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The State Lottery Tax: An Equity Analysis

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ABSTRACT: This paper finds the state lottery tax to be vertically inequitable. The tax is inherently regressive, meaning poorer income classes spend a larger share of their income on lottery products than higher income classes. The paper also finds the lottery tax to be horizontally inequitable. Older people, males, less educated individuals, and minorities (except Asians) all tend to spend more on lottery products than their respective counterparts. Policy makers should lower the implicit tax rate from its current level of 44% to 19%. A decrease in the tax rate will increase state revenue, increase consumer surplus, possibly stimulate the economy, and decrease the inequities outlined above.

I. Introduction

> Not only did I work two jobs, my wife wasn't well and she had to work. I'd stop at a gas station where they sold lottery tickets. The guy'd stay open for me until I got there. I'd buy $20 worth of lottery tickets and he'd put it on my credit card as a gas purchase or car repair. You couldn't put lottery ticket purchases on a credit card. I would get my bill each month and pay $200 or so, and the total bill would stay the same or rise some each month. [Clotfelter and Cook, 1989, 123].
>
> I have been married to "Jim" for 28 years. We have four grown kids and I have always worked to help out with the bills. I've earned a rest and I would love to stay home but I can't. Why? Because my husband spends half of his paycheck every week on lottery tickets…If it weren't for the lottery I would have decent furniture, carpets and draperies. He tells me I am lucky he doesn't drink or smoke or chase women. Maybe so, but I feel cheated. [Clotfelter and Cook, 1989, 123].

The lottery can be quite invasive in some people's lives. In an age of fancy automobiles, yachts, and 25,000 square foot mansions, people will do anything to strike it rich. "If you don't play, you can't win" is a common phrase heard from avid lottery players. Just who is the typical lottery player? Does lottery play vary across income and social classes? If so, does it adversely affect some of these classes more than others and

can anything be done about it?

As it turns out, it isn't possible to predict exactly who will play the lottery. What appears to be true, however, is that the poorest income classes spend the greatest proportion of their personal income on the lottery. This is an issue that demands attention since the state lottery is a form of taxation. A large portion of each dollar spent on the lottery accrues directly to the state as revenue. The fact that poorer citizens spend a higher share of their income on the lottery violates the traditional American pattern of personal taxation which holds that as income increases, the proportion of income paid in taxes should increase.

Older people, men, the undereducated, and minorities all spend more on lottery tickets than their respective counterparts. This also violates the traditional American taxation ideal which holds that people with equal income levels should pay equal amounts in taxes. Therefore, shouldn't we as a society ban the state lotteries for good since they are causing financial distress and affect some more than others? Not necessarily. State lotteries provide more to the consumer than just an avenue to overfill the state governments' pockets—they provide excitement and entertainment.

As will be shown, reducing the implicit lottery tax rate from its current level of 44% to an optimal level of 19% would accomplish four things: one, it would increase state revenue; two, it would increase consumer surplus; three, it might stimulate the private sector of the economy; and four, it would reduce the inequities of the lottery tax.

II. Lottery History and Terminology

State-run lotteries in the United States began in 1789, just after the Constitution was signed. Since no reliable forms of collecting local taxes existed, lotteries were used to fund expenditures including those for prisons, courthouses, and orphanages. Prior to the Civil War, three-hundred schools, two-hundred churches, and fifty colleges—including Yale, Princeton, and Harvard—were erected with lottery proceeds. By 1905, however, Congress banned the last of the state lotteries in Louisiana because privately-operated lotteries were corrupt due to lower than advertised payouts or no payout at all. [North American Association of State and Provincial Lotteries, 2001a] The corruption in the private sector had given a bad name to lotteries in general. Therefore, lotteries

had lost their effectiveness as revenue raising tools for both the private and public sectors.

As hikes in income or property taxes became increasingly unpopular in the eyes of citizens, some states were forced to find alternatives to traditional forms of taxation. In 1964, New Hampshire became the first to revive the lottery as a source of state revenue. In order to avoid the seventy-year-old federal anti-lottery statutes, New Hampshire tied the "Sweepstakes" to horse races. As one might have predicted, the unpopularity of these lotteries with state government officials across the country soon gave way to their powerful revenue raising ability. By 1973, total lottery sales for the United States surpassed five-hundred million dollars; only three years later total sales had more than doubled, surpassing one billion dollars. [North American Association of State and Provincial Lotteries, 2001a]

Today, thirty-seven states and the District of Columbia operate lotteries to generate revenue. Total revenue for the United States in fiscal year 2000 amounted to nearly $38 billion [North American Association of State and Provincial Lotteries, 2001b]. In 1999, lottery revenues in Iowa were $45.83 million and total tax revenue in Iowa was $11.63 billion [North American Association of State and Provincial Lotteries, 2001b; U.S. Census Bureau, 2001]. Therefore, lottery revenues accounted for .39% of the 1999 Iowa budget.

