter and Cook (1987)
Maryland instant game	–0.41	Clotfelter and Cook (1987)
Colorado instant game	–0.10	Hansen (1995)
Michigan instant game	–0.37	Koza (1982)
California instant game	–0.32	Clotfelter and Cook (1989)

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