State lottery systems typically sell three games:

1. *Instant*. Tickets contain a section with an opaque coating that when scratched off by the player reveals what prize, if any, has been won.
2. *Numbers*. This game involves selection of a three or four-digit number in a frequent, usually daily, drawing. Prizes are usually fixed amounts.
3. *Lotto*. The player selects numbers from a defined range, say six from 1 to 44 (a 6/44 game). A drawing, usually weekly, awards a prize determined by the amount bet on that game that is divided among those picking the correct numbers. Monies not won roll into the next prize pool. Because there are many possible number combinations (7,059,052 in a 6/44 game, for instance), the prizes often roll over and the pool can become enormous. Source: [Mikesell, 1989, 514].

III. Equity Analysis

When examining the properties of taxation, two important principles surface: vertical and horizontal equity. Vertical equity is the notion that people with less ability to pay (i.e. lower income) should bear less of the tax burden, and people with higher ability to pay (i.e. higher income) should bear more of the tax burden [Bruce, 2001, 374]. Thus, if a tax is vertically equitable, it is ordinarily progressive. A tax is progressive if, as income increases, the proportion of one's income paid in taxes also increases. Alternatively, a tax is regressive if, as income decreases, the proportion of one's income paid in taxes *increases*. Property and income taxes, for example, adhere to the principle of vertical equity. Horizontal equity demands that if people have equal ability to pay, they should pay equal amounts in taxes [Bruce, 2001, 374]. So regardless of race, sex, age, or other factors, persons with equal levels of income should pay equal amounts in taxes. The question arises, then, if state-run lotteries sustain these equity principles. As it turns out, the vast majority of the evidence shows that the lottery tax fails to meet either equity principle.

A. VERTICAL EQUITY

As one's personal income increases, it is likely that one's discretionary income will increase as well. Discretionary income is the remainder of one's personal income after all taxes, mortgage payments, groceries, transportation expenses, and other mandatory payments have been made. Purchasing a lottery ticket is not mandatory, so it is a discretionary purchase. One might therefore deduce that as income decreases, the likelihood that an individual will purchase a lottery ticket will likewise decrease. Unfortunately, this does not appear to be the case at all.

A March 1986 Los Angeles Times survey on weekly expenditures on instant games tickets in California found that household lottery expenditures as a percentage of household income monotonically decreased as income increased: 2.1% of income was spent on lottery tickets by people with income below $10,000 and only .3% of income was spent on lottery tickets by consumers with income above $60,000 [Clotfelter and Cook, 1987, 537]. This clearly implies that the lottery tax is regressive and violates the principle of vertical equity. In the fall of

1991, survey results from all lottery games in the states of Florida, Virginia, and Colorado showed the same pattern of regressivity. For a household with an annual income of less than $20,000, the annual excise tax as a percentage of income was .4001%, while for incomes above $80,000 it was only .110% [Borg and Stranahan, 1998].

Using a measure called the Suits Index, which ranges from -1 (one person with zero income purchases all the tickets—complete regressivity) to 1 (one person with all income purchases all the tickets—complete progressivity), a study based on data from 195 Texas counties also found the implicit lottery tax to be regressive for all games. The Suits Index was -.058 for lotto, -.129 for instant, and -.099 for all lottery games [Novak and Price, 2000, 87]. The table below lists Suits Indices from various other studies conducted on lottery taxation. Notice that in all cases the lottery tax is regressive, while other forms of taxation (income, property) have a positive Suits coefficient indicating that the tax is progressive.

This is just a sample of many studies conducted—in general, the instant game has been found to be the most regressive, the numbers game is less regressive, and the lotto game is the least regressive. It has been argued that one of the main causes of poverty is the habit of seeking instant gratification. Thus, the finding that the instant games are more regressive than lotto tickets confirms the theory that poor people are more present value oriented.

The preponderance of evidence available suggests that the lottery tax is highly regressive, with one notable exception. In an analysis of Illinois county lottery sales from 1985-1987, Mikesell found "scant evidence of regressivity" [1989, 519]. Even though Mikesell found income elasticities to be less than one for instant games (an elasticity equal to one implies a proportional tax), they were not statistically significant [1989, 519]. Despite this one study, the evidence is nearly conclusive. I feel it is safe to conclude that the excise tax on all lottery products is extremely regressive. Therefore, the principle of vertical equity is grossly violated.

Suits Index Estimates for Various Taxes

Type of Tax	Suits Index
Individual Income Tax (1989)	0.06
Individual Income Tax (1988)	0.28

Real Property Tax (1970)	0.18
Maryland Lotto Game	-0.36
Pennsylvania Lotto Game	-0.2
Maryland four-digit numbers	-0.42
Maryland three-digit numbers	-0.48
Maryland Instant Game	-0.41
Colorado Instant Game	-0.1
Michigan Instant Game	-0.37
California Instant Game	-0.32

Source: [Novak and Price, 1999, 751]

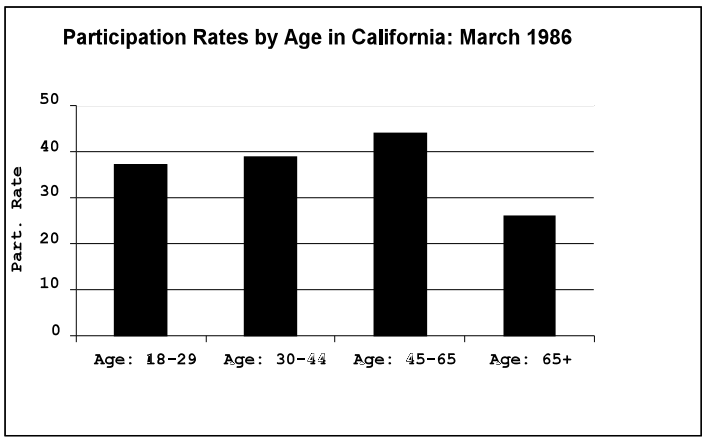
B. HORIZONTAL EQUITY

Horizontal equity can be violated on the basis of numerous sociodemographic characteristics: age, gender, education, race, and personal preferences. Theoretically, taxes should penalize all citizens equally regardless of any of these characteristics. Unfortunately, the state lotteries don't appear to follow this desirable pattern.

1. Generational Equity

Some studies indicate that the pattern of lottery play by age follows an inverted U pattern. For example, a Los Angeles Times poll conducted in 1986 found the highest participation rates were for the age group of 45-65, with lower participation rates in both older and younger age groups (see graph below). Likewise, Hansen found an inverted U pattern for age in the Colorado Instant Game from 1989-1990 [1995, 394].

Other studies have found different results. Borg and Stranahan found that age does not affect the decision to play and older players spend more on lottery tickets [1998b, 76]. Translated into layman's terms, age does not affect the decision to play, but if a person does play, older people will spend more. In fact, Borg and Mason reported a 65 year old citizen spends $4.40 more per week than a 25 year old citizen [1988, 77].



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e: derived from Clotfelter and Cook, 1989, 96

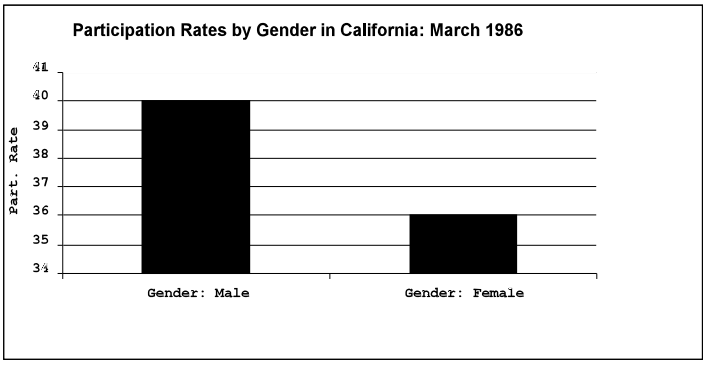
Additionally, a 1994 study found that in 1983, as the percentage of the population over age 65 increased, per capita lottery sales decreased; in 1990, the data showed that as the percentage of the population over 65 increased, so did per capita lottery sales [Jackson, 1994, 322]. These results indicate that older citizens are playing more as the lottery matures. Finally, a study of 1994 Texas lottery sales found a negative relationship between age and the Lotto game and age and the Pick 3 game; alternatively, it found a positive relationship between age and the Instant game [Novak and Price, 1999, 746]. The most apparent implication is that older players spend more on the more regressive games.

Although no definite pattern surfaces regarding age and lottery play, most of the results reveal that lottery play is not equal across all age groups. It appears, however, that the participation rate of older citizens is increasing as indicated in the more recent studies.

2. Gender Equity

The graph below shows that the participation rate in California is 40% for men and 36% for women. This shows that the participation rates for men and women are very similar, but the more noticeable difference in play is found in the amount wagered. Men tend to purchase more tickets than the women who participate [Clotfelter and

Cook, 1989, 97]. In fact, white males spend one dollar more per week than white females, and black males spend four dollars more per week than black females [Clotfelter and Cook, 1987, 541]. Price and Novak found that males are more likely to play the lotto and are less likely to play the numbers game than are females [Novak and Price, 1999, 749]. Contrary to most findings in the literature, however, Borg and Stranahan found no significant gender relationship for either the participation rate or the amount wagered [1998, 76].



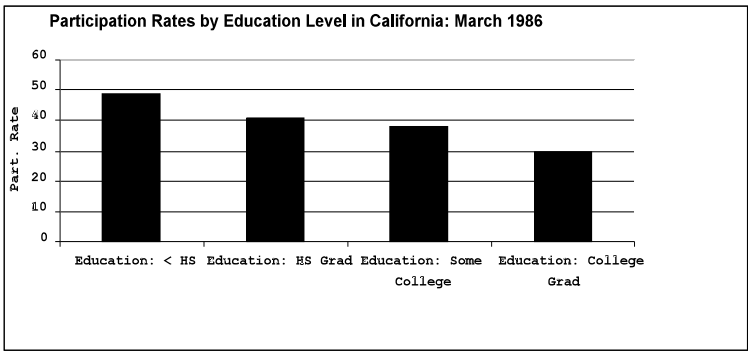
Source: derived from Clotfelter and Cook, 1989, 96

3. Educational Equity

While a little research has been done concerning the impact of age and gender on lottery play, a multitude of studies have investigated the effect of education and race. Not surprisingly, these variables seem to have an even more pronounced effect on lottery play.

As revealed in the graph below, there is a systematic decline in lottery participation rates as the level of education increases. For example, respondents who did not graduate high school had a participation rate of 49%, while only 30% of respondents with a college degree played. Mikesell confirmed this result when he documented that Illinois counties with more residents with greater than 16 years of education have lower per capita lottery sales [1989, 518]. While Borg and Stranahan did not find that educational attainment affected the participation rate, their findings clearly showed that those players with the least education spent the most on

tickets [1998a, 78]. More specifically, Borg and Stranahan found that households with heads who did not graduate from high school spend $6.87 more per month than identical households with heads who had gone to college [Borg and Stranahan, 1998b, 109]. This is disconcerting since in 1998 high school dropouts earned only $15,959, high school graduates earned an average of $24,110, bachelor's degree recipients earned $44,740, and advanced degree recipients earned $62,935 [American Council on Education, 2000, para. 3 and 5]. A parallel analysis of 1983 and 1990 data from Massachusetts found that as the level of education increases, per capita sales in a community declines [Jackson, 1994, 318].



Source: derived from Clotfelter and Cook, 1989, 96

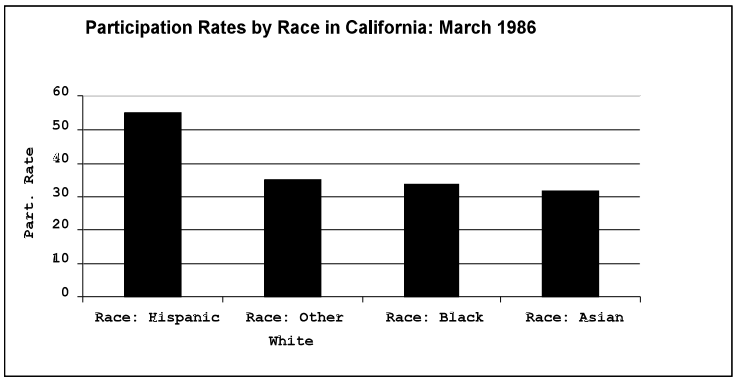
A more detailed study using 1994 data from Texas examined the relationship between education level and each of the three Texas State Lottery games: Lotto, Pick 3, and Instant games. Novak and Price found that education level and the purchase of instant games were negatively correlated, education and Pick 3 had no correlation, and education and the Lotto had a positive correlation. Novak and Price noted that the Instant games were the most regressive and the Lotto was the least regressive. They concluded that as education level increases, the likelihood of playing the most regressive games declines [Novak and Price, 2000, 90]. Novak and Price found similar results in their 1999 analysis of the Texas State Lottery [748]. Additionally, Borg and Stranahan pointed out that most of the $6.87 referred to in the preceding paragraph was spent on the most regressive game, the Instant game [1998b, 109]. Given that less

educated individuals are more likely to have lower income levels, this evidence confirms the regressivity of the lottery tax.

It is important to mention that the evidence on the relationship between educational attainment and lottery play is not conclusive. The 1989-1990 data from the Colorado lottery suggests that both the less than college and college completion variables had positive impacts on lottery sales. Thus, Hansen concluded that educational attainment had no discernable impact on lottery sales [1995, 395]. In spite of this piece of controversial evidence, Mikesell notes that the negative relationship between educational attainment and per capita lottery sales is "consistently the strongest found, possibly indicating an element of horizontal inequity in lottery finance," [1989, 518].

4. Racial Equity

The graph below illustrates the disparate participation rates among the races. On the upper end, Hispanics had a participation rate of 55%; on the lower end, Asians only had a 32% participation rate. The data also reveals a noteworthy comparison: whites had a one percentage point higher participation rate than blacks.



Source: derived from Clotfelter and Cook, 1989, 96

Novak and Price concluded that the minority population (Blacks and Hispanics) were more likely to purchase the most regressive products (instant game) and less likely to purchase the least regressive products (lotto) in their analysis of the 1994 Texas Lottery [2000, 90]. Mikesell uncovered similar evidence in that the percentage of the population that was Black and per-capita sales were positively

related for instant game sales in Illinois counties [1989, 519]. In addition to the apparent horizontal inequity, this implies that minorities are paying a vertically inequitable portion of the state lottery tax since Hispanics only earn 67.6% and Blacks only 79.6% of the weekly wages of Whites as of 2001 [*Bureau of Labor Statistics*, 2001]. In another analysis of the 1994 Texas State Lottery, Novak and Price found both Blacks and Hispanics spend greater amounts on the more regressive games than the non-minority population [1999, 747].

1991 data from Colorado, Florida, and Virginia showed that while race does not affect participation rates, minorities spend significantly more on lottery games than Caucasians [Borg and Stranahan, 1998b, 76]. Interestingly, Borg and Stranahan also found the average Caucasian pays $47.12 in lottery taxes per year, while the average Black pays $96.10 per year. Hispanics were also found to pay disproportionate amounts of lottery taxes, but the amounts were not significantly different from that of Whites [1998b, 79]. The two economists also concluded that lottery advertising more significantly affects the amount paid in tax per year for Blacks than for Whites. When advertising interactions were included in their model, Borg and Stranahan found the average Caucasian's annual tax was virtually unchanged at $46.41, while the average Black's increased to an astounding $124.40 [1998b, 81]. Thus, Borg and Stranahan concluded that lottery advertising exacerbates the horizontal inequity of the lottery tax for Blacks.

Analysis of a two-month period of the 1986 California state lottery found Blacks spent an average of $4.50 more than Whites [Clotfelter and Cook, 1987, 541]. Likewise, data analysis from 518 Illinois State Lottery winners from 1984-1986 revealed nonwhites spend over $6.00 more per week more than Whites [Borg and Mason, 1988, 77].

The literature concerning the horizontal equity of the lottery tax pertaining to race is not in universal agreement. None of the evidence, however, suggests that the lottery tax is in any way horizontally equitable. Even if the participation rates are roughly the same across the races, it is apparent that minorities tend to spend more on lotteries than do whites. According to Borg and Mason, "Given that minorities make up a disproportionately large percentage of the poor, this finding foreshadows the likely regressivity of the tax

contained in the lottery," [1988, 77].

5. Preferential Equity

Another violation of horizontal equity becomes apparent when examining data from the March 1986 California lottery. If the state lotteries were preferentially equitable, then all adults over the age of 21 with equal ability to pay would pay equal amounts in the lottery tax regardless of their preference to play the lottery. This would imply that all adults should play the lottery for it to be preferentially and in turn horizontally equitable. Clotfelter and Cook found that 52% of the adult population accounted for all lottery purchases [1989, 93]. Given that the unemployment rate in California in March of 1986 was 6.9%, the participation rate should have been closer to 93.1% to be horizontally equitable [*Bureau of Labor Statistics*, 2002]. More interestingly, roughly 20% of those who did play accounted for an astounding 65% of all purchases [Clotfelter and Cook, 1989, 93]. Although not of the same magnitude as the common "80/20" rule (which holds that 80% of purchases come from 20% of the customers), this result still violates horizontal equity. In May 1986, Clotfelter and Cook found similar results in California where only 23% of the players purchased nearly 69% of the tickets [1987, 540].

C. OBSERVATIONS

The empirical evidence supports the theory that state run lotteries as we know them today violate horizontal and vertical equity on many levels. Not only are lotteries inherently regressive, instant games are the most regressive. This inherent regressivity violates vertical equity. Unfortunately, citizens who are older, minorities (except Asians), and less educated tend to purchase the most regressive games. As noted earlier, income is negatively correlated with age, minorities make up a disproportionately large percentage of the poor, and less educated people make less income. So one can conclude with a high degree of confidence that the most regressive games are supported disproportionately by those in society who have the least ability to pay. In addition, not all citizens who have the ability to pay are paying their equitable portion of the lottery tax, and a small percentage of those that do pay account for a majority of purchases.

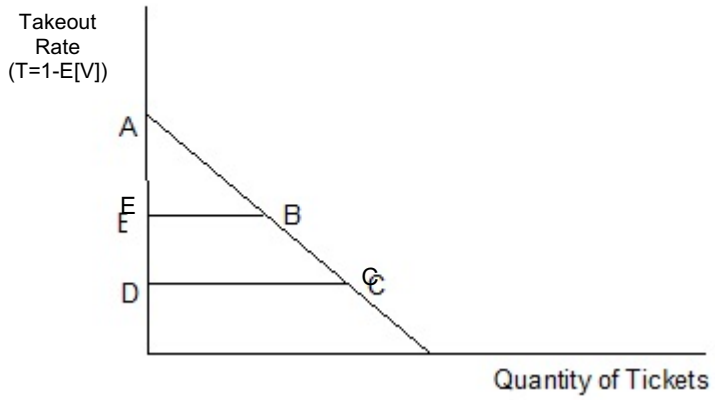
IV. Policy Implications

Now that it has been established that state lotteries are neither horizontally or vertically equitable, it is important to examine methods of reducing this inequity. Although the state lotteries are a form of taxation, the fact remains that they also have characteristics of consumption. If all humans are completely rational and all information is known, not a single ticket would ever be sold as an investment because people would want to avoid paying any more taxes than required. Yet sales have grown by over 16% (compounded annually) per year since 1976, so this is obviously not the case.[1] One might conclude that humans are not rational, especially since the less educated spend more on lotteries. However, the lottery offers more to citizens than just a way to pay more of their hard earned dollars to the government—it is a form of entertainment. The lottery offers the excitement of striking it rich like few other forms of gambling can. So even though the expected value of a lottery ticket is less than its price, net consumer utility is positive. Therefore, it is not in the best interests of consumers, as measured by utility, to recommend that the lottery should be removed from the growing list of ways to raise tax revenues; rather, policymakers should explore ways of increasing consumer utility. One such method would be to decrease the take-out rate.

According to 1987 data collected on all state lotteries in the United States, the average break-down of each dollar spent is as follows: $0.50 is paid out in the form of prizes, $0.12 is allocated to operating expenses, and the remaining $0.38 accrues to the state as profit [Clotfelter and Cook, 1989, 26-27]. Of the $.012 allocated to operating expenses, roughly $0.06 is paid to retailers in the form of commissions [DeBoer, 1985, 479]. Therefore, the average takeout rate is essentially 44% (1-.56). In comparison, the average takeout rate in 2000 on the "Las Vegas Strip" was 6.02% [Nevada Gaming Control Board, 4]. If casino gambling is well known as a "social evil" amongst many politicians, it seems odd that consumers get an even greater negative return on their investment playing the lottery than they would gambling in Las Vegas. And since advertising portrays the lottery as a way to get to the greener grass on the other side of the fence, policymakers should decrease the takeout to a level comparable to slot machines. The individual demand curve below illustrates how decreasing the takeout rate will increase consumer surplus.

If the takeout rate is set at level E, consumer surplus is area ABE. If the takeout is lowered to level D consumer surplus increases to area ACD for a net gain to consumers of area EBCD.

Individual Demand Curve for Lottery Tickets



Source: derived from Clotfelter and Cook, 1987, 535

The preceding argument sounds good, but state lotteries are in business to increase the revenue of the state—not consumer utility. However, a happy medium between a takeout rate of 44% and that of 6% might be the best solution for increasing both consumer utility and state revenue. In 1979, Suits found the price elasticity of demand for pari-mutuel betting to be in the range of -1.6 to -2.7 [DeBoer, 1985, 484]. DeBoer hypothesized that if the price elasticity of demand for lottery tickets was similar to that of pari-mutuel betting, the low marginal cost of lottery production implies a profit-maximizing takeout rate much lower than those currently in use [1985, 484-485]. One year later, DeBoer found the price elasticity of demand for the lottery to be -1.19 and the marginal cost of lottery operation to be less than 3 cents for each additional sales dollar [1986, 595]. DeBoer could now calculate the tax rate which would maximize net lottery revenue using the formula from the monopoly pricing model (e x MC)/(1 + e), where e is the elasticity and MC is the marginal cost of operation. Since e equals -1.19 and MC equals 3 cents, DeBoer found the optimal tax rate (takeout rate) to be 19%, which is much lower than those currently in use [1986, 595].

Assuming that DeBoer's calculation is correct, his finding that the

revenue maximizing takeout rate is 19% is very significant. It has already been illustrated how lowering the takeout rate will increase consumer utility. DeBoer's finding shows that not only consumer utility but also state lottery revenue will *increase* if the takeout rate is lowered. And even if DeBoer's findings aren't completely accurate, a takeout rate of 19% is substantially lower than the current rate of 44%. Thus, there is plenty of room for error.

Gulley and Scott also calculated the revenue maximizing price elasticity of demand to be -1.19; in comparison, the estimated elasticity for the Massachusetts Mass Millions game was -1.92 [1993, 20]. With this information, the economists concluded that the Mass Millions revenue was not maximized and the takeout rate should be lowered. Interestingly, Gulley and Scott also found that the Megabucks lotto revenue was not maximized, but that the Kentucky and Ohio lotteries' revenues were maximized [1993, 21].

Even more evidence in the literature suggests that decreasing the takeout rate might increase state revenue. Efficiency can be defined as achieving the highest level of utility from the available resources. Rodgers and Stuart determined that since lottery taxes are less efficient than labor income taxes for raising marginal public revenue, the takeout rate on lotteries should be reduced and labor income taxes should be increased to raise efficiency levels [1995, 243]. In a multi-state analysis of lotteries in 1987, Borg, Mason, and Shapiro found that for every dollar in revenue accumulated through the lottery, as much as 23 cents in revenue from other state sources is forfeited in states without income taxes but high sales and excise taxes [1993, 139]. One can infer that ceteris paribus, government officials can expect that future lottery growth will lead to a decline in other revenue sources.

Although the evidence does not suggest that all state lotteries would increase tax revenue by decreasing the takeout rate, it is clear that policymakers should consider it as a way to increase revenue and benefit the consumer. It has been shown that individual lottery winners from Massachusetts in the 1980's saved an average of 16% of winnings and that the savings rate increased as the proportion of the prize increased [Imbens and Rubin and Sacerdote, 2001, 793]. Therefore, by decreasing the takeout rate, the number of winners and/or the magnitude of the jackpots would increase, thereby stimulating the economy through an increase in savings. In turn, the economic growth would lead to an increase in tax revenues from other sources.

Some evidence exists to suggest that reducing the takeout rate might help correct the horizontal and/or vertical equity issues with the state lottery. In 1945 and 1975 national surveys on gambling participation was shown to *increase* with formal education [Clotfelter and Cook, 1989, 97]. Consider that the takeout rates in Nevada were 5.23% for slot machines and 14.41% for table games in 2000 [Nevada Gaming Control Board, 4]. Additionally consider that the average takeout rate in state lottery games is 44%. If the takeout rate for state lotteries decreased to levels much closer to those of other forms of gambling, then participation among more educated individuals would likely increase. Because income increases with formal education, the regressivity of the lottery tax might very well decrease and ease the inherent vertical inequity. Additionally, horizontal inequity would decrease, at least on the educational level, since more educated persons would be drawn to participate and/or bet more.

In recent years, however, casinos, dog tracks, and horseracing have become more prevalent in states other than Nevada. The repercussion of this is that the poorer, uneducated people have gained access to gambling that they otherwise couldn't have because the transportation costs to Las Vegas were too high. In a 1995 study of Mississippi gambling, Rivenbark found the casino tax to be regressive for both casino-counties and non-casino counties, with casino-counties displaying the highest regressivity [1998, 586]. Rivenbark also found that as education levels increased, the amount spent on casino gambling decreased, ceteris paribus [1998, 586].

Even though this evidence contradicts the previous analysis, assume that more educated consumers are more informed and more rational. Also assume that the consumer has a choice of playing the lottery *or* a slot machine as a form of weekend entertainment. The consumer will choose to play the game that has the highest expected value. Given that the expected value of a lottery ticket or a slot machine pull is equal to (1-takeout rate), the consumer will choose to play the slot machine. Theoretically, then, reducing the takeout rate will lead to an increase in the participation of more educated consumers, thereby decreasing the educational inequity of the lottery. Additionally, since it has been established that more educated individuals earn a higher average income, the regressivity of the lottery tax might also decrease.

Additional evidence exists that the lottery tax is too high. Consider the excise tax rates in 1985 on the consumer products listed below. It has been established that the poor spend a disproportionately large amount of

their personal income on lottery tickets. Therefore, a lottery ticket can be considered an inferior good (an increase in income will cause a leftward shift in demand). In contrast, consumer expenditure surveys reveal that liquor is normal throughout the income distribution and that the other commodities are normal overall [Clotfelter and Cook, 1987, 543]. Unless lotteries exhibit more substantial negative externalities than the other products, the lottery excise tax is too high relative to other excise taxes. Clotfelter and Cook point out that given the regressivity of the implicit lottery tax, any reduction in lottery tax rates would have distributional effects favoring those groups that play the most [1987, 544]. Therefore, decreasing the lottery tax would ease the vertical inequity of state lotteries. In addition, because a consumer's preference to play the lottery is taxed at a drastically higher rate than another consumer's preference to consume alcohol and tobacco products, the preferential inequity of the state lottery tax would decrease to a level more in line with other products which exhibit negative externalities.

Product	Tax Rate
Lotteries	46%
Liquor	30%
Wine	13%
Beer	12%
Tobacco	33%

Source: derived from Clotfelter and Cook, 1987, 544

V. Conclusion

To the untrained eye or the untuned ear, state lotteries as we know them today may appear to be a vehicle by which a tax-paying citizen can beat the odds and strike it rich. However, it has been shown that state lotteries possess other undesirable characteristics as well. The state lotteries violate vertical equity through their inherent regressivity. The poorest income classes pay a disproportionately large amount of their personal income as a lottery tax compared to higher income classes.

The state lottery tax violates horizontal equity on the basis of age, sex, education, race, and personal preferences. No conclusive evidence exists on the participation rates across the age groups, but it appears older players spend more on the lottery and play the most regressive games.

This is doubly unfortunate because of the negative correlation between age and income. Again, no obvious pattern emerges concerning the participation rates by gender, but it is clear that men tend to purchase more tickets than women. A lottery consumer's educational attainment most likely affects the decision to play, the amount to purchase, and which games to purchase. A more educated person is less likely to play, spends less on lottery tickets, and plays the least regressive games. Minorities most likely spend more on tickets than Whites and play the more regressive games. A consumer's personal preference on whether to play the lottery also creates a horizontal inequity inherent in the lottery tax because not all employed citizens are participating.

Due to these apparent inequities, policymakers should consider decreasing the takeout rate to increase consumer surplus. In addition, it is expected that decreasing the takeout rate will increase state revenue and possibly stimulate the economy. Given that the average takeout rate across the states is currently 44%, it should be lowered to 19% to maximize state revenue and substantially increase consumer surplus. It is also possible that decreasing the takeout rate will ease the vertical and horizontal inequities of the state lottery tax. Following these recommendations will put more money into the pockets of both states and lottery ticket consumers.

Endnotes

1. Calculated using the end-point method: **(37.8/1.0)^(1/24)-1=16.33%** where 37.8 =$37.8B in sales in 2000, 1.0=$1.0B in sales in 1976, and 24=24 years. Source: [National Association for State and Provisional Lotteries, 2001a].

